INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

(Approved by AICTE | NAAC Accreditation with 'A' Grade | Accredited by NBA | Affiliated to JNTUH)

Dundigal, Hyderabad - 500 043, Telangana

OUTCOME BASED EDUCATION
WITH
CHOICE BASED CREDIT SYSTEM

BACHELOR OF TECHNOLOGY
COMPUTER SCIENCE AND ENGINEERING

ACADEMIC REGULATIONS, COURSE STRUCTURE AND SYLLABI UNDER AUTONOMOUS STATUS

B.Tech Regular Four Year Degree Programme

(for the batches admitted from the academic year 2016- 2017)

&

B.Tech (Lateral Entry Scheme)

(for the batches admitted from the academic year 2017 - 2018)

FAILURE TO READ AND UNDERSTAND THE REGULATIONS IS NOT AN EXCUSE

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"Take up one idea.
Make that one idea your life-think of it, dream of it, live on that idea. Let the brain muscles, nerves, every part of your body be full of that idea and just leave every other idea alone.
This is the way to success"

Swami Vivekananda

PRELIMINARY DEFINITIONS AND NOMENCLATURES

Academic Council: The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Autonomy: Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.

Academic Year: It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., (one odd + one even) and one supplementary semester.

AICTE: Means All India Council for Technical Education, New Delhi.

Autonomous Institute: Means an institute designated as autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (Jawaharlal Nehru Technological University, Hyderabad) and State Government.

Backlog Course: A course is considered to be a backlog course if the student has obtained a failure grade (F) in that course.

Basic Sciences: The courses offered in the areas of Mathematics, Physics, Chemistry, Biology etc., are considered to be foundational in nature.

Betterment: Betterment is a way that contributes towards improvement of the students' grade in any course(s). It can be done by either (a) re-appearing or (b) re-registering for the course.

Board of Studies (BOS): BOS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.

Branch: Means specialization in a program like B.Tech degree program in Civil Engineering, B.Tech degree program in Computer Science and Engineering etc.

Certificate course: It is a course that makes a student gain hands-on expertise and skills required for holistic development in a specific area/field.

Choice Based Credit System: The credit based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

Compulsory course: Course required to be undertaken for the award of the degree as per the program.

Commission: Means University Grants Commission (UGC), New Delhi.

Continuous Internal Examination: It is an examination conducted towards sessional assessment.

Course: A course is a subject offered by a department for learning in a particular semester.

Course Outcomes: The essential skills that need to be acquired by every student through a course.

Credit: A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

Credit point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student over all the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff and other resources in the process of study for a degree.

Detention in a course: Student who does not obtain minimum prescribed attendance in a course shall be detained in that particular course.

Dropping from the Semester: A student who doesn't want to register for any semester can apply in writing in prescribed format before commencement of that semester.

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

Evaluation: Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal assessment and semester end examinations.

Grade: It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

Institute: Means Institute of Aeronautical Engineering, Hyderabad unless indicated otherwise by the context.

Massive Open Online Course (MOOC): MOOC courses inculcate the habit of self learning. MOOC courses would be additional choices in all the elective group courses.

Pre-requisite: A course, the knowledge of which is required for registration into higher level course.

Core: The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

Professional Elective: It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

Program: Means, Bachelor of Technology (B.Tech) degree program / PG degree program: M.Tech/ MBA.

Program Educational Objectives: The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

Project work: It is a design or research based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit based course and is to be planned carefully by the student.

Re-Appearing: A student can reappear only in the semester end examination for the theory component of a course, subject to the regulations contained herein.

Registration: Process of enrolling into a set of courses in a semester of a Program.

Regulations: The regulations, common to all B.Tech programs offered by Institute are designated as "IARE Regulations R-16" and are binding on all the stakeholders.

Semester: It is a period of study consisting of 15 to 18 weeks of academic work equivalent to normally 90 working days. The odd Semester starts usually in July and even semester in December.

Semester End Examinations: It is an examination conducted for all courses offered in a semester at the end of the semester.

S/he: Means "she" and "he" both.

Student Outcomes: The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioral.

University: Means the Jawaharlal Nehru Technological University Hyderabad, Hyderabad.

Withdraw from a Course: Withdrawing from a course means that a student can drop from a course within the first two weeks of the odd or even semester (deadlines are different for summer sessions). However s/he can choose a substitute course in place of it by exercising the option within 5 working days from the date of withdrawal.

FOREWORD

The autonomy is conferred to Institute of Aeronautical Engineering (IARE), Hyderabad by University Grants Commission (UGC), New Delhi based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like J N T University Hyderabad (JNTUH), Hyderabad and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own **curriculum, examination system** and **monitoring mechanism**, independent of the affiliating University but under its observance.

IARE is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the institute and recommendations of the JNTUH to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the institute to order to produce a quality engineering graduate to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The Cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

ACADEMIC REGULATIONS

B.Tech. Regular Four Year Degree Programme
(for the batches admitted from the academic year 2016 - 17)
&
B.Tech. (Lateral Entry Scheme)
(for the batches admitted from the academic year 2017 - 18)

For pursuing four year undergraduate Bachelor Degree programme of study in Engineering (B.Tech) offered by Institute of Aeronautical Engineering under Autonomous status and herein after referred to as IARE.

1.0. CHOICE BASED CREDIT SYSTEM

The Indian Higher Education Institutions (HEI's) are changing from the conventional course structure to Choice Based Credit System (CBCS) along with introduction to semester system at first year itself. The semester system helps in accelerating the teaching-learning process and enables vertical and horizontal mobility in learning.

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

Choice Based Credit System (CBCS) is a flexible system of learning and provides choice for students to select from the prescribed elective courses. A course defines learning objectives and learning outcomes and comprises of lectures / tutorials / laboratory work / field work / project work / comprehensive Examination / seminars / assignments / alternative assessment tools / presentations / self-study etc. or a combination of some of these.

Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students.

The CBCS permits students to:

1. Choose electives from a wide range of elective courses offered by the departments.
2. Undergo additional courses of interest.
3. Adopt an interdisciplinary approach in learning.
4. Make the best use of expertise of the available faculty.

2.0 MEDIUM OF INSTRUCTION

The medium of instruction shall be English for all courses, examinations, seminar presentations and project work. The curriculum will comprise courses of study as given in course structure, in accordance with the prescribed syllabi.

3.0 TYPES OF COURSES

Courses in a programme may be of three kinds: **Foundation / Skill, Core and Elective.**

3.1 Foundation / Skill Course:

Foundation courses are the courses based upon the content leads to enhancement of skill and knowledge as well as value based and are aimed at man making education. Skill subjects are those areas in which one needs to develop a set of skills to learn anything at all. They are fundamental to learning any subject.

3.2 Core Course:

There may be a core course in every semester. This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

3.3 Elective Course:

Electives provide breadth of experience in respective branch and applications areas. Elective course is a course which can be chosen from a pool of courses. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline/domain
- Nurturing student's proficiency/skill.

An elective may be discipline centric (Professional Elective) focusing on those courses which add generic proficiency to the students or may be chosen from an unrelated discipline called as "Open Elective".

There are six professional elective groups; students can choose not more than two courses from each group. Overall, students can opt for four professional elective courses which suit their project work in consultation with the faculty advisor/mentor. Nevertheless, one course from each of the two open electives has to be selected. A student may also opt for more elective courses in his area of interest.

4.0 SEMESTER STRUCTURE

Each academic year is divided into three semesters, TWO being MAIN SEMESTERS (one odd + one even) and ONE being a SUPPLEMENTARY SEMESTER. Main Semesters are for regular class work. Supplementary Semester is primarily for failed students i.e. registration for a course for the first time is generally not permitted in the supplementary semester. However, the following cases are exempted:

4.1 Students admitted under Lateral Entry Scheme in the subjects 'Audit Course', 'Advanced Programming Lab' and 'Value Added Course'.

4.2 Students admitted under Lateral Entry Scheme shall register 'Environmental Studies' course in supplementary semester and pass the subject by the end of VI semester for the award of the degree. This is a non-credit and mandatory course for students admitted under Lateral Entry Scheme.

4.3 Students admitted on transfer from JNTU affiliated institutes, Universities and other institutes in the subjects in which they are required to earn credits so as to be on par with regular students as prescribed by concerned 'Board of Studies'.

4.4 Each main semester shall be of 21 weeks (Table 1) duration and this period includes time for registration of courses, course work, examination preparation and conduct of examinations.

4.5 Each main semester shall have a minimum of 90 working days; out of which number of contact days for teaching / practical are 75 and 15 days for conduct of exams and preparation.

4.6 The supplementary semester shall be a fast track semester consisting of eight weeks and this period includes time for registration of courses, course work, examination preparation, conduct of examinations, assessment and declaration of final results.

4.7 All subjects may not be offered in the supplementary semester. The student has to pay a stipulated fee prescribed by the Institute to register for a course in the supplementary semester. The supplementary semester is provided to help the student in not losing an academic year. It is optional for a student to make use of supplementary semester. **Supplementary semester is a special semester and the student cannot demand it as a matter of right** and will be offered based on availability of faculty and other institute resources.

4.8 The institute may use **supplementary semester** to arrange add-on courses for regular students and / or for deputing them for practical training / FSI. A student can register for a maximum number of 15 credits during a supplementary semester.

4.0.1 The registration for the Summer Semester (May – July) provides an opportunity to students to clear their backlogs ('F' grade) or who are prevented from appearing for SEE examinations due to shortage of attendance less than 65% in each course ('SA' Grade) in the earlier semesters or the courses which he / she could not register (Drop/Withdraw) for some reason.

Students will not be permitted to register for more than 15 credits (both I and II Semester) in the Summer Semester. Students are required to register for Summer Semester courses are to pay a nominal fee in within the stipulated time.

It will be optional for a student to get registered in the course(s) of Summer Semester; otherwise, he / she can opt to appear directly in supplementary examination. However, if a student gets registered in a course of Summer Semester, then it will be compulsory for a student to fulfil attendance criteria (≥90%) of Summer Semester and he / she will lose option to appear in immediate supplementary examination.

The students who have earlier taken an SEE Examination and register afresh for the Summer Semester will revoke the CIA marks secured by them in their regular/earlier attempt in the same course. Once revoked, the students shall not seek restoration of the CIA marks.

Summer Semester will be at an accelerated pace and will be at double the rate of normal semester e.g. one credit of course shall require two hours/week so that the total contact hours are maintained same as in normal semester.

Instructions and guidelines for the summer semester course:

- A minimum of 36 to 40 hours will be taught by the faculty for every course.
- The students registered and having sufficient percentage of attendance for the course alone will be permitted to write the examination.
- The assessment procedure in a summer semester course will also be similar to the procedure for a regular semester course.
- Student shall register for the Summer Semester as per the schedule given in academic calendar.
- Once registered, students will not be allowed to withdraw from a summer semester.

4.0.2 The academic calendar shown in Table 1 is declared at the beginning of the academic year.

Table 1: Academic Calendar

FIRST SEMESTER (21 weeks)	I Spell Instruction Period	8 weeks	19 weeks
	I Mid Examinations	1 week	
	II Spell Instruction Period	8 weeks	
	II Mid Examinations	1 week	
	Preparation and Practical Examinations	1 week	
	Semester End Examinations		2 weeks
Semester Break and Supplementary Exams			2 weeks
SECOND SEMESTER (21 weeks)	I Spell Instruction Period	8 weeks	19 weeks
	I Mid Examinations	1 week	
	II Spell Instruction Period	8 weeks	
	II Mid Examinations	1 week	
	Preparation & Practical Examinations	1 week	
	Semester End Examinations		2 weeks
Summer Vacation, Supplementary Semester and Remedial Exams			8 weeks

5.0 REGISTRATION / DROPPING / WITHDRAWAL

5.1. Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar. It is absolutely compulsory for the student to register for courses in time. The registration will be organized departmentally under the supervision of the Head of the Department.

5.2. IN ABSENTIA registration will not be permitted under any circumstance.

5.3. At the time of registration, students should have cleared all the dues of Institute and Hostel in the previous semesters, paid the prescribed fees for the current semester and not been debarred from institute for a specified period on disciplinary or any other ground.

5.4. The student has to normally register for a minimum of 20 credits and may register up to a maximum of 30 credits, in consultation with HOD/faculty mentor. On an average, a student is expected to register for 25 credits.

5.5. **Dropping of Courses:** Within one week after the last date of first internal assessment test or by the date notified in the academic calendar, the student may in consultation with his / her faculty mentor/adviser, drop one or more courses without prejudice to the minimum number of credits as specified in clause 5.4. The dropped courses are not recorded in the Grade Card. Student must complete the dropped subject by registering in the supplementary semester / forthcoming semester in order to earn the required credits. Student must complete the dropped subject by registering in the supplementary semester / forthcoming semester in order to earn the required credits.

5.6. **Withdrawal from Courses:** A student is permitted to withdraw from a course by the date notified in the academic calendar. Such withdrawals will be permitted without prejudice to the minimum number of credits as specified in clause 5.4. A student cannot withdraw a course more than once and withdrawal of reregistered subjects is not permitted.

5.7. After **Dropping and / or Withdrawal** of courses, minimum credits registered shall be 20.

6.0 UNIQUE COURSE IDENTIFICATION CODE

Every course of the B.Tech program will be placed in one of the nine groups of courses as listed in the Table 2. The various courses and their two-letter codes are given below;

Table 2: Group of Courses

S. No	Branch	Code
1	Aeronautical Engineering	AE
2	Computer Science and Engineering	CS
3	Information Technology	IT
4	Electronics and Communication Engineering	EC
5	Electrical and Electronics Engineering	EE
6	Mechanical Engineering	ME
7	Civil Engineering	CE
8	Humanities and Basic Sciences	HS
9	Miscellaneous	MS

7.0 CURRICULUM AND COURSE STRUCTURE

The curriculum shall comprise Foundation / Skill Courses, Core Courses, Elective Courses, Laboratory Courses, Audit Courses, Mandatory Courses, Comprehensive Examination, Mini Project, Internship and Project work. The list of elective courses may include subjects from allied disciplines also.

Contact Periods: Depending on the complexity and volume of the course, the number of contact periods per week will be assigned. Each Theory and Laboratory course carries credits based on the number of hours/week as follows:

- **Contact classes (Theory):** 1 credit per lecture hour per week, 1 credit per tutorial hour per week.
- **Laboratory Hours (Practical):** 1 credit for 2 Practical hours, 2 credits for 3 or 4 practical hours per week.
- **Project Work:** 1 credit for 4 hours of project work per week.
- **Mini Project:** 1 credit for 2 hours per week

7.1 Credit distribution for courses offered is shown in Table 3.

Table 3: Credit distribution

S. No	Course	Hours	Credits
1	Theory Course (Core and Foundation)	3 / 4	3 / 4
2	Elective Courses	3	3
3	MOOC Courses	-	2
4	Laboratory Courses	2 / 3	1 / 2
5	Audit Course / Mandatory Course	-	0
6	Comprehensive Examination	-	1
7	Mini Project	-	1
8	Summer Internship	-	0
9	Full Semester Internship (FSI) Project Work	-	16
10	Project Work	-	10

7.2 Course Structure

Every program of study shall be designed to have 38 - 42 theory courses and 20 - 26 laboratory courses. Every course of the B.Tech program will be placed in one of the eight categories with minimum credits as listed in the Table 4. In addition, a student has to carry out a mini project, project work and comprehensive Examination.

Table 4: Category Wise Distribution of Credits

S. No	Category	Subject Area and % of Credits	Average No. of Credits
1	Humanities and Social Sciences (HS), including Management.	HS (05% to 10%)	10
2	Basic Sciences (BS) including Mathematics, Physics and Chemistry.	BS (15% to 20%)	28
3	Engineering Sciences (ES), including Workshop, Drawing, Basics of Electrical / Electronics / Mechanical / Computer Engineering.	ES (15% to 20%)	28
4	Professional Subjects - Core (PC), relevant to the chosen specialization/branch.	PC (30% to 40%)	96
5	Professional Subjects - Electives (PE), relevant to the chosen specialization/branch.	PE (10% to 15%)	12
6	Open Subjects - Electives (OE), from other technical and/or emerging subject areas.	OE (05% to 10%)	06
7	Project Work or Full Semester Internship, Mini Project, Comprehensive Examination.	10% to 15%	12 - 18
8	Mandatory Courses / Audit Courses.	MC / AC	Non-Credit
TOTAL			**192**

7.3 Semester wise course break-up

Following are the **TWO** models of course structure out of which any student shall choose or will be allotted with one model based on their academic performance.

i. Full Semester Internship (FSI) Model and

ii. Non Full Semester Internship (NFSI) Model.

7.4 For Four year regular program (FSI Model):

In the FSI Model, out of the selected students - half of students shall undergo Full Semester Internship in VII semester and the remaining students in VIII semester. In the Non FSI Model, all the selected students shall carry out the course work and Project work as specified in the course structure. A student who secures a minimum CGPA of 7.5 up to IV semester with no current arrears and maintains the CGPA of 7.5 till VI Semester shall be eligible to opt for FSI.

Semester	No. of Theory Courses	No. of Lab Courses	Total Credits
I Semester	5 Foundation	4	24
II Semester	5 Foundation	4	24
III Semester	5 + Mandatory Course (2 Core + 3 Foundation)	3	25
IV Semester	5 + Audit Course (3 Core + 2 Foundation)	3	25
V Semester	6 (5 Core + 1 Professional Elective)	3	29
VI Semester	6 (3 Core + 1 Professional Elective + 1 Open Elective + 1 Foundation)	3 + Mini Project	28
VII Semester	**Full Semester Internship (FSI)**		16
VIII Semester	4 (3 Core + 1 Professional Elective)	3 + Comprehensive Examination	21
Total	**36 (16 Foundation + 16 Core + 3 Professional Electives + 1 Open Electives) + Mandatory Course + Audit course**	**22 + Comprehensive Examination + Mini Project + FSI**	**192**

7.5 For Four year regular program (Non FSI Model):

Semester	No. of Theory Courses	No. of Lab Courses	Total Credits
I Semester	5 Foundation	4	24
II Semester	5 Foundation	4	24
III Semester	5 + Mandatory Course (2 Core + 3 Foundation)	3	25
IV Semester	5 + Audit Course (3 Core + 2 Foundation)	3	25
V Semester	6 (4 Core + 1 Skill 1 Professional Elective)	3	25
VI Semester	5 (3 Core + 1 Professional Elective + 1 Open Elective)	3 + Mini Project	25
VII Semester	5 (3 Core + 1 Professional Elective + 1 Open Elective)	3	24
VIII Semester	3 (2 Core + 1 Professional Elective)	Project Work + Comprehensive Examination	20
Total	**39 (15 Foundation + 01 Skill + 17 Core + 4 Professional Electives + 2 Open Electives) + Mandatory Course + Audit Course**	**23 + Mini Project + Comprehensive Examination + Project work**	**192**

7.6 For Three year lateral entry program (FSI Model):

Semester	No. of Theory Courses	No. of Lab Courses	Total Credits
III Semester	5 + Mandatory Course (2 Core + 3 Foundation)	3	25
IV Semester	5 + Audit course (3 Core + 2 Foundation)	3	25
V Semester	6 (5 Core + 1 Professional Elective)	3	29
VI Semester	6 (3 Core + 1 Professional Elective + 1 Open Elective + 1 Foundation)	3 + Mini Project	28
VII Semester	**Full Semester Internship (FSI)**		16
VIII Semester	4 (3 Core + 1 Professional Elective)	3 + Comprehensive Examination	21
Total	**26 (6 Foundation + 16 Core + 3 Professional Electives + 1 Open Electives) + Mandatory Course + Audit Course**	**14 + Comprehensive Examination + Mini Project + FSI**	**144**

7.7 For Three year lateral entry program (Non FSI Model):

Semester	No. of Theory Courses	No. of Lab Courses	Total Credits
III Semester	5 + Mandatory Course (2 Core + 3 Foundation)	3	25
IV Semester	5 + Audit Course (3 Core + 2 Foundation)	3	25
V Semester	6 (4 Core + 1 Skill + 1 Professional Elective)	3	25
VI Semester	5 (3 Core + 1 Professional Elective + 1 Open Elective)	3 + Mini Project	25
VII Semester	5 (3 Core + 1 Professional Elective + 1 Open Elective)	3	24
VIII Semester	3 (2 Core + 1 Professional Elective)	Project Work + Comprehensive Examination	20
Total	**29 (05 Foundation + 17 Core + 4 Professional Electives + 2 Open Electives + 1 Skill) + Mandatory Course + Audit Course**	**15 + Mini Project + Comprehensive Examination + Project work**	**144**

7.8 Course wise break-up for the total credits (FSI Model):

Total Theory Courses (36) Core Courses (16) + Foundation Courses (11+ 5) + Professional Electives (03) + Open Elective (01)	16 @ 4 credits + 11 @ 4 credits + 05 @ 3 credits + 03 @ 3 credits + 01 @ 3 credits	134
Total Laboratory Courses (16 + 08)	16 @ 2 credits + 08 @ 1 credit	40
Comprehensive Examination	1 @ 1 credit	01
Mini Project	1 @ 1 credit	01
Full Semester Internship (FSI)	1 @ 16 credits	16
TOTAL CREDITS		**192**

7.9 For Four year regular program (Non FSI Model):

Total Theory Courses (38) Core Courses (16) + Foundation Courses (11+ 5) + Professional Electives (04) + Open Electives (02) + Skill (01)	14 @ 4 credits + 02 @ 3 credits + 11 @ 4 credits + 05 @ 3 credits + 04 @ 3 credits + 02 @ 3 credits + 01 @ 3 credits	142
Total Laboratory Courses (15 + 08)	15 @ 2 credits + 08 @ 1 credit	38
Comprehensive Examination	1 @ 1 credit	01
Mini Project	1 @ 1 credit	01
Project work	1 @ 10 credits	10
TOTAL CREDITS		**192**

7.10 For three year lateral entry program (FSI Model):

Total Theory Courses (26) Core Courses (16) + Foundation Courses (5+2) + Professional Electives (03) + Open Electives (01)	14 @ 4 credits + 02 @ 3 credits + 05 @ 4 credits + 02 @ 3 credits + 03 @ 3 credits + 01 @ 3 credits	100
Total Laboratory Courses (11 + 04)	11 @ 2 credits + 04 @ 1 credit	26
Comprehensive Examination	1 @ 1 credit	01
Mini Project	1 @ 1 credit	01
Full Semester Internship	1 @ 16 credits	16
TOTAL CREDITS		**144**

7.11 For three year lateral entry program (Non FSI Model):

Total Theory Courses (28) Core Courses (16) + Foundation Courses (5+1) + Professional Electives (04) + Open Electives (02) + Skill (01)	14 @ 4 credits + 02 @ 3 credits + 05 @ 4 credits + 01 @ 3 credits + 04 @ 3 credits + 02 @ 3 credits + 01@ 3 credits	106
Total Laboratory Courses (11 + 04)	11 @ 2 credits + 04 @ 1 credit	26
Comprehensive Examination	1 @ 1 credit	01
Mini Project	1 @ 1 credit	01
Project work	1 @ 10 credits	10
TOTAL CREDITS		**144**

8.0 EVALUATION METHODOLOGY

8.1 Theory Course:

Each theory course will be evaluated for a total of 100 marks, with 30 marks for Continuous Internal Assessment (CIA) and 70 marks for Semester End Examination (SEE). Out of 30 marks allotted for CIA during the semester, marks are awarded by taking average of two sessional examinations or the marks scored in the make-up examination conducted.

8.1.1 Semester End Examination (SEE):

The SEE is conducted for 70 marks of 3 hours duration. The syllabus for the theory courses is divided into FIVE units and each unit carries equal weightage in terms of marks distribution. The question paper pattern is as follows.

Two full questions with 'either' 'or' choice will be drawn from each unit. Each question carries 14 marks. There could be a maximum of three sub divisions in a question.

The emphasis on the questions is broadly based on the following criteria:

50 %	To test the objectiveness of the concept
30 %	To test the analytical skill of the concept
20 %	To test the application skill of the concept

8.1.2 Continuous Internal Assessment (CIA):

For each theory course the CIA shall be conducted by the faculty/teacher handling the course as given in Table-5. CIA is conducted for a total of 30 marks, with 25 marks for Continuous Internal Examination (CIE) and 05 marks for Quiz / Alternative Assessment Tool (AAT).

Table-5: Assessment pattern for Theory Courses

COMPONENT	THEORY		TOTAL MARKS
Type of Assessment	CIE Exam (Sessional)	Quiz / AAT	
Max. CIA Marks	25	05	30

8.1.2.1 Continuous Internal Examination (CIE):

Two CIE exams shall be conducted at the end of the 8th and 17th week of the semester respectively. The CIE exam is conducted for 25 marks of 2 hours duration consisting of two parts. Part–A shall have five compulsory questions of one mark each. In part–B, four out of five questions have to be answered where, each question carries 5 marks. Marks are awarded by taking average of marks scored in two CIE exams. The valuation and verification of answer scripts of CIE exams shall be completed within a week after the conduct of the Internal Examination.

8.1.2.2 Quiz / Alternative Assessment Tool (AAT)

Two Quiz exams shall be online examination consisting of 20 multiple choice questions and are be answered by choosing the correct answer from a given set of choices (commonly four). Such a question paper shall be useful in the testing of knowledge, skills, application, analysis, evaluation and understanding of the students. Marks shall be awarded considering the average of two quizzes for every course.

In order to encourage innovative methods while delivering a course, the faculty members have been encouraged to use the Alternative Assessment Tool (AAT) in place of two quizzes. This AAT enables faculty to design own assessment patterns during the CIA. However, the usage of AAT is completely optional. The AAT enhances the autonomy (freedom and flexibility) of individual faculty and enables them to create innovative pedagogical practices. If properly applied, the AAT converts the classroom into an effective learning centre. The AAT may include seminars, assignments, term paper, open ended experiments, micro-projects, five minutes video, MOOCs etc.

However, it is mandatory for a faculty to obtain prior permission from the concerned HOD and spell out the teaching/assessment pattern of the AAT prior to commencement of the classes.

8.2 Laboratory Course:

8.2.1 Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment. The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

8.2.2 All the drawing related courses are evaluated in line with laboratory courses. The distribution shall be 30 marks for internal evaluation (20 marks for day–to–day work, and 10 marks for internal tests) and 70 marks for semester end lab examination. There shall be ONE internal test for 10 marks in each semester.

8.3 MOOC Courses:

Meeting with the global requirements, to inculcate the habit of self learning and in compliance with UGC guidelines, MOOC (Massive Open Online Course) courses have been introduced as electives.

8.3.1 The proposed MOOC courses would be additional choices in all the elective groups subject to the availability during the respective semesters and respective departments will declare the list of the courses at the beginning of the semester. Course content for the selected MOOC courses shall be drawn from respective MOOCs links or shall be supplied by the department. Course will be mentored by faculty members and Assessment & Evaluation of the courses shall be done by the department.

8.3.2 There shall be one Mid Continuous Internal Examination (Quiz exam for 30 marks) after 8 weeks of the commencement of the course and semester end examination (Descriptive exam for 70 marks) shall be done along with the other regular courses.

8.3.3 Two credits will be awarded upon successful completion of each MOOC courses. Students need to complete three such MOOC courses to compensate any two elective courses (one open and one professional) having three credits.

8.3.4 Students interested in doing MOOC courses shall register the course title at their department office at the start of the semester against the courses that are announced by the department.

8.4 Audit Courses (AC) / Mandatory Courses (MC):

These courses are among the compulsory courses and do not carry any credits.

a) Gender Sensitivity is a mandatory course in III semester for all the students.

b) The student has to choose one audit course at the beginning of IV semester under self study mode. By the end of VI semester, all the students (regular and lateral entry students) shall complete the audit course.

c) The students will have four chances in total to clear the audit / mandatory course. Further, the student has an option to change the audit course in case if s/he is unable to clear the audit course in the first two chances. However, the audit course should be completed by VI semester and its result will be given in the VI semester grade sheet.

d) Audit / Mandatory courses will not carry any credits; but, a pass in each such course after attaining required CIE and SEE requirements during the programme shall be necessary requirement for the student to qualify for the award of Degree. Its result shall be declared with "Satisfactory" or "Not Satisfactory" performance.

8.5 Value Added Courses:

The value added courses are audit courses in nature offered through joint ventures with various organizations provide ample scope for the students as well as faculty to keep pace with the latest technologies pertaining to their chosen field of studies. A plenty of value added programs will be proposed by the departments one week before the commencement of classwork. The students are given the option to choose the courses according to their desires and inclinations as they choose the desired items in a cafeteria. The expertise gained through the value added programs should enable them to face the formidable challenges of the future and also assist them in exploring new opportunities. Its result shall be declared with "Satisfactory" or "Not Satisfactory" performance.

8.6 Comprehensive Examination

The comprehensive Examination is aimed at assessing the students understanding of various Foundation, Skill and Core courses studied till the end of VII semester and is intended to test the students' grasp of the chosen field of study.

The Comprehensive Examination consists of two parts. Part A is a written examination and part B is the oral examination. The written examination shall be objective type of one hour duration and shall have 50 marks and is to be conducted by the concerned department under the supervision of Dean Academics. Oral examination shall be conducted by the department and carry 50 marks. The examination shall be conducted during the VIII semester.

8.7 Mini Project

The Mini Project shall be carried out either during VI semester along with other lab courses by having regular weekly slots. Students will take mini project batch wise and the batches will be divided as per the guidelines issued. The topic of mini project should be so selected that the students are enabled to complete the work in the stipulated time with the available resources in the respective laboratories. The scope of the mini project could be handling part of the consultancy work, maintenance of the existing equipment, development of new experiment setup or can be a prelude to the main project with a specific outcome. Mini project report will be evaluated for 100 marks in total. Assessment will be done by the supervisor/guide for 30 marks based on the work and presentation/execution of the mini project. Subdivision for the remaining 70 marks is based on report, presentation, execution and viva-voce. Evaluation shall be done by a committee comprising the mini project supervisor, Head of the department and an

examiner nominated by the Principal from the panel of experts recommended by Chairman, BOS in consultation with Head of the department.

8.8 Project work

In the non-FSI Model, the project work shall be evaluated for 100 marks out of which 30 marks for internal evaluation and 70 marks for semester end evaluation. The project work shall be spread over in VII semester and in VIII semester. The project work shall be somewhat innovative in nature, exploring the research bent of the mind of the student. A project batch shall comprise not more than three students.

At the end of VII semester, students should submit synopsis summarizing the work done in VII semester. The project is expected to be completed by the end of VIII semester. In VII semester, a first mid review is conducted by Project Review Committee (PRC) (on the progress) for 10 marks.

In VIII semester, a second mid review is conducted by PRC (on the progress) for 10 marks. On completion of the project, a third evaluation is conducted for award of internal marks of another 10 marks before the report is submitted, making the total internal marks 30.

The end semester examination shall be based on the report submitted and a viva-voce exam for 70 marks by a committee comprising the Head of the department, project supervisor and an external examiner nominated by the Principal. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

8.9 Full Semester Internship (FSI)

FSI is a full semester internship programme carries 16 credits. During the FSI, student has to spend one full semester in an identified industry / firm / organization and has to carry out the internship as per the stipulated guidelines of that industry / firm / organization and the institute.

Following are the evaluation guidelines:

- Quizzes: 2 times
- Quiz #1 - About the industry profile, weightage: 5%
- Quiz #2 - Technical-project related, weightage: 5%
- Seminars - 2 times (once in six weeks), weightage: 7.5% + 7.5%
- Viva-voce: 2 times (once in six weeks), weightage: 7.5% + 7.5%
- Project Report, weightage: 15%
- Internship Diary, weightage: 5 %
- Final Presentation, weightage: 40%

FSI shall be open to all the branches with a ceiling of maximum 10% distributed in both semesters. The selection procedure is:

- Choice of the students
- CGPA (> 7.5) up to IV semester
- Competency Mapping / Allotment

9.0 MAKE-UP EXAMINATION

The make-up examination facility shall be available to students who may have missed to attend CIE exams in one or more courses in a semester for valid genuine reasons. The make-up examination shall have comprehensive online objective type questions. The syllabus for the make-up examination shall be the whole syllabus covered till the end of the semester under consideration and will be conducted at the end of the semester.

10.0 ATTENDANCE REQUIREMENTS AND DETENTION POLICY

10.1 It is desirable for a candidate to put on 100% attendance in each course. In every course (theory/laboratory), student has to maintain a minimum of 75% attendance including the days of attendance in sports, games, NCC and NSS activities to be eligible for appearing in Semester End Examination of the course.

10.2 For cases of medical issues, deficiency of attendance in each course to the extent of 10% may be condoned by the College Academic Committee (CAC) on the recommendation of Head of the department if their attendance is between 75% to 65% in every course, subjected to submission of medical certificates, medical case file and other needful documents to the concerned departments.

10.3 The basis for the calculation of the attendance shall be the period prescribed by the institute by its calendar of events. For late admission, attendance is reckoned from the date of admission to the program. However, in case of a student having less than 65% attendance in any course, s/he shall be detained in the course and in no case such process will be relaxed.

10.4 A candidate shall put in a minimum required attendance at least three (3) theory courses for getting promoted to next higher class / semester. Otherwise, s/he shall be declared detained and has to repeat semester.

10.5 Students whose shortage of attendance is not condoned in any subject are not eligible to write their semester end examination of that courses and their registration shall stand cancelled.

10.6 A prescribed fee shall be payable towards condonation of shortage of attendance.

10.7 A student shall not be promoted to the next semester unless he satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

10.8 Any student against whom any disciplinary action by the institute is pending shall not be permitted to attend any SEE in that semester.

11.0 CONDUCT OF SEMESTER END EXAMINATIONS AND EVALUATION

11.1 Semester end examination shall be conducted by the Controller of Examinations (COE) by inviting Question Papers from the External Examiners.

11.2 Question papers may be moderated for the coverage of syllabus, pattern of questions by a Semester End Examination Committee chaired by Head of the Department one day before the commencement of semester end examinations. Internal Examiner shall prepare a detailed scheme of valuation.

11.3 The answer papers of semester end examination should be evaluated by the internal examiner immediately after the completion of exam and the award sheet should be submitted to COE in a sealed cover before the same papers are kept for second evaluation by external examiner.

11.4 In case of difference of more than 15% of marks, the answer paper shall be re-evaluated by a third examiner appointed by the Examination Committee and marks awarded by this examiner shall be taken as final.

11.5 COE shall invite 3 - 9 external examiners to evaluate all the end-semester answer scripts on a prescribed date(s). Practical laboratory exams are conducted involving external examiners.

11.6 Examinations Control Committee shall consolidate the marks awarded by internal and external examiners and award grades.

12.0 SCHEME FOR THE AWARD OF GRADE

12.1 A student shall be deemed to have satisfied the minimum academic requirements and earn the credits for each theory course, if s/he secures

i. Not less than 35% marks for each theory course in the semester end examination, and

ii. A minimum of 40% marks for each theory course considering both internal and semester end examination.

12.2 A student shall be deemed to have satisfied the minimum academic requirements and earn the credits for each Lab / Comprehensive Examination / Mini Project / Project, if s/he secures

i. Not less than 40% marks for each Lab / Comprehensive Examination / Mini Project / Project course in the semester end examination,

ii. A minimum of 40% marks for each Lab / Comprehensive Examination / Mini Project / Project course considering both internal and semester end examination.

12.3 If a candidate fails to secure a pass in a particular course, it is mandatory that s/he shall register and reappear for the examination in that course during the next semester when examination is conducted in that course. It is mandatory that s/he should continue to register and reappear for the examination till s/he secures a pass.

13.0 LETTER GRADES AND GRADE POINTS

13.1 Performances of students in each course are expressed in terms of marks as well as in Letter Grades based on absolute grading system. The UGC recommends a 10-point grading system with the following letter grades as given in the Table-6.

Table-6: Grade Points Scale (Absolute Grading)

Range of Marks	Grade Point	Letter Grade
100 – 90	10	S (Superior)
89 – 80	9	A+ (Excellent)
79 – 70	8	A (Very Good)
69 – 60	7	B+ (Good)
59 – 50	6	B (Average)
49 – 40	5	C (Pass)
Below 40	0	F (Fail)
Absent	0	AB (Absent)
Authorized Break of Study	0	ABS

13.2 A student is deemed to have passed and acquired to correspondent credits in particular course if s/he obtains any one of the following grades: "S", "A+", "A", "B+", "B", "C".

13.3 A student obtaining Grade F shall be considered Failed and will be required to reappear in the examination.

13.4 For non credit courses, 'Satisfactory' or "Not Satisfactory" is indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

13.5 "SA" denotes shortage of attendance (as per item 10) and hence prevention from writing Semester End Examination.

13.6 "W" denotes **withdrawl** from the exam for the particular course.

13.7 At the end of each semester, the institute issues grade sheet indicating the SGPA and CGPA of the student. However, grade sheet will not be issued to the student if s/he has any outstanding dues.

14.0 COMPUTATION OF SGPA AND CGPA

The UGC recommends to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA). The credit points earned by a student are used for calculating the Semester Grade Point Average (SGPA) and the Cumulative Grade Point Average (CGPA), both of which are important performance indices of the student. SGPA is equal to the sum of all the total points earned by the student in a given semester divided by the number of credits registered by the student in that semester. CGPA gives the sum of all the total points earned in all the previous semesters and the current semester divided by the number of credits registered in all these semesters. Thus,

$$SGPA = \sum_{i=1}^{n} (C_i G_i) / \sum_{i=1}^{n} C_i$$

Where, C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} course and n represent the number of courses in which a student is registered in the concerned semester.

$$CGPA = \sum_{j=1}^{m} (C_j S_j) / \sum_{j=1}^{m} C_j$$

Where, S_j is the SGPA of the j^{th} semester and C_j is the total number of credits upto the semester and m represent the number of semesters completed in which a student registered upto the semester.

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

15.0 ILLUSTRATION OF COMPUTATION OF SGPA AND CGPA

15.1 Illustration for SGPA

Course Name	Course Credits	Grade letter	Grade point	Credit Point (Credit x Grade)
Course 1	3	A	8	3 x 8 = 24
Course 2	4	B+	7	4 x 7 = 28
Course 3	3	B	6	3 x 6 = 18
Course 4	3	S	10	3 x 10 = 30
Course 5	3	C	5	3 x 5 = 15
Course 6	4	B	6	4 x 6 = 24
	20			**139**

Thus, $SGPA = 139 / 20 = 6.95$

15.2 Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4
Credit: 20 SGPA: 6.9	Credit: 22 SGPA: 7.8	Credit: 25 SGPA: 5.6	Credit: 26 SGPA: 6.0
Semester 5	**Semester 6**		
Credit: 26 SGPA: 6.3	Credit: 25 SGPA: 8.0		

$$Thus,\ CGPA = \frac{20x6.9 + 22x7.8 + 25x5.6 + 26x6.0 + 26x6.3 + 25x8.0}{144} = 6.73$$

16.0 PHOTOCOPY / REVALUATION

A student, who seeks the re-valuation of the answer script, is directed to apply for the photocopy of his/her semester examination answer paper(s) in the theory course(s), within 2 working days from the declaration of results in the prescribed format to the Controller of Examinations through the Head of the department. On receiving the photocopy, the student can consult with a competent member of faculty and seek the opinion for revaluation. Based on the recommendations, the student can register for the revaluation with prescribed fee. The Controller of Examinations shall arrange for the revaluation and declare the results. Revaluation is not permitted to the courses other than theory courses.

17.0 PROMOTION POLICIES

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 10.

17.1 For students admitted into B.Tech (Regular) program

17.1.1 A student will not be promoted from II semester to III semester unless s/he fulfills the academic requirement of securing 24 credits from I and II semesters examinations, whether or not the candidate takes the examinations.

17.1.2 A student will not be promoted from IV semester to V semester unless s/he fulfills the academic requirement of securing 37 credits upto III semester **or** 49 credits upto IV semester, from all the examinations, whether or not the candidate takes the examinations.

17.1.3 A student shall be promoted from VI semester to VII semester only if s/he fulfills the academic requirements of securing 62 credits upto V semester **or** 74 credits upto VI semester from all the examinations, whether or not the candidate takes the examinations.

17.1.4 A student shall register for all the 192 credits and earn all the 192 credits. Marks obtained in all the 192 credits shall be considered for the award of the Grade.

17.2 For students admitted into B.Tech (lateral entry students)

17.2.1 A student will not be promoted from IV semester to V semester unless s/he fulfills the academic requirement of securing 25 credits upto IV semester, from all the examinations, whether or not the candidate takes the examinations.

17.2.2 A student shall be promoted from VI semester to VII semester only if s/he fulfills the academic requirements of securing 38 credits upto V semester **or** 50 credits upto VI semester from all the examinations, whether or not the candidate takes the examinations.

17.2.3 A student shall register for all the 144 credits and earn all the 144 credits. Marks obtained in all the 144 credits shall be considered for the award of the Grade.

18.0 GRADUATION REQUIREMENTS

The following academic requirements shall be met for the award of the B.Tech degree.

18.1 Student shall register and acquire minimum attendance in all courses and secure 192 credits for regular program and 144 credits for lateral entry program.

18.2 A student of a regular program, who fails to earn 192 credits within eight consecutive academic years from the year of his/her admission with a minimum CGPA of 4.0, shall forfeit his/her degree and his/her admission stands cancelled.

18.3 A student of a lateral entry program who fails to earn 144 credits within six consecutive academic years from the year of his/her admission with a minimum CGPA of 4.0, shall forfeit his/her degree and his/her admission stands cancelled.

19.0 BETTERMENT OF MARKS IN THE COURSES ALREADY PASSED

Students who clear all the courses in their first attempt and wish to improve their CGPA shall register and appear for betterment of marks for one course of any theory courses within a period of subsequent two semesters. The improved marks shall be considered for classification / distinction but not for ranking. If there is no improvement, there shall not be any change in the original marks already awarded.

20.0 AWARD OF DEGREE

20.1 Classification of degree will be as follows:

CGPA ≥ 7.5	CGPA ≥ 6.5 and < 7.5	CGPA ≥ 5.0 and < 6.5	CGPA ≥ 4.0 and < 5.0	CGPA < 4.0
First Class with Distinction	**First Class**	**Second Class**	**Pass Class**	**Fail**

20.2. In order to extend the benefit to the students with one/two backlogs after either VI semester or VIII semester, GRAFTING option is provided to the students enabling their placements and fulfilling graduation requirements. Following are the guidelines for the Grafting:

a. Grafting will be done among the courses within the semester shall draw a maximum of 7 marks from the any one of the cleared courses in the semester and will be grafted to the failed course in the same semester.

b. Students shall be given a choice of grafting only once in the 4 years program, either after VI semester (Option #1) or after VIII semester (Option #2).

c. Option#1: Applicable to students who have maximum of TWO theory courses in V and / or VI semesters.

Option#2: Applicable to students who have maximum of TWO theory courses in VII and / or VIII semesters.

d. Eligibility for grafting:

i. Prior to the conduct of the supplementary examination after the declaration of VI or VIII semester results.

ii. S/he must appear in all regular or supplementary examinations as per the provisions laid down in regulations for the courses s/he appeals for grafting.

iii. The marks obtained by her/him in latest attempt shall be taken into account for grafting of marks in the failed course(s).

20.3 Student, who clears all the courses upto VII semester, shall have a chance to appear for Quick Supplementary Examination to clear the failed courses of VIII semester.

20.4 By the end of VI semester, all the students (regular and lateral entry students) shall complete one of the audit course and mandatory course with acceptable performance.

20.5 In case, a student takes more than one attempt in clearing a course, the final marks secured shall be indicated by * mark in the grade sheet.

All the candidates who register for the semester end examination will be issued grade sheet by the institute. Apart from the semester wise grade sheet, the institute will issue the provisional certificate and consolidated grade sheet subject to the fulfillment of all the academic requirements.

21.0 TEMPORARY BREAK OF STUDY FROM THE PROGRAMME

21.1 A candidate is normally not permitted to break the study. However, if a candidate intends to temporarily discontinue the program in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the program in a later respective semester, s/he shall apply to the Principal in advance. Such application shall be submitted before the last date for payment of examination fee of the semester in question and forwarded through the Head of the department stating the reasons for such withdrawal together with supporting documents and endorsement of his / her parent / guardian.

21.2 The institute shall examine such an application and if it finds the case to be genuine, it may permit the student to temporarily withdraw from the program. Such permission is accorded only to those who do not have any outstanding dues / demand at the College / University level including tuition fees, any other fees, library materials etc.

21.3 The candidate has to rejoin the program after the break from the commencement of the respective semester as and when it is offered.

21.4 The total period for completion of the program reckoned from the commencement of the semester to which the candidate was first admitted shall not exceed the maximum period specified in clause 18.0. The maximum period includes the break period.

21.5 If any candidate is detained for any reason, the period of detention shall not be considered as 'Break of Study'.

22.0 TERMINATION FROM THE PROGRAM

The admission of a student to the program may be terminated and the student is asked to leave the institute in the following circumstances:

a. The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

b. A student shall not be permitted to study any semester more than three times during the entire Program of study.

c. The student fails to satisfy the norms of discipline specified by the institute from time to time.

23.0 WITH-HOLDING OF RESULTS

If the candidate has not paid any dues to the institute / if any case of indiscipline / malpractice is pending against him, the results of the candidate will be withheld. The issue of the degree is liable to be withheld in such cases.

24.0 GRADUATION DAY

The institute shall have its own annual Graduation Day for the award of Degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute. The college shall institute prizes and medals to meritorious students and award them annually at the Graduation Day. This will greatly encourage the students to strive for excellence in their academic work.

25.0 DISCIPLINE

Every student is required to observe discipline and decorum both inside and outside the institute and not to indulge in any activity which will tend to bring down the honor of the institute. If a student indulges in malpractice in any of the theory / practical examination, continuous assessment examinations he/she shall be liable for punitive action as prescribed by the Institute from time to time.

26.0 GRIEVANCE REDRESSAL COMMITTEE

The institute shall form a Grievance Redressal Committee for each course in each department with the Course Teacher and the HOD as the members. This Committee shall solve all grievances related to the course under consideration.

27.0 TRANSITORY REGULATIONS

A candidate, who is detained or discontinued in a semester, on readmission shall be required to do all the courses in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such courses in the earlier semester(s) he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

a) Four Year B.Tech Regular course:

A student who is following Jawaharlal Nehru Technological University (JNTUH) curriculum and detained due to shortage of attendance at the end of the first semester shall join the autonomous batch of first semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUH curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUH for the award of degree. The total

number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUH regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

b) Three Year B.Tech program under Lateral Entry Scheme:

A student who is following JNTUH curriculum and detained due to shortage of attendance at the end of the first semester of second year shall join the autonomous batch of third semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with Lateral Entry regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUH curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of second year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUH for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUH regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

c) Transfer candidates (from non-autonomous college affiliated to JNTUH):

A student who is following JNTUH curriculum, transferred from other college to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in their place as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUH for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester under JNTUH regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

d) Transfer candidates (from an autonomous college affiliated to JNTUH):

A student who has secured the required credits upto previous semesters as per the regulations of other autonomous institutions shall also be permitted to be transferred to this institute. A student who is transferred from the other autonomous colleges to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the

courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester as per the regulations of the college from which he is transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

28.0 REVISION OF REGULATIONS AND CURRICULUM

The Institute from time to time may revise, amend or change the regulations, scheme of examinations and syllabi if found necessary and on approval by the Academic Council and the Governing Body shall come into force and shall be binding on the students, faculty, staff, all authorities of the Institute and others concerned.

FAILURE TO READ AND UNDERSTAND THE REGULATIONS IS NOT AN EXCUSE

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

COMPUTER SCIENCE AND ENGINEERING

COURSE STRUCTURE

I SEMESTER

Course Code	Course Name	Subject Area	Category	Periods per WEEK			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
THEORY										
AHS002	Linear Algebra and Ordinary Differential Equations	BS	Foundation	3	1	-	4	30	70	100
AHS003	Computational Mathematics and Integral Calculus	BS	Foundation	3	1	-	4	30	70	100
AHS006	Engineering Physics	BS	Foundation	3	1	-	4	30	70	100
AHS005	Engineering Chemistry	BS	Foundation	3	-	-	3	30	70	100
ACS001	Computer Programming	ES	Foundation	3	-	-	3	30	70	100
PRACTICAL										
AHS104	Engineering Physics and Chemistry Laboratory	BS	Foundation	-	-	3	2	30	70	100
ACS101	Computer Programming Laboratory	ES	Foundation	-	-	3	2	30	70	100
AME103	Computer Aided Engineering Drawing	ES	Foundation	-	-	2	1	30	70	100
AHS102	Computational Mathematics Laboratory	BS	Foundation	-	-	2	1	30	70	100
TOTAL				**15**	**03**	**10**	**24**	**270**	**630**	**900**

II SEMESTER

Course Code	Course Name	Subject Area	Category	Periods per WEEK			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
THEORY										
AHS001	English for Communication	HS	Foundation	3	-	-	3	30	70	100
AHS010	Probability and Statistics	BS	Foundation	3	1	-	4	30	70	100
AHS009	Environmental Studies	HS	Foundation	3	-	-	3	30	70	100
ACS002	Data Structures	PC	Foundation	3	1	-	4	30	70	100
AEE001	Fundamentals of Electrical and Electronics Engineering	ES	Foundation	3	1	-	4	30	70	100
PRACTICAL										
AHS101	Communication Skills Laboratory	HS	Foundation	-	-	2	1	30	70	100
ACS102	Data Structures Laboratory	PC	Foundation	-	-	3	2	30	70	100
AEE101	Electrical and Electronics Engineering Laboratory	ES	Foundation	-	-	3	2	30	70	100
ACS112	Engineering Practice Laboratory	ES	Foundation	-	-	2	1	30	70	100
TOTAL				**15**	**03**	**10**	**24**	**270**	**630**	**900**

III SEMESTER

Course Code	Course Name	Subject Area	Category	Periods per WEEK			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
THEORY										
AIT001	Design and Analysis of Algorithms	PC	Core	3	-	-	3	30	70	100
AEC020	Digital Logic Design	PC	Foundation	3	1	-	4	30	70	100
AHS013	Discrete Mathematical Structures	BS	Foundation	3	1	-	4	30	70	100
ACS003	Object Oriented Programming through JAVA	PC	Foundation	3	1	-	4	30	70	100
ACS004	Computer Organization and Architecture	PC	Core	3	1	-	4	30	70	100
AHS017	Gender Sensitivity	MC	Perspective	-	-	-	-	-	-	-
PRACTICAL										
AIT101	Design and Analysis of Algorithms Laboratory	PC	Core	-	-	3	2	30	70	100
ACS103	Object Oriented Programming through JAVA Laboratory	PC	Foundation	-	-	3	2	30	70	100
AEC116	Digital Logic Design Laboratory	PC	Foundation	-	-	3	2	30	70	100
TOTAL				**15**	**04**	**09**	**25**	**240**	**560**	**800**

IV SEMESTER

Course Code	Course Name	Subject Area	Category	Periods per WEEK			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
THEORY										
ACS005	Database Management Systems	PC	Core	3	1	-	4	30	70	100
ACS006	Web Technologies	PC	Core	3	1	-	4	30	70	100
AIT002	Theory of Computation	PC	Foundation	3	-	-	3	30	70	100
AIT003	Computer Networks	PC	Core	3	1	-	4	30	70	100
ACS007	Operating Systems	PC	Foundation	3	1	-	4	30	70	100
	Audit Course	AC	Perspective	-	-	-	-	-	-	-
PRACTICAL										
ACS104	Database Management Systems Laboratory	PC	Core	-	-	3	2	30	70	100
ACS105	Web Technologies Laboratory	PC	Core	-	-	3	2	30	70	100
ACS106	Operating Systems Laboratory	PC	Foundation	-	-	3	2	30	70	100
TOTAL				**15**	**04**	**09**	**25**	**240**	**560**	**800**

V SEMESTER

Course Code	Course Name	Subject Area	Category	Periods per WEEK			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
THEORY										
ACS008	Software Engineering	PC	Core	3	1	-	4	30	70	100
AEC021	Microprocessors and Interfacing	PC	Core	3	-	-	3	30	70	100
AIT004	Compiler Design	PC	Core	3	1	-	4	30	70	100
AHS012	Optimization Techniques	BS	Core	2	1	-	3	30	70	100
AHS015	Business Economics and Financial Analysis	HS	Skill	2	1	-	3	30	70	100
	Professional Elective-1	PE	Elective	3	-	-	3	30	70	100
	Available and Selected MOOC Courses									
PRACTICAL										
ACS107	Software Engineering Laboratory	PC	Core	-	-	3	2	30	70	100
AEC115	Microprocessors and Interfacing Laboratory	PC	Foundation	-	-	3	2	30	70	100
AHS106	Technical Writing and Content Development Laboratory	HS	Skill	-	-	2	1	30	70	100
TOTAL				**16**	**04**	**08**	**25**	**270**	**630**	**900**

VI SEMESTER

Course Code	Course Name	Subject Area	Category	Periods per WEEK			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
THEORY										
ACS009	Object Oriented Analysis and Design	PC	Core	3	1	-	4	30	70	100
ACS010	Linux Programming	PC	Core	3	1	-	4	30	70	100
AIT006	Data Warehousing and Data Mining	PC	Core	3	1	-	4	30	70	100
	Professional Elective – II	PE	Elective	3	-	-	3	30	70	100
	Available and Selected MOOC Courses									
	Open Elective – I	OE	Elective	3	-	-	3	30	70	100
	Available and Selected MOOC Courses									
	Value Added Course –I	AC	Skill	-	-	-	-	-	-	-
PRACTICAL										
ACS108	Object Oriented Analysis Design Laboratory	PC	Core	-	-	3	2	30	70	100
ACS109	Linux Programming Laboratory	PC	Core	-	-	3	2	30	70	100
AIT102	Data Warehousing and Data Mining Laboratory	PC	Core	-	-	3	2	30	70	100
ACS201	Mini Project	-	Skill	-	-	2	1	30	70	100
TOTAL				**15**	**03**	**11**	**25**	**270**	**630**	**900**

VII SEMESTER

Course Code	Course Name	Subject Area	Category	Periods per WEEK			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
THEORY										
ACS011	Cloud Application Development	PC	Core	3	1	-	4	30	70	100
AIT008	Software Testing Methodology	PC	Core	3	1	-	4	30	70	100
ACS012	Big Data and Business Analytics	PC	Core	3	1	-	4	30	70	100
	Professional Elective – III	PE	Elective	3	-	-	3	30	70	100
	Available and Selected MOOC Courses									
	Open Elective – II	OE	Elective	3	-	-	3	30	70	100
	Available and Selected MOOC Courses									
	Value Added Course –II	AC	Skill	-	-	-	-	-	-	-
PRACTICAL										
ACS110	Cloud Application Development Laboratory	PC	Core	-	-	3	2	30	70	100
AIT104	Software Testing Methodology Laboratory	PC	Core	-	-	3	2	30	70	100
ACS111	Big Data and Business Analytics Laboratory	PC	Core	-	-	3	2	30	70	100
ACS301	Project Work (Phase- I)	PC	Core	-	-	-	-	-	-	-
TOTAL				**15**	**03**	**09**	**24**	**240**	**560**	**800**

VIII SEMESTER

Course Code	Course Name	Subject Area	Category	Periods per WEEK			Credits	Scheme of Examination Max. Marks		
				L	T	P		CIA	SEE	Total
THEORY										
ACS013	Information Security	PC	Core	3	-	-	3	30	70	100
ACS014	Machine Learning	PC	Core	3	-	-	3	30	70	100
	Professional Elective-IV	PE	Elective	3	-	-	3	30	70	100
	Available and Selected MOOC Courses									
PRACTICAL										
ACS401	Comprehensive Examination	PC	Skill	-	-	-	1	-	100	100
ACS302	Project Work (Phase- II)	PC	Core	-	-	4	10	30	70	100
TOTAL				**09**	**00**	**04**	**20**	**120**	**380**	**500**

PROFESSIONAL ELECTIVES

GROUP – I: PROGRAMMING, ARCHITECTURE AND OPERATING SYSTEM DESIGN

Course Code	Course Title
ACS501	C# and .NET framework
ACS502	Advanced Java Programming
ACS503	Advanced Computer Architecture
AIT501	Advanced Operating System
AIT502	Parallel Programming Using CUDA
ACS504	Multi-core Architectures

GROUP – II: SECURITY AND NETWORK PROGRAMMING

Course Code	Course Title
ACS505	Database Security
ACS506	Cyber Security
ACS507	Network Programming and Management
ACS508	Software Defined Networks
ACS509	High Speed Networks
ACS510	Internet of Things (IoT)

GROUP – III: DATABASES AND MULTIMEDIA

Course Code	Course Title
ACS511	Image Processing
AIT503	Pattern Recognition
AIT504	User Interface Design
AIT505	Advanced Databases
AIT506	Parallel Computing
AIT507	Distributed Databases

GROUP – IV: SOFTWARE ENGINEERING

Course Code	Course Title
AIT508	Software Development Methodology
AIT509	Software Quality Management
AIT510	Software Architecture and Design Patterns
AIT511	Software Engineering and Estimation
AIT512	Software Process and Project Management
AIT513	Component Based Software Engineering

GROUP – V: ARTIFICIAL INTELLIGENCE AND COGNITIVE MODELING

Course Code	Course Title
ACS512	Artificial Intelligence
ACS513	Soft Computing
ACS514	Elements of Neural Computation
ACS515	Computational Intelligence
ACS516	Intelligent System Design
ACS517	Natural Language Processing

GROUP – VI: CLOUD AND ADVANCED COMPUTING

Course Code	Course Title
ACS518	Cloud Infrastructure and Services
ACS519	Wireless and Mobile Computing
ACS520	High Performance Computing
AIT514	E-commerce
AIT515	Web Services
AIT516	Green Computing

OPEN ELECTIVE-I

Course Code	Course Title
AME551	Elements of Mechanical Engineering
ACE551	Disaster Management
ACE552	Geospatial Techniques
ACS007	Operating Systems*
ACS003	Object Oriented Programming through JAVA*
AEC016	Embedded Systems
AEC551	Signal Analysis and Transform Techniques
AME552	Introduction to Automobile Engineering
AME553	Introduction to Robotics
AAE551	Aerospace Propulsion and Combustion
Note: * indicates that subject not offered to the students of Computer Science and Engineering department.	

OPEN ELECTIVES- II

Course Code	Course Title
AEC508	Digital Image Processing
AHS012	Optimization Techniques*
ACS005	Database Management Systems*
ACS013	Information Security*
AHS551	Modeling and Simulation
AEE551	Energy from Waste
AAE552	Finite Element Analysis
AHS552	Research Methodologies
AME554	Basic Refrigeration and Air - Conditioning
AAE553	Launch Vehicles and Controls
Note: * indicates that subject not offered to the students of Computer Science and Engineering department.	

AUDIT COURSES

Course Code	Course Title
AHS601	Intellectual Property Rights
AHS602	Total Quality Management
AHS603	Professional Ethics and Human Values
AHS604	Legal Sciences
AHS605	Clinical Psychology
AHS606	English for Special Purposes
AHS607	Entrepreneurship
AHS608	Any Foreign Language
AHS609	Design History
AHS017	Gender Sensitivity

SYLLABUS
(Semesters: I - VIII)

LINEAR ALGEBRA AND ORDINARY DIFFERENTIAL EQUATIONS

I Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS002	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Analyze and solve linear system of equations by using elementary transformations.
II. Apply differential equations on real time applications
III. Determine the maxima and minima of functions of several variables by using partial differential coefficients.

UNIT-I	THEORY OF MATRICES	Classes: 08

Real matrices: Symmetric, skew-symmetric and orthogonal matrices; Complex matrices: Hermitian, Skew-Hermitian and unitary matrices; Elementary row and column transformations, elementary matrix, finding rank of a matrix by reducing to Echelon form and normal form; Finding the inverse of a matrix using elementary row/column transformations: Gauss-Jordan method; Solving of linear system of equations by LU decomposition method.

UNIT-II	LINEAR TRANSFORMATIONS	Classes: 10

Cayley-Hamilton theorem: Statement, verification, finding inverse and powers of a matrix; Linear dependence and independence of vectors; Linear transformation; Eigen values and Eigen vectors of a matrix; Properties of Eigen values and Eigen vectors of real and complex matrices; Diagonalization of matrix.

UNIT-III	DIFFERENTIAL EQUATIONS OF FIRST ORDER AND THEIR APPLICATIONS	Classes: 08

Solution of first order linear differential equations by exact, non exact, linear equations; Bernoulli equation.

Applications of first order differential equations: Orthogonal trajectories; Newton's law of cooling; Law of natural growth and decay.

UNIT-IV	HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS	Classes: 10

Linear differential equations of second and higher order with constant coefficients, non-homogeneous term of the type $f(x)=e^{ax}, \sin ax, \cos ax$ and $f(x)=x^n, e^{ax}v(x), x^n v(x)$; Method of variation of parameters; Applications to electrical circuits and simple harmonic motion.

UNIT-V	FUNCTIONS OF SINGLE AND SEVERAL VARIABLES	Classes: 09

Mean value theorems: Rolle's theorem, Lagrange's theorem, Cauchy's theorem-without proof;
Functions of several variables: Partial differentiation, chain rule, total derivative, Euler's theorem, functional dependence, Jacobian, maxima and minima of functions of two variables without constraints and with constraints; Method of Lagrange multipliers.

Text Books:

1. E. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Publishers, 9th Edition, 2014.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, 2013.

Reference Books:

1. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", Narosa Publishers, 5th Edition, 2016.
2. Ravish R Singh, Mukul Bhatt, "Engineering Mathematics-1", Tata Mc Graw Hill Education, 1st Edition, 2009.
3. Srimanthapal, Suboth C. Bhunia, "Engineering Mathematics", Oxford Publishers, 3rd Edition, 2015.

Web References:

1. http://www.efunda.com/math/math_home/math.cfm
2. http://www.ocw.mit.edu/resources/#Mathematics
3. http://www.sosmath.com/
4. http://www.mathworld.wolfram.com/

E-Text Books:

1. http://www.e-booksdirectory.com/details.php?ebook=10166
2. http://www.e-booksdirectory.com/details.php?ebook=7400re

Course Home Page:

COMPUTATIONAL MATHEMATICS AND INTEGRAL CALCULUS

I Semester: CSE / ECE / EEE / IT | **II Semester:** AE / CE / ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS003	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes:15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Enrich the knowledge of solving algebraic, transcendental and differential equation by numerical methods.
II. Apply multiple integration to evaluate mass, area and volume of the plane.
III. Analyze gradient, divergence and curl to evaluate the integration over a vector field.
IV. Understand the Bessels equation to solve them under special conditions with the help of series solutions.

UNIT-I	ROOT FINDING TECHNIQUES AND INTERPOLATION	Classes: 09

Root finding techniques: Solving algebraic and transcendental equations by bisection method, method of false position, Newton-Raphson method; Interpolation: Finite differences, forward differences, backward differences and central differences; Symbolic relations; Newton's forward interpolation, Newton's backward interpolation; Gauss forward central difference formula, Gauss backward central difference formula; Interpolation of unequal intervals: Lagrange's interpolation.

UNIT-II	CURVE FITTING AND NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	Classes: 08

Fitting a straight line; Second degree curves; Exponential curve, power curve by method of least squares; Taylor's series method; Step by step methods: Euler's method, modified Euler's method and Runge-Kutta method for first order differential equations.

UNIT-III	MULTIPLE INTEGRALS	Classes: 10

Double and triple integrals; Change of order of integration.

Transformation of coordinate system; Finding the area of a region using double integration and volume of a region using triple integration.

UNIT-IV	VECTOR CALCULUS	Classes: 08

Scalar and vector point functions; Gradient, divergence, curl and their related properties; Solenoidal and irrotational vector point functions; Scalar potential function; Laplacian operator; Line integral, surface integral and volume integral; Vector integral theorems: Green's theorem in a plane, Stoke's theorem and Gauss divergence theorem without proofs.

UNIT-V	SPECIAL FUNCTIONS	Classes: 10

Gamma function, properties of gamma function; Ordinary point and regular singular point of differential equations; Series solutions to differential equations around zero, Frobenius method about zero; Bessel's differential equation: Bessel functions properties, recurrence relations, orthogonality, generating function, trigonometric expansions involving Bessel functions.

Text Books:

1. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Publishers, 9th Edition, 2014.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, 2012.

Reference Books:

1. R K Jain, S R K Iyengar, "Advanced Engineering Mathematics", Narosa Publishers, 5th Edition, 2016.
2. S. S. Sastry, "Introduction Methods of Numerical Analysis", Prentice-Hall of India Private Limited, 5th Edition, 2012.

Web References:

1. http://www.efunda.com/math/math_home/math.cfm
2. http://www.ocw.mit.edu/resources/#Mathematics
3. http://www.sosmath.com/
4. http://www.mathworld.wolfram.com

E-Text Books:

1. http://www.keralatechnologicaluniversity.blogspot.in/2015/06/erwin-kreyszig-advanced-engineering-mathematics-ktu-ebook-download.html
2. http://www.faadooengineers.com/threads/13449-Engineering-Maths-II-eBooks

Course Home Page:

ENGINEERING PHYSICS

I Semester: CSE / ECE / EEE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS006	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Develop strong fundamentals of nanomaterials.
II. Meliorate the knowledge of theoretical and technological aspects of lasers.
III. Correlate principles with applications of the quantum mechanics, dielectric and magnetic materials.
IV. Enrich knowledge in modern engineering materials like semiconductors.

UNIT-I	DIELECTRIC AND MAGNETIC PROPERTIES	Classes: 09

Dielectric properties: Basic definitions, electronic, ionic and orientation polarizations-qualitative; Internal field in solids; Magnetic properties: Basic definitions, origin of magnetic moment, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, domain theory of ferro magnetism on the basis of hysteresis curve.

UNIT-II	LASERS	Classes: 09

Lasers: Characteristics of lasers, spontaneous and stimulated emission of radiation, metastable state, population inversion, lasing action, Einstein's coefficients, ruby laser, He-Ne laser, semiconductor diode laser and applications of lasers.

UNIT-III	NANOMATERIAL	Classes: 09

Nanomaterial: Origin of nanomaterial, nano scale, surface to volume ratio, quantum confinement; Properties of nanomaterials: Physical, chemical, electrical, optical, magnetic and mechanical.

Bottom-up fabrication: Sol-gel; Top-down fabrication: Chemical vapour deposition; Applications of nanomaterials, characterization by XRD, TEM.

UNIT-IV	QUANTUM MECHANICS	Classes: 09

Quantum mechanics: Waves and particles, De Broglie hypothesis, matter waves, Heisenberg's uncertainty principle, Davisson and Germer experiment, Schrodinger's time independent wave equation, physical significance of the wave function, infinite potential well and its extension to three dimensions.

UNIT-V	SEMICONDUCTOR PHYSICS	Classes: 09

Semiconductor physics: Fermi level in intrinsic and extrinsic semiconductors, calculation of carrier concentration in intrinsic and extrinsic semiconductors, energy gap, direct and indirect band gap semiconductors, Hall effect.

Text Books:

1. Dr. K. Vijaya Kumar, Dr. S. Chandralingam, "Modern Engineering Physics", S. Chand & Co., New Delhi, 1st Edition, 2010.
2. P. K. Palanisamy, "Engineering Physics", Scitech Publishers, 4th Edition, 2014.

Reference Books:

1. Rajendran, "Engineering Physics", Tata Mc Graw Hill Book Publishers, 1st Edition, 2010.
2. R. K. Gaur, S. L. Gupta, "Engineering Physics", Dhanpat Rai Publications, 8th Edition, 2001.
3. A. J. Dekker, "Solid State Physics", Macmillan India ltd, 1st Edition, 2000.
4. Hitendra K. Malik, A. K. Singh, "Engineering Physics", Mc Graw Hill Education, 1st Edition, 2009.

Web References:

1. http://www.link.springer.com/book
2. http://www.thphys.physics.ox.ac.uk
3. http://www.sciencedirect.com/science
4. http://www.e-booksdirectory.com

E-Text Books:

1. http://www.peaceone.net/basic/Feynman
2. http://www.physicsdatabase.com/free-physics-books
3. http://www.damtp.cam.ac.uk/user/tong/statphys/sp.pdf
4. http://www.freebookcentre.net/Physics/Solid-State-Physics-Books.html

Course Home Page:

ENGINEERING CHEMISTRY

I Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS005	Foundation	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Apply the electrochemical principles in batteries.
II. Understand the fundamentals of corrosion and development of different techniques in corrosion control.
III. Analysis of water for its various parameters and its significance in industrial applications.
IV. Improve the fundamental science and engineering principles relevant to materials.

UNIT-I	ELECTROCHEMISTRY AND BATTERIES	Classes: 10

Electrochemistry: Basic concepts of electrochemistry; Conductance: Specific, equivalent and molar conductance and effect of dilution on conductance; Electrochemical cells: Galvanic cell (daniel cell); Electrode potential; Electrochemical series and its applications; Nernst equation; Types of electrodes: Calomel electrode, quinhydrone electrode; Batteries: Classification of batteries, primary cells (dry cells) and secondary cells (lead-acid battery, Ni-Cd cell), applications of batteries, numerical problems.

UNIT-II	CORROSION AND ITS CONTROL	Classes: 08

Corrosion: Introduction, causes and effects of corrosion; Theories of corrosion: Chemical and electrochemical corrosion with mechanism; Factors affecting the rate of corrosion: Nature of the metal and nature of the environment; Types of corrosion: Waterline and crevice corrosion; Corrosion control methods: Cathodic protection- sacrificial anodic protection and impressed current cathodic protection; Surface coatings: Metallic coatings, methods of application of metallic coatings-hot dipping(galvanizing, tinning), electroplating(copper plating); Organic coatings: Paints, its constituents and their functions.

UNIT-III	WATER TECHNOLOGY	Classes: 09

Water: Sources and impurities of water, hardness of water, expression of hardness-units; Types of hardness: Temporary hardness, permanent hardness and numerical problems; Estimation of temporary and permanent hardness of water by EDTA method; Determination of dissolved oxygen by Winkler's method; Boiler troubles: Priming, foaming, scales, sludges and caustic embrittlement.

Treatment of water: Internal treatment of boiler feed water- carbonate, calgon and phosphate conditioning, softening of water by Zeolite process and Ion exchange process; Potable water-its specifications, steps involved in the treatment of potable water, sterilization of potable water by chlorination and ozonization, purification of water by reverse osmosis process.

UNIT-IV	MATERIALS CHEMISTRY	Classes: 10

Materials chemistry: Polymers-classification with examples, polymerization-addition, condensation and co-polymerization; Plastics: Thermoplastics and thermosetting plastics; Compounding of plastics; Preparation, properties and applications of polyvinyl chloride, Teflon, Bakelite and Nylon-6, 6; Rubbers: Natural rubber its process and vulcanization; Elastomers: Buna-s and Thiokol rubber; Fibers:

Characteristics of fibers, preparation properties and applications of Dacron; Characteristics of fiber reinforced plastics; Cement: Composition of Portland cement, setting and hardening of Portland cement; Lubricants: Classification with examples; Properties: Viscosity, flash, fire, cloud and pour point; Refractories: Characteristics and classification with examples.

UNIT-V	FUELS AND COMBUSTION	Classes: 08

Fuel: Definition, classification of fuels and characteristics of a good fuels; Solid fuels: Coal; Analysis of coal: Proximate and ultimate analysis; Liquid fuels: Petroleum and its refining; Cracking: Fixed bed catalytic cracking; Knocking: Octane and cetane numbers; Gaseous fuels: Composition, characteristics and applications of natural gas, LPG and CNG; Combustion: Calorific value: Gross Calorific Value(GCV) and Net Calorific Value(NCV), calculation of air quantity required for complete combustion of fuel, numerical problems.

Text Books:

1. P. C. Jain, Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company, 15th Edition, 2015.
2. Shasi Chawla, "Text Book of Engineering Chemistry", Dhantpat Rai Publishing Company, New Delhi, 1st Edition, 2011.

Reference Books:

1. B. Siva Shankar, "Engineering Chemistry", Tata Mc Graw Hill Publishing Limited, 3rd Edition, 2015.
2. S. S. Dara, Mukkanti, "Text of Engineering Chemistry", S. Chand & Co., New Delhi, 12th Edition, 2006.
3. C. V. Agarwal, C. P. Murthy, A. Naidu, "Chemistry of Engineering Materials", Wiley India, 5th Edition, 2013.
4. R. P. Mani, K. N. Mishra, "Chemistry of Engineering Materials", Cengage Learning, 3rd Edition, 2015.

Web References:

1. https://www.tndte.com
2. https://www.nptel.ac.in/downloads
3. https://www.scribd.com
4. https://www.cuiet.info
5. https://www.sbtebihar.gov.in
6. https://www.ritchennai.org

E-Text Books:

1. https://www.Corrosion.ksc.nasa.gov/electrochem_cells.htm
2. https://www.science.uwaterloo.ca/~cchieh/cact/applychem/watertreatment.html
3. https://www.acs.org/content/acs/en/careers/college-to-career/areas-of-chemistry/polymer-chemistry.html
4. https://www.darvill.clara.net/altenerg/fossil.htm
5. https://www.Library.njit.edu/research helpdesk/subject guides/chemistry.php

Course Home Page:

COMPUTER PROGRAMMING

I Semester: CSE / ECE / EEE / IT | **II Semester:** AE / CE / ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS001	Foundation	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Learn adequate knowledge by problem solving techniques.
II. Understand programming skills using the fundamentals and basics of C Language.
III. Improve problem solving skills using arrays, strings, and functions.
IV. Understand the dynamics of memory by pointers.
V. Study files creation process with access permissions.

UNIT-I	INTRODUCTION	Classes: 10

Introduction to computers: Computer systems, computing environments, computer languages, creating and running programs, algorithms, flowcharts; Introduction to C language: History of C, basic structure of C programs, process of compiling and running a C program, C tokens, keywords, identifiers, constants, strings, special symbols, variables, data types; Operators and expressions: Operators, arithmetic, relational and logical, assignment operators, increment and decrement operators, bitwise and conditional operators, special operators, operator precedence and associativity, evaluation of expressions, type conversions in expressions, formatted input and output.

UNIT-II	CONTROL STRUCTURES, ARRAYS AND STRINGS	Classes: 10

Control structures: Decision statements; if and switch statement; Loop control statements: while, for and do while loops, jump statements, break, continue, goto statements; Arrays: Concepts, one dimensional arrays, declaration and initialization of one dimensional arrays, two dimensional arrays, initialization and accessing, multi dimensional arrays; Strings concepts: String handling functions, array of strings.

UNIT-III	FUNCTIONS AND POINTERS	Classes: 09

Functions: Need for user defined functions, function declaration, function prototype, category of functions, inter function communication, function calls, parameter passing mechanisms, recursion, passing arrays to functions, passing strings to functions, storage classes, preprocessor directives.

Pointers: Pointer basics, pointer arithmetic, pointers to pointers, generic pointers, array of pointers, pointers and arrays, pointers as functions arguments, functions returning pointers.

UNIT-IV	STRUCTURES AND UNIONS	Classes: 08

Structures and unions: Structure definition, initialization, accessing structures, nested structures, arrays of structures, structures and functions, passing structures through pointers, self referential structures, unions, bit fields, typedef, enumerations; Dynamic memory allocation: Basic concepts, library functions.

UNIT-V	FILES	Classes: 08
Files: Streams, basic file operations, file types, file opening modes, file input and output functions, file status functions, file positioning functions, command line arguments.		

Text Books:

1. Stephen G. Kochan, "Programming in C", Addison-Wesley Professional, 4th Edition, 2014.
2. B. A. Forouzan, R. F. Gillberg, "C Programming and Data Structures", Cengage Learning, India, 3rd Edition, 2014.

Reference Books:

1. W. Kernighan Brian, Dennis M. Ritchie, "The C Programming Language", PHI Learning, 2nd Edition, 1988.
2. Yashavant Kanetkar, "Exploring C", BPB Publishers, 2nd Edition, 2003.
3. E. Balagurusamy, "Programming in ANSI C", Mc Graw Hill Education, 6th Edition, 2012.
4. Schildt Herbert, "C: The Complete Reference", Tata Mc Graw Hill Education, 4th Edition, 2014.
5. R. S. Bichkar, "Programming with C", Universities Press, 2nd Edition, 2012.
6. Dey Pradeep, Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford University Press, 2nd Edition, 2006.

Web References:

1. https://www.bfoit.org/itp/Programming.html
2. https://www.khanacademy.org/computing/computer-programming
3. https://www.edx.org/course/programming-basics-iitbombayx-cs101-1x-0
4. https://www.edx.org/course/introduction-computer-science-harvardx-cs50x

E-Text Books:

1. http://www.freebookcentre.net/Language/Free-C-Programming-Books-Download.htm
2. http://www.imada.sdu.dk/~svalle/courses/dm14-2005/mirror/c/
3. http://www.enggnotebook.weebly.com/uploads/2/2/7/1/22718186/ge6151-notes.pdf

MOOC Course

1. https://www.alison.com/courses/Introduction-to-Programming-in-c
2. http://www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s096-effective-programming-in-c-and-c-january-iap-2014/index.htm

Course Home Page:

ENGINEERING PHYSICS AND CHEMISTRY LABORATORY

I Semester: CSE / ECE / EEE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS104	Foundation	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 42				Total Classes: 42		

OBJECTIVES:

The course should enable the students to:

I. Elevate practical knowledge to understand technological aspects of LED, energy gap and solar cell.
II. Enrich real-time application aspect of R-C, magnetic field intensity and numerical aperture of optical fiber.
III. Enlighten the phenomenon of instrumentation, physical properties and preparations.

LIST OF EXPERIMENTS

Week-l	**INTRODUCTION TO PHYSICS/CHEMISTRY LABORATORY**
Introduction to physics/chemistry laboratory. Do's and Don'ts in physics/chemistry laboratory.	
Week-2	**PHY: LED AND LASER CHARACTERISTICS, CHE: VOLUMETRIC ANALYSIS**
Batch I: Characteristics of LED and LASER. Batch II: Estimation of hardness of water by EDTA method.	
Week-3	**CHE: VOLUMETRIC ANALYSIS, PHY: LED AND LASER CHARACTERISTICS**
Batch I: Estimation of hardness of water by EDTA method. Batch II: Characteristics of LED and LASER.	
Week-4	**PHY: STEWART GEE'S METHOD, CHE: INSTRUMENTATION**
Batch I: Magnetic field along the axis of current carrying coil-Stewart and Gee's method. Batch II: Conductometric titration of strong acid vs strong base.	
Week-5	**CHE: INSTRUMENTATION, PHY: STEWART GEE'S METHOD**
Batch I: Conductometric titration of strong acid vs strong base. Batch II: Magnetic field along the axis of current carrying coil-Stewart and Gee's method.	
Week-6	**PHY: SOLAR CELL, CHE: INSTRUMENTATION**
Batch I: Study of characteristics of solar cell. Batch II: Potentiometric titration of strong acid vs strong base.	

Week-7	**CHE: INSTRUMENTATION, PHY: SOLAR CELL**
Batch I: Potentiometric titration of strong acid vs strong base. Batch II: Study of characteristics of solar cell.	
Week-8	**PHY: R C CIRCUIT, CHE: INSTRUMENTATION**
Batch I: Time constant of an R C circuit. Batch II: Determination of P^H of a given solution by P^H meter.	
Week-9	**CHE: INSTRUMENTATION, PHY: R C CIRCUIT**
Batch I: Determination of P^H of a given solution by P^H meter. Batch II: Time constant of an R C circuit.	
Week-10	**PHY: OPTICAL FIBER, CHE: PHYSICAL PROPERTIES**
Batch I: Evaluation of numerical aperture of given fiber. Batch II: Determination of surface tension and viscosity of lubricants.	
Week-11	**CHE: PHYSICAL PROPERTIES, PHY: OPTICAL FIBER**
Batch I: Determination of surface tension and viscosity of lubricants. Batch II: Evaluation of numerical aperture of given fiber.	
Week-12	**PHY: ENERGY GAP, CHE: PREPARATION OF ORGANIC COMPOUNDS**
Batch I: Estimating energy gap of given semiconductor diode. Batch II: Preparation of Aspirin and Thiokol rubber.	
Week-13	**CHE: PREPARATION OF ORGANIC COMPOUNDS, PHY: ENERGY GAP**
Batch I: Preparation of Aspirin and Thiokol rubber. Batch II: Estimating energy gap of given semiconductor diode.	
Week-14	**REVISION**
Revision.	
Reference Books:	
1. C. L. Arora, "Practical Physics", S. Chand & Co., New Delhi, 3rd Edition, 2012. 2. Vijay Kumar, Dr. T. Radhakrishna, "Practical Physics for Engineering Students", S M Enterprises, 2nd Edition, 2014. 3. Vogel's, "Quantitative Chemical Analysis", Prentice Hall, 6th Edition, 2000. 4. Gary D. Christian, "Analytical Chemistry", Wiley Publications, 6th Edition, 2007.	
Web Reference:	
http://www.iare.ac.in	
Course Home Page:	

LIST OF PHYSICS LABORATORY EQUIPMENT REQUIRED FOR A BATCH OF 30 STUDENTS:

S. No	Name of the Component	Qty	Range
1	LED circuit	10	I/P 0-10V DC, Resistors 1k Ω-4kΩ
2	Digital ammeter	10	Digital Meter DC 0-20mA
3	Digital voltmeter	10	Digital Meter DC 0-20V
4	Probes	30	Dia - 4mm
5	Stewart and Gees's set	10	Coil 2, 50, 200 turns
6	DC Ammeter	10	Digital Meter DC 0-20V
7	Battery eliminator	10	DC 2Amps
8	Solar cell Kit with panel	10	XL-10
9	Bulb	20	0 – 100W, 230V
10	Numerical aperture kit	10	Optical power meter 660nm
11	RC Circuit	10	I/P 15V, Voltmeter 0-20V, Ammeter 0-2000mA, Resistors 4K7- 100K Ω, Capacitors 0.047-2200µF
12	Stop clock	20	+/- 1s
13	Energy gap	10	Heating element - 35W, E_g = 0.2-0.4eV I/P 0-10V, Ammeter 0-200µA
14	Laser diode circuit	10	I/P 0-10V DC, Resistors 1k Ω-4K Ω

LIST OF CHEMISTRY LABORATORY EQUIPMENT REQUIRED FOR A BATCH OF 30 STUDENTS:

S. No	Name of the Apparatus	Quantity of the apparatus	Total numbers of apparatus required
1	Analytical balance	100 gm	04
2	Beaker	100 ml	30
3	Burette	50 ml	30
4	Burette Stand	Metal	30
5	Clamps with Boss heads	Metal	30
6	Conical Flask	250 ml	30
7	Conductivity cell	K=1	05
8	Calomel electrode	Glass	06
9	Digital Potentiometer	EI	05
10	Digital Conductivity meter	EI	05
11	Digital electronic balance	RI	01
12	Distilled water bottle	500 ml	30
13	Funnel	Small	30
14	Glass rods	20 cm length	30
15	Measuring Cylinders	10 ml	10
16	Oswald Viscometer	Glass	30
17	Pipette	20 ml	30
18	Platinum Electrode	PP	05
19	Porcelain Tiles	White	30
20	Reagent bottle	250 ml	30
21	Standard Flask	100 ml	30
22	Stalagmo meter	Glass	30
23	Digital P^H meter	P^H 0-14	05

COMPUTER PROGRAMMING LABORATORY

I Semester: Common for CSE / ECE / EEE / IT | **II Semester:** Common for AE / CE / ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS101	Foundation	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES:

The course should enable the students to:

I. Formulate problems and implement algorithms using C programming language.
II. Develop programs using decision structures, loops and functions.
III. Learn memory allocation techniques using pointers.
IV. Use structured programming approach for solving of computing problems in real world.

LIST OF EXPERIMENTS

Week-1 OPERATORS AND EVALUATION OF EXPRESSIONS

a. Write a C program to check whether a number is even or odd using ternary operator.
b. Write a C program to perform the addition of two numbers without using + operator.
c. Write a C program to evaluate the arithmetic expression ((a + b / c * d - e) * (f - g)). Read the values a, b, c, d, e, f, g from the standard input device.
d. Write a C program to find the sum of individual digits of a 3 digit number.
e. Write a C program to read the values of x and y and print the results of the following expressions in one line:
   i. (x + y) / (x - y)
   ii. (x + y)(x - y)

Week-2 CONTROL STRUCTURES

a. Write a C program to find the sum of individual digits of a positive integer.
b. A Fibonacci sequence is defined as follows: The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
c. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
d. A character is entered through keyboard. Write a C program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol using if-else and switch case. The following table shows the range of ASCII values for various characters.

Characters	ASCII values
A – Z	65 – 90
a – z	97 – 122
0 – 9	48 – 57
Special symbols	0 – 47, 58 – 64, 91 – 96, 123 – 127

e. If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Write a C program to determine how much profit or loss incurred in percentage.

Week-3	CONTROL STRUCTURES

a. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use switch statement).
b. Write a C program to calculate the following sum:

$$sum = 1 - x^2/2! + x^4/4! - x^6/6! + x^8/8! - x^{10}/10!$$

c. Write a C program to find the roots of a quadratic equation.
d. Write a C program to check whether a given 3 digit number is Armstrong number or not.
e. Write a C program to print the numbers in triangular form

```
1
1  2
1  2  3
1  2  3  4
```

Week-4	ARRAYS

a. Write a C program to find the second largest integer in a list of integers.
b. Write a C program to perform the following:
   i. Addition of two matrices
   ii. Multiplication of two matrices
c. Write a C program to count and display positive, negative, odd and even numbers in an array.
d. Write a C program to merge two sorted arrays into another array in a sorted order.
e. Write a C program to find the frequency of a particular number in a list of integers.

Week-5	STRINGS

a. Write a C program that uses functions to perform the following operations:
   i. To insert a sub string into a given main string from a given position.
   ii. To delete n characters from a given position in a given string.
b. Write a C program to determine if the given string is a palindrome or not.
c. Write a C program to find a string within a sentence and replace it with another string.
d. Write a C program that reads a line of text and counts all occurrence of a particular word.
e. Write a C program that displays the position or index in the string S where the string T begins, or 1 if S doesn't contain T.

Week-6	FUNCTIONS

a. Write C programs that use both recursive and non-recursive functions
   i. To find the factorial of a given integer.
   ii. To find the greatest common divisor of two given integers.
b. Write C programs that use both recursive and non-recursive functions
   i. To print Fibonacci series.
   ii. To solve towers of Hanoi problem.
c. Write a C program to print the transpose of a given matrix using function.
d. Write a C program that uses a function to reverse a given string.

Week-7	POINTERS

a. Write a C program to concatenate two strings using pointers.
b. Write a C program to find the length of string using pointers.
c. Write a C program to compare two strings using pointers.
d. Write a C program to copy a string from source to destination using pointers.
e. Write a C program to reverse a string using pointers.

Week-8	STRUCTURES AND UNIONS

a. Write a C program that uses functions to perform the following operations:
   i. Reading a complex number
   ii. Writing a complex number
   iii. Addition and subtraction of two complex numbers
   iv. Multiplication of two complex numbers. Note: represent complex number using a structure.
b. Write a C program to compute the monthly pay of 100 employees using each employee's name, basic pay. The DA is computed as 52% of the basic pay. Gross-salary (basic pay + DA). Print the employees name and gross salary.
c. Create a Book structure containing book_id, title, author name and price. Write a C program to pass a structure as a function argument and print the book details.
d. Create a union containing 6 strings: name, home_address, hostel_address, city, state and zip. Write a C program to display your present address.
e. Write a C program to define a structure named DOB, which contains name, day, month and year. Using the concept of nested structures display your name and date of birth.

Week-9	ADDITIONAL PROGRAMS

a. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$. For example: if n is 3 and x is 5, then the program computes 1+5+25+125. Print x, n, the sum. Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.
b. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
c. Write a C program to convert a Roman numeral to its decimal equivalent. E.g. Roman number CD is equivalent to 400.

Week-10	PREPROCESSOR DIRECTIVES

a. Define a macro with one parameter to compute the volume of a sphere. Write a C program using this macro to compute the volume for spheres of radius 5, 10 and 15 meters.
b. Define a macro that receives an array and the number of elements in the array as arguments. Write a C program for using this macro to print the elements of the array.
c. Write symbolic constants for the binary arithmetic operators +, -, *, and /. Write a C program to illustrate the use of these symbolic constants.

Week-11	FILES

a. Write a C program to display the contents of a file.
b. Write a C program to copy the contents of one file to another.
c. Write a C program to reverse the first n characters in a file, where n is given by the user.
d. Two files DATA1 and DATA2 contain sorted lists of integers. Write a C program to merge the contents of two files into a third file DATA i.e., the contents of the first file followed by those of the second are put in the third file.
e. Write a C program to count the no. of characters present in the file.

Week-12	COMMAND LINE ARGUMENTS

a. Write a C program to read arguments at the command line and display it.
b. Write a C program to read two numbers at the command line and perform arithmetic operations on it.
c. Write a C program to read a file name at the command line and display its contents.

Reference Books:

1. Yashavant Kanetkar, "Let Us C", BPB Publications, New Delhi, 13th Edition, 2012.
2. Oualline Steve, "Practical C Programming", O'Reilly Media, 3rd Edition, 1997.
3. King K N, "C Programming: A Modern Approach", Atlantic Publishers, 2nd Edition, 2015.
4. Kochan Stephen G, "Programming in C – A Complete Introduction to the C Programming Language", Sam's Publishers, 3rd Edition, 2004.
5. Linden Peter V, "Expert C Programming: Deep C Secrets", Pearson India, 1st Edition, 1994.

Web References:

1. http://www.sanfoundry.com/c-programming-examples
2. http://www.geeksforgeeks.org/c
3. http://www.cprogramming.com/tutorial/c
4. http://www.cs.princeton.edu

Course Home Page:

COMPUTER AIDED ENGINEERING DRAWING

I Semester: CSE / ECE / EEE / I T

Course Code	Category	Hours / WEEK			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AME103	Foundation	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 30				Total Classes: 30		

OBJECTIVES:

The course should enable the students to:

I. Understand the basic principles of engineering drawing.
II. Understand the construction of scales.
III. Apply the knowledge of interpretation of dimensions of different quadrant projections.
IV. Convert the pictorial views into orthographic views and vice versa.
V. Create intricate details of components through sections and to develop its surfaces.

UNIT-I	INTRODUCTION TO ENGINEERING DRAWING AND AUTOCAD	Classes : 06

Introduction to engineering drawing: Introduction to engineering drawing**,** drawing instruments and accessories, types of lines, lettering practice and rules of dimensioning, geometrical constructions, basic geometrical shapes; Introduction to AutoCAD familiarization of graphical user interface, toggle functional keys and tool bars; Drawing of closed form entities like line, circle, ellipse, polygon; Lettering and standard drawing templates.

UNIT-II	DRAFTING AND MODELING COMMANDS	Classes : 06

Drafting and modeling commands: Geometric commands, layers, display control command, editing, dimensioning and solid modeling.

UNIT-III	ORTHOGRAPHIC PROJECTION	Classes : 06

Orthographic projection: Principles of orthographic projections, conventions, first and third angle projections.

Projection of points, straight lines, planes and regular solid, prisms, cylinders, pyramids and cones.

UNIT-IV	ISOMETRIC PROJECTIONS	Classes : 06

Isometric projections: Principle of isometric projection, isometric scale, isometric projections and isometric views, isometric projections of solids.

UNIT-V	TRANSFORMATION OF PROJECTIONS	Classes : 06

Transformation of projections: Conversion of isometric views to orthographic views and conversion of orthographic views to isometric views.

Text Books:

1. N. D. Bhatt, "Engineering Drawing", Charotar Publications, 49th Edition, 2012.
2. C. M. Agrawal, Basant Agrawal, "Engineering Drawing'', Tata McGraw Hill, 2nd Edition, 2013.

Reference Books:

3. K. Venugopal, "Engineering Drawing and Graphics", New Age Publications, 2nd Edition, 2010.
4. Dhananjay. A. Johle, "Engineering Drawing", Tata McGraw Hill, 1st Edition, 2008.
5. S. Trymbaka Murthy, "Computer Aided Engineering Drawing", I K International Publishers, 3rd Edition, 2011.
6. A. K. Sarkar, A. P. Rastogi, "Engineering graphics with Auto CAD", PHI Learning, 1st Edition, 2010.

Web References:

1. http://nptel.ac.in/courses/112103019/
2. http://www.autocadtutorials.net/
3. https://grabcad.com/questions/tutorial-16-for-beginner-engineering-drawing-1

E-Text Book:

https://books.google.co.in/books?id=VRN7e09Rq0C&pg=PA9&source=gbs_toc_r&cad=4#v=onepage&q&f=false

Course Home Page:

COMPUTATIONAL MATHEMATICS LABORATORY

I Semester: CSE / ECE / EEE / IT | **II Semester:** AE / CE / ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AHS102	Foundation	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes: 24		

OBJECTIVES:

The course should enable the students to:

I. Train the students how to approach for solving engineering problems.
II. Understand the concepts of algebra, calculus and numerical solutions using MATLAB software.
III. Enrich the knowledge in MATLAB and can apply for project works.

LIST OF EXPERIMENTS

Week-l	**BASIC FEATURES**

a. Features and uses.
b. Local environment setup.

Week-2	**ALGEBRA**

a. Solving basic algebraic equations.
b. Solving system of equations.
c. Two dimensional plots.

Week-3	**CALCULUS**

a. Calculating limits.
b. Solving differential equations.
c. Finding definite integral.

Week-4	**MATRICES**

a. Addition, subtraction and multiplication of matrices.
b. Transpose of a matrix.
c. Inverse of a matrix.

Week-5	**SYSTEM OF LINEAR EQUATIONS**

a. Rank of a matrix.
b. Gauss Jordan method.
c. LU decomposition method.

Week-6	**LINEAR TRANSFORMATION**

a. Characteristic equation.
b. Eigen values.
c. Eigen vectors.

Week-7	DIFFERENTIATION AND INTEGRATION
a. Higher order differential equations. b. Double integrals. c. Triple integrals.	
Week-8	**INTERPOLATION AND CURVE FITTING**
a. Lagrange polynomial. b. Straight line fit. c. Polynomial curve fit.	
Week-9	**ROOT FINDING**
a. Bisection method. b. Regula false method. c. Newton Raphson method.	
Week-10	**NUMERICAL DIFFERENTION AND INTEGRATION**
a. Trapezoidal, Simpson's method. b. Euler method. c. Runge Kutta method.	
Week-11	**3D PLOTTING**
a. Line plotting. b. Surface plotting. c. Volume plotting.	
Week-12	**VECTOR CALCULUS**
a. Gradient. b. Divergent. c. Curl.	
Reference Books:	
1. Cleve Moler, "Numerical Computing with MATLAB", SIAM, Philadelphia, 2nd Edition, 2008. 2. Dean G. Duffy, "Advanced Engineering Mathematics with MATLAB", CRC Press, Taylor & Francis Group, 6th Edition, 2015.	
Web Reference:	
http://www.iare.ac.in	
Course Home Page:	
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS: **SOFTWARE:** Microsoft Windows 7 and MATLAB – V 8.5, which is also R2015a **HARDWARE:** 30 numbers of Intel Desktop Computers with 2 GB RAM	

ENGLISH FOR COMMUNICATION

I Semester: AE / CE / ME | II Semester: CSE / ECE / EEE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS001	Foundation	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Communicate in an intelligible English accent and pronunciation.
II. Effectively use the four language skills i.e., Listening, Speaking, Reading and Writing.
III. Develop the art of writing simple English with correct spelling, grammar and punctuation.

UNIT-I	LISTENING SKILL	Classes: 08

Significance, essentials, barriers and effectiveness of listening; Listening to dialogues, conversation, discussions, monologues; Listening to sounds, silent letters, stressed syllables in English; Listening for the gist of the text, for identifying the topic, general meaning and specific information; Listening for multiple choice questions, positive and negative comments for interpretation

Note: Instructions in theory and practice in the lab

UNIT-II	SPEAKING SKILL	Classes: 10

Significance, essentials, barriers and effectiveness of speaking; Simple oral or casual interaction, dialogue, conversation; Debates: Differences between disagreeing and being disagreeable; Brief presentations; Role plays; Generating talks based on visual or written prompts; Addressing a small group or a large formal gathering; Speaking about present, past experiences and future plans; Arguing outs a topic without verbal fights; Paper presentation.

Note: Instructions in theory and practice in the lab

UNIT-III	READING SKILL	Classes: 09

Techniques of reading: Skimming, scanning, intensive and extensive reading; Reading comprehension: Exercises for multiple choice questions and contextual meaning – Values in Dr. Kalam.

Vocabulary enrichment and grammar exercises based on selective readings: Swami Vivekananda Chicago Speech, 1893; Passages for intellectual and emotional comments; Reading for the gist of a text, for specific information, for information transfer and interpretation.

UNIT-IV	WRITING SKILL	Classes: 08

Significance, essentials and effectiveness of writing; Writing emails; Writing paragraphs: Comparing, contrasting, presentations with an introduction, body and conclusion; Writing formal and informal letters: Letter of invitation, accepting, declining, requesting, complaint, seeking information ; Cover letter enclosing a CV.

UNIT-V	VOCABULARY AND GRAMMAR	Classes: 10
Punctuation, parts of speech, articles, prepositions, tenses, concords, phrasal verbs; Forms of verbs: Regular and irregular, direct and indirect speech, change of voice; prefixes, suffixes, Synonyms, antonyms, one word substitutes, idioms and phrases, technical vocabulary.		

Text Books:

1. Meenakshi Raman, Sangeetha Sharma, "Technical Communication Principles Practices", Oxford University Press, New Delhi, 3rd Edition , 2015.

Reference Books:

1. Norman Whitby, "Business Benchmark: Pre-Intermediate to Intermediate – BEC Preliminary", Cambridge University Press, 2nd Edition, 2008.
2. Devaki Reddy, Shreesh Chaudhary, "Technical English", Macmillan, 1st Edition, 2009.
3. Rutherford, Andrea J, "Basic Communication Skills for Technology", Pearson Education, 2nd Edition, 2010
4. Raymond Murphy, "Essential English Grammar with Answers" Cambridge University Press, 2nd Edition.

Web References:

1. http://www.edufind.com
2. http://www.myenglishpages.com
3. http://www.grammar.ccc.comment.edu
4. http://www.owl.english.prudue.edu

E-Text Books:

1. http://www.bookboon.com/en/communication-ebooks-zip
2. http://www.bloomsbury-international.com/images/ezone/ebook/writing-skills-pdf.pdf
3. https://www.americanenglish.state.gov/files/ae/resource_files/developing_writing.pdf
4. http://www.learningenglishvocabularygrammar.com/files/idiomsandphraseswithmeaningsandexamples pdf.pdf
5. http://www.robinwood.com/Democracy/GeneralEssays/CriticalThinking.pdf

Course Home Page:

PROBABILITY AND STATISTICS

II Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS010	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Enrich the knowledge of probability on single random variables and probability distributions.
II. Apply the concept of correlation and regression to find covariance.
III. Analyze the given data for appropriate test of hypothesis.

UNIT-I	**SINGLE RANDOM VARIABLES AND PROBABILITY DISTRIBUTION**	**Classes: 09**

Random variables: Basic definitions, discrete and continuous random variables; Probability distribution: Probability mass function and probability density functions; Mathematical expectation; Binomial distribution, Poisson distribution and normal distribution.

UNIT-II	**MULTIPLE RANDOM VARIABLES**	**Classes: 09**

Joint probability distributions, joint probability mass, density function, marginal probability mass, density functions; Correlation: Coefficient of correlation, the rank correlation; Regression: Regression coefficient, the lines of regression, multiple correlation and regression.

UNIT-III	**SAMPLING DISTRIBUTION AND TESTING OF HYPOTHESIS**	**Classes: 09**

Sampling: Definitions of population, sampling, statistic, parameter; Types of sampling, expected values of sample mean and variance, sampling distribution, standard error, sampling distribution of means and sampling distribution of variance.

Estimation: Point estimation, interval estimations; Testing of hypothesis: Null hypothesis, alternate hypothesis, type I and type II errors, critical region, confidence interval, level of significance. One sided test, two sided test.

UNIT-IV	**LARGE SAMPLE TESTS**	**Classes: 09**

Test of hypothesis for single mean and significance difference between two sample means, Tests of significance difference between sample proportion and population proportion and difference between two sample proportions.

UNIT-V	**SMALL SAMPLE TESTS AND ANOVA**	**Classes: 09**

Small sample tests: Student t-distribution, its properties: Test of significance difference between sample mean and population mean; difference between means of two small samples. Snedecor's F-distribution and its properties; Test of equality of two population variances Chi-square distribution and it's properties; Test of equality of two population variances Chi-square distribution, it's properties, Chi-square test of goodness of fit; ANOVA: Analysis of variance, one way classification, two way classification.

Text Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Publishers, 9th Edition, 2014.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, 2012.

Reference Books:

1. S. C. Gupta, V. K. Kapoor, "Fundamentals of Mathematical Statistics", S. Chand & Co., 10th Edition, 2000.
2. N. P. Bali, "Engineering Mathematics", Laxmi Publications, 9th Edition, 2016.
3. Richard Arnold Johnson, Irwin Miller and John E. Freund, "Probability and Statistics for Engineers", Prentice Hall, 8th Edition, 2013.

Web References:

1. http://www.efunda.com/math/math_home/math.cfm
2. http://www.ocw.mit.edu/resourcs/#Mathematics
3. http://www.sosmath.com
4. http://www.mathworld.wolfram.com

E-Text Books:

1. http://www.keralatechnologicaluniversity.blogspot.in/2015/06/erwin-kreyszig-advanced-engineering-mathematics-ktu-ebook-download.html
2. http://www.faadooengineers.com/threads/13449-Engineering-Maths-II-eBooks

Course Home Page:

ENVIRONMENTAL STUDIES

II Semester: **Common for all Branches**

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS009	Foundation	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Analyze the interrelationship between living organism and environment.
II. Understand the importance of environment by assessing its impact on the human world.
III. Enrich the knowledge on themes of biodiversity, natural resources, pollution control and waste management.

UNIT-I	ENVIRONMENT AND ECOSYSTEMS	Classes: 08

Environment: Definition, scope and importance of environment, need for public awareness; Ecosystem: Definition, scope and importance of ecosystem, classification, structure and function of an ecosystem, food chains, food web and ecological pyramids, flow of energy; Biogeochemical cycles; Biomagnifications.

UNIT-II	NATURAL RESOURCES	Classes: 08

Natural resources: Classification of resources, living and nonliving resources; Water resources: Use and over utilization of surface and ground water, floods and droughts, dams, benefits and problems; Mineral resources: Use and exploitation; Land resources; Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III	BIODIVERSITY AND BIOTIC RESOURCES	Classes: 10

Biodiversity and biotic resources: Introduction, definition, genetic, species and ecosystem diversity; Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and optional values; India as a mega diversity nation; Hot spots of biodiversity.

Threats to biodiversity: Habitat loss, poaching of wildlife, human-wildlife conflicts; Conservation of biodiversity: In situ and ex situ conservation; National biodiversity act.

UNIT-IV	ENVIRONMENTAL POLLUTION, POLLUTION CONTROL TECHNOLOGIES AND GLOBAL ENVIRONMENTAL PROBLEMS	Classes: 10

Environmental pollution: Definition, causes and effects of air pollution, water pollution, soil pollution, noise pollution; Solid waste: Municipal solid waste management, composition and characteristics of e-waste and its management; Pollution control technologies: Waste water treatment methods, primary, secondary and tertiary; Concepts of bioremediation; Global environmental problems and global efforts: Climate change, ozone depletion, ozone depleting substances, deforestation and desertification; International conventions / protocols: Earth summit, Kyoto protocol and Montreal protocol.

UNIT-V	ENVIRONMENTAL LEGISLATIONS AND SUSTAINABLE DEVELOPMENT	Classes: 09

Environmental legislations: Environmental protection act, air act1981, water act, forest act, wild life act, municipal solid waste management and handling rules, biomedical waste management and handling rules2016, hazardous waste management and handling rules, Environmental impact assessment(EIA); Towards sustainable future: Concept of sustainable development, population and its explosion, crazy consumerism, environmental education, urban sprawl, concept of green building.

Text Books:

1. Benny Joseph, "Environmental Studies", Tata Mc Graw Hill Publishing Co. Ltd, New Delhi, 1st Edition, 2006.
2. Erach Bharucha, "Textbook of Environmental Studies for Under Graduate Courses", Orient Black Swan, 2nd Edition, 2013.
3. Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi, 12th Edition, 2015.

Reference Books:

1. Tyler Miller, Scott Spoolman, "Environmental Science", Cengage Learning, 14th Edition, 2012.
2. Anubha Kaushik, "Perspectives in Environmental Science", New Age International, New Delhi, 4th Edition, 2006.
3. Gilbert M. Masters, Wendell P. Ela, "Introduction to Environmental Engineering and Science, Pearson, 3rd Edition, 2007.

Web References:

1. https://www.elsevier.com
2. https://www. libguides.lib.msu.edu
3. https://www.fao.org

E-Text Books:

1. http://www.ilocis.org
2. http://www.img.teebweb.org
3. http://www.ec.europa.eu

Course Home Page:

DATA STRUCTURES

II Semester: **CSE / ECE / EEE / IT**

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS002	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Learn the basic techniques of algorithm analysis.
II. Demonstrate several searching and sorting algorithms.
III. Implementation of linear data structure mechanisms.
IV. Demonstrate various tree and graph traversal algorithms.
V. Analyze and choose appropriate data structure to solve problems in real world.

UNIT-I	INTRODUCTION TO DATA STRUCTURES, SEARCHING AND SORTING	Classes: 10

Basic concepts: Introduction to data structures, classification of data structures, operations on data structures, abstract data type, algorithms, different approaches to design an algorithm, recursive algorithms; Searching techniques: Linear search, binary search and Fibonacci search; Sorting techniques: Bubble sort, selection sort, insertion sort, quick sort, merge sort, and comparison of sorting algorithms.

UNIT-II	LINEAR DATA STRUCTURES	Classes: 10

Stacks: Primitive operations, implementation of stacks using Arrays, applications of stacks arithmetic expression conversion and evaluation; Queues: Primitive operations; Implementation of queues using Array, applications of linear queue, circular queue and double ended queue (deque).

UNIT-III	LINKED LISTS	Classes: 09

Linked lists: Introduction, singly linked list, representation of a linked list in memory, operations on a single linked list; Applications of linked lists: Polynomial representation and sparse matrix manipulation.

Types of linked lists: Circular linked lists, doubly linked lists;
Linked list representation and operations of Stack, linked list representation and operations of queue.

UNIT-IV	NON LINEAR DATA STRUCTURES	Classes: 08

Trees: Basic concept, binary tree, binary tree representation, array and linked representations, binary tree traversal, binary search tree, tree variants, application of trees; Graphs: Basic concept, graph terminology, graph implementation, graph traversals, Application of graphs, Priority Queue.

UNIT-V	BINARY TREES AND HASHING	Classes: 08

Binary search trees: Binary search trees, properties and operations; Balanced search trees: AVL trees; Introduction to M-Way search trees, B trees; Hashing and collision: Introduction, hash tables, hash functions, collisions, applications of hashing.

Text Books:

1. Mark A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson, 2nd Edition, 1996.
2. Ellis Horowitz, Satraj Sahni, Susan Anderson Freed, "Fundamentals of Data Structures in C", Universities Press, 2nd Edition, 2008.

Reference Books:

1. Reema Thareja, "Data Structures using C", Oxford University Press, 2nd Edition, 2014.
2. S. Lipschutz, "Data Structures", Tata McGraw Hill Education, 1st Edition, 2008.
3. D. Samanta, "Classic Data Structures", PHI Learning, 2nd Edition, 2004.
4. Tanenbaum, Langsam, Augenstein, "Data Structures Using C", Pearson, 1st Edition, 2003.

Web References:

1. http://www.tutorialspoint.com/data_structures_algorithms
2. http://www.geeksforgeeks.org/data-structures/
3. http://www.studytonight.com/data-structures/
4. https://www.coursera.org/specializations/data-structures-algorithms

E-Text Books:

1. https://www.scribd.com/doc/268924096/c-Data-Structures-Balaguruswamy-eBook
2. https://www.safaribooksonline.com/library/view/data-structures-using/9789332524248/
3. http://www.amazon.com/Data-Structures-C-Noel-Kalicharan/dp/1438253273
4. https://www.scribd.com/doc/40147240/Data-Structures-Using-c-by-Aaron-m-Tenenbaum-946

Course Home Page:

FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

II Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEE001	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Discuss various circuit elements and apply KCL, KVL to analyze electrical networks.
II. Apply network analysis techniques to solve electrical circuits.
III. Understand single phase and three phase AC circuits and evaluate power and power factor.
IV. Illustrate the application of semiconductor diodes as half wave and full wave rectifier.
V. Classify BJT characteristics.

UNIT-I	ELECTRIC CIRCUIT ELEMENTS	Classes: 10

Electrical circuit elements: Voltage and current sources, linear, non linear, active and passive elements, inductor current and capacitor voltage continuity, Kirchhoff's laws, elements in series and parallel, superposition in linear circuits, controlled sources, energy and power in elements, energy in mutual inductor and constraint on mutual inductance.

UNIT-II	NETWORK ANALYSIS AND THEOREMS	Classes: 07

Network analysis: Nodal analysis with independent and dependant sources, modified nodal analysis, mesh analysis, notion of network graph, nodes, trees, twigs, links, co-tree, independent sets of branch currents and voltages; Network theorems: Voltage shift theorem, zero current theorem, Tellegen's theorem, reciprocity, substitution theorem, Thevenin's and Norton's theorems, pushing a voltage source through a node, splitting a current source, compensation theorem, maximum power transfer theorem.

UNIT-III	AC CIRCUITS	Classes: 11

RLC circuits: Natural, step and sinusoidal steady state responses, series and parallel RLC circuits.
AC signal measurement: Complex, apparent, active and reactive power, power factor.

Introduction to three phase supply: Three phase circuits, star-delta transformations, balance and unbalanced three phase load, power measurement, two wattmeter method.

UNIT-IV	SEMICONDUCTOR DIODE AND APPLICATIONS	Classes: 09

P-N diode, symbol, V-I characteristics, half wave rectifier, full wave rectifier, bridge rectifier and filters, diode as a switch, Zener diode as a voltage regulator.

UNIT-V	BIPOLAR JUNCTION TRANSISTOR AND APPLICATIONS	Classes: 08

DC characteristics, CE, CB, CC configurations, biasing, load line, Transistor as an amplifier.

Text Books:

1. A. Chakrabarti, "Circuit Theory", Dhanpat Rai Publications, 6th Edition, 2004.
2. K. S. Suresh Kumar, "Electric Circuit Analysis", Pearson Education, 1st Edition, 2013.
3. William Hayt, Jack E. Kemmerly S. M. Durbin, "Engineering Circuit Analysis", Tata McGraw-Hill, 7th Edition, 2010.
4. J. P. J. Millman, C. C. Halkias, Satyabrata Jit, "Millman's Electronic Devices and Circuits", Tata McGraw Hill, 2nd Edition, 1998.
5. R. L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuits", PEI/PHI, 9th Edition, 2006.

Reference Books:

1. Charles A. Desoer, Ernest S.Kuh, "Basic Circuit Theory", Tata McGraw Hill, 1st Edition, 1969.
2. S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, "Electronic Devices and Circuits", Tata McGraw-Hill, 2nd Edition, 2011.
3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2005.
4. M. Arshad, "Network Analysis and Circuits", Infinity Science Press, 9th Edition, 2016.
5. A. Bruce Carlson, "Circuits", Cengage Learning, 1st Edition, 2008.

Web References:

1. http:// www.nptel.ac.in/Courses/117106108
2. http:// www.powerlab.ee.ncku.edu.tw
3. http:// www.textofvideo.nptel.iitm.ac.in

E-Text Books:

1. http://www.textbooksonline.tn.nic.in
2. http://www.bookboon.com
3. http://www.ktustudents.in

Course Home Page:

COMMUNICATION SKILLS LABORATORY

I Semester: AE / CE / ME | II Semester: CSE / ECE / EEE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS101	Foundation	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes: 24		

OBJECTIVES:

The course enables the students to:

I. Improve their ability to listen and comprehend a given text.
II. Upgrade the fluency and acquire a functional knowledge of English Language.
III. Enrich thought process by viewing a problem through multiple angles.

LIST OF EXPERIMENTS

Week-l	**LISTENING SKILL**

a. Listening to conversations and interviews of famous personalities in various fields, listening practice related to the TV talk shows, news.
b. Listening for specific information, listening for summarizing information.

Week-2	**LISTENING SKILL**

a. Listening to films of short duration and monologues for taking notes, listening to answer multiple choice questions.
b. Listening to telephonic conversations; Listening to native Indian, British and American speakers to analyze intercultural differences.

Week-3	**SPEAKING SKILL**

a. Functions of English Language; Introduction to phonetics, exercises on pronunciation, symbols of phonetics.
b. Speaking exercises involving the use of stress and intonation, improving pronunciation through tongue twisters.
c. Tips on how to develop fluency, body language and communication; Introducing oneself: Talking about yourself others, leave taking.

Week-4	**SPEAKING SKILL**

a. Just a minute (JAM) sessions, public speaking, situational conversation/role-play.
b. Greetings for different occasions with feedback preferably through video recording; Speaking about present, past experiences and future plans; Acting as a compere and news reader.

Week-5	**READING SKILL**

a. Reading anecdotes to predict the content, reading for interpretation.
b. Suggested reading: Short stories and poem; Critical reading.

Week-6	**READING SKILL**
a. Reading for information transfer; Reading newspaper and magazine articles, memos, letters, notices and minutes for critical commentary. b. Reading selective autobiographies.	
Week-7	**READING SKILL**
a. Reading brochures, advertisements, pamphlets for improved presentation. b. Reading comprehension exercises with critical and analytical questions based on context.	
Week-8	**WRITING SKILL**
a. Writing messages, leaflets, notice; Writing tasks; Flashcard. b. Filling gaps while listening short stories.	
Week-9	**WRITING SKILL**
a. Write a slogan related to the image. b. Write a short story of 6-10 lines based on the hints given.	
Week-10	**WRITING SKILL**
a. Writing a short story on their own; Writing a review on: Video clippings on inspirational speeches. b. Writing a review on short films, advertisements, recipe and recently watched film.	
Week-11	**THINKING SKILL**
a. Practice in preparing thinking blocks to decode diagrammatical representations into English words, expressions, idioms, proverbs. b. Argumentative skills; Debates.	
Week-12	**THINKING SKILL**
a. Inculcating interest in English using thinking blocks. b. Making pictures and improvising diagrams to form English words, phrases and proverbs.	
Reference Books:	
1. Meenakshi Raman, Sangeetha Sharma, "Technical Communication Principles Practices", Oxford University Press, New Delhi, 3rd Edition, 2015. 2. Rhirdion, Daniel, "Technical Communication", Cengage Learning, New Delhi, 1st Edition, 2009.	
Web References:	
1. http://learnenglish.britishcouncil.org 2. http://www.esl-lab.com/ 3. http://www.elllo.org/	
Course Home Page:	

DATA STRUCTURES LABORATORY

II Semester: **CSE / ECE / EEE / IT**

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS102	Foundation	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES:

The course should enable the students to:

I. Implement linear and non linear data structures.
II. Analyze various algorithms based on their time complexity.
III. Choose appropriate data structure and algorithm design method for a specific application.
IV. Identify suitable data structure to solve various computing problems.

LIST OF EXPERIMENTS

Week-1 **SEARCHING TECHNIQUES**

Write C programs for implementing the following searching techniques.
a. Linear search.
b. Binary search.
c. Fibonacci search.

Week-2 **SORTING TECHNIQUES**

Write C programs for implementing the following sorting techniques to arrange a list of integers in ascending order.
a. Bubble sort.
b. Insertion sort.
c. Selection sort.

Week-3 **SORTING TECHNIQUES**

Write C programs for implementing the following sorting techniques to arrange a list of integers in ascending order.
a. Quick sort.
b. Merge sort.

Week-4 **IMPLEMENTATION OF STACK AND QUEUE**

Write C programs to
a. Design and implement Stack and its operations using Arrays.
b. Design and implement Queue and its operations using Arrays

Week-5 **APPLICATIONS OF STACK**

Write C programs for the following:
a. Uses Stack operations to convert infix expression into postfix expression.
b. Uses Stack operations for evaluating the postfix expression.

Week-6 **IMPLEMENTATION OF SINGLE LINKED LIST**

Write C programs for the following:
a. Uses functions to perform the following operations on single linked list.
(i) Creation (ii) insertion (iii) deletion (iv) traversal

b. To store a polynomial expression in memory using linked list.	
Week-7	**IMPLEMENTATION OF CIRCULAR SINGLE LINKED LIST**
Write C programs for the following: Uses functions to perform the following operations on Circular linked list. (i) Creation (ii) insertion (iii) deletion (iv) traversal	
Week-8	**IMPLEMENTATION OF DOUBLE LINKED LIST**
Write C programs for the following: Uses functions to perform the following operations on double linked list. (i) Creation (ii) insertion (iii) deletion (iv) traversal in both ways.	
Week-9	**IMPLEMENTATION OF STACK USING LINKED LIST**
Write C programs to implement stack using linked list.	
Week-10	**IMPLEMENTATION OF QUEUE USING LINKED LIST**
Write C programs to implement queue using linked list.	
Week-11	**GRAPH TRAVERSAL TECHNIQUES**
Write C programs to implement the following graph traversal algorithms: a. Depth first search. b. Breadth first search.	
Week-12	**IMPLEMENTATION OF BINARY SEARCH TREE**
Write a C program that uses functions to perform the following: a. Create a binary search tree. b. Traverse the above binary search tree recursively in pre-order, post-order and in-order. c. Count the number of nodes in the binary search tree.	
Reference Books:	
1. Kernighan Brian W, Dennis M. Ritchie, "The C Programming Language", Prentice Hall of India, Re-Print, 2008. 2. Balagurusamy E, "Programming in ANSI C", Tata Mc Graw Hill, 6th Edition, 2008. 3. Gottfried Byron, "Schaum's Outline of Programming with C", Tata Mc Graw Hill, 1st Edition, 2010. 4. Lipschutz Seymour, " Data Structures Schaum's Outlines Series", Tata Mc Graw Hill, 3rd Edition, 2014. 5. Horowitz Ellis, Satraj Sahni, Susan Anderson, Freed, "Fundamentals of Data Structures in C", W. H. Freeman Company, 2nd Edition, 2011.	
Web References:	
1. http://www.tutorialspoint.com/data_structures_algorithms 2. http://www.geeksforgeeks.org/data-structures/ 3. http://www.studytonight.com/data-structures/ 4. http://www.coursera.org/specializations/data-structures-algorithms	
Course Home Page:	

ELECTRICAL AND ELCETRONICS ENGINEERING LABORATORY

II Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEE101	Foundation	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 39				Total Classes: 39		

OBJECTIVES:

The course should enable the students to:

I. Analyze basic electrical circuits by implementing different circuits.
II. Apply circuit theorems to evaluate the behavior of electrical circuits.
III. Gain knowledge on semiconductor devices like diode and transistor.
IV. Interpret different transistor configurations.

LIST OF EXPERIMENTS

Week-1	**KIRCHOFF'S LAWS**
Practical verification of Kirchhoff's current law and voltage law.	
Week-2	**SUPERPOSITION THEOREM**
Illustration of superposition theorem.	
Week-3	**THEVENIN'S THEOREM**
Obtain the equivalent circuit of the given electrical network using Thevenin's theorem.	
Week-4	**NORTON'S THEOREM**
Practical verification of Norton's theorem and obtain the equivalent circuit.	
Week-5	**MAXIMUM POWER TRANSFER THEOREM**
Verification of maximum power transfer theorem.	
Week-6	**KVL AND KCL**
Verification of KVL and KCL using digital simulation.	
Week-7	**DIGITAL SIMULATION OF THEOREMS**
Superposition theorem and Thevenins theorem using digital simulation.	
Week-8	**NORTON'S THEOREM AND MAXIMUM POWER TRANSFER THEOREM**
Norton's theorem and maximum power transfer theorem using digital simulation.	

Week-9	**P-N JUNCTION DIODE**
Volt Ampere characteristics of p-n junction diode.	
Week-10	**ZENER DIODE**
Zener Diode VI Characteristics	
Week-11	**RECTIFIERS**
Application of diode as Half wave rectifier and Full wave rectifier.	
Week-12	**COMMON BASE TRANSISTOR**
Verify the characteristics of common base transistor.	
Week-13	**COMMON EMITTER TRANSISTOR**
Verify the characteristics of common emitter transistor.	

Reference Books:

1. A. Chakrabarti, "Circuit Theory", Dhanpat Rai Publications, 6th Edition, 2006.
2. William Hayt, Jack E. Kemmerly S.M. Durbin, "Engineering Circuit Analysis", Tata McGraw-Hill, 7th Edition, 2010.
3. K. S. Suresh Kumar, "Electric Circuit Analysis", Pearson Education, 1st Edition, 2013.

Web References:

1. http://www.ee.iitkgp.ac.in
2. http://www.citchennai.edu.in
3. http://www.iare.ac.in

Course Home Page:

ENGINEERING PRACTICE LABORATORY

II Semester: CSE / ECE / EEE / IT

Course Code	Category	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS112	Foundation	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 48				Total Classes: 48		

OBJECTIVES:

The course should enable the students to:

I. Understand the fundamental concepts of computer networking.
II. Design blogs and view the Skype installation.
III. Prepare productivity tools like word processors, spreadsheets, presentations.
IV. Develop models using fitting, carpentry and Tin-Smithy trades.
V. Demonstrate the process of house wiring for connecting and controlling home appliances.
VI. Illustrate metal joining arc welding process, plumbing, and power tools.

LIST OF EXPERIMENTS

WEEK-1 NETWORK DEVICES

1 Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.
2 Study of following Network Devices in Detail
- Repeater
- Hub
- Switch
- Bridge
- Router
- Gate Way

WEEK-2 IP ADDRESS

1 Study of network IP Classification of IP address, Sub netting ,Super netting
2 Connect the computers in Local Area Network
3 Study of basic network command and Network configuration commands

WEEK-3 PACKET TRACER

1 Configure a Network topology using packet tracer software
2 Configure a Network using Distance Vector Routing protocol(RIP)
3 Configure Network using Link State Vector Routing protocol(OSPF)

WEEK-4 BLOG CRAETION, SKYPE INSTALLATION AND CYBER HYGIENE

Creating blogs import the data into blogs, blog templates, blog design. Skype installation and usages of Skype. Install antivirus software; Configure their personal firewall and windows update on their computer.

WEEK-5 LATEX

To create project certificate, Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in LaTeX

WEEK-6	**LATEX**
Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check and Track Changes using LaTeX.	
WEEK-7	**LATEX**
Mathematical expressions, Subscripts and superscripts, Brackets and Parentheses, Fractions and Binomials, Aligning Equations, Operators, Spacing in math mode, Integrals, sums and limits, Display style in math mode, List of Greek letters and math symbols, Mathematical fonts.	
WEEK-8	**LATEX**
Producing Simple Documents, a LaTeX Input File and Ordinary Text using LaTeX	
WEEK-9	**LATEX**
Prepare class timetable and student marks list using LaTex.	
WEEK-10	**SHARE LATEX**
Create your first ShareLaTeX document, Uploading a project, Copying a project, Creating a project from a template, Including images in ShareLaTeX.	
WEEK-11	**SHARE LATEX**
Exporting your work from ShareLaTeX,Using bibliographies in ShareLaTeX,Sharing your work with others,Debugging Compilation timeout errors,Code Check	
WEEK-12	**HOUSE WIRING**
Power point, light fitting and switches, television, home theater.	
WEEK-13	**CARPENTRY**
Study of tools and joints; Practice in planning, chiseling, marking and sawing; Joints: Cross joint, T joint, Dove tail joint.	
WEEK-14	**SOLDERING**
Electronic components (PCB'S), resistance soldering, desoldering, and soldering effects.	
WEEK-15	**FITTING**
Study of tools, practice in filing, cutting, drilling and tapping; Male and female joints, stepped joints**.**	
WEEK-16	**ELECTRICAL WINDING**
Lap winding, wave winding and design of transformer.	
Reference Books:	
1. Peter Norton, "Introduction to Computers", Tata McGraw-Hill Publishers, 6th Edition, 2010. 2. Scott Muller, Que, "Upgrading and Repairing", Pearson Education, PC's 18th Edition, 2009. 3. H. S. Bawa, "Workshop Practice", Tata Mc Graw Hill Publishing Company Limited, New Delhi, 2nd 4. Edition, 2007.	
Web References:	
1. http://www.cl.cam.ac.uk/teaching/1011/CompFunds 2. http://www.bibcol.com. 3. http://www.tutorialspoint.com/computer_fundamentals 4. http://www.craftsmanspace.com	

DESIGN AND ANALYSIS OF ALGORITHMS

III Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT001	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Assess how the choice of data structures and algorithm design methods impacts the performance of programs.
II. Solve problems using data structures such as binary search trees, and graphs and writing programs for these solutions.
III. Choose the appropriate data structure and algorithm design method for a specified application.
IV. Solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking, and branch and bound and writing programs for these solutions.

UNIT-I	INTRODUCTION	Classes: 9

Algorithm: Pseudo code for expressing algorithms; Performance analysis: Space complexity, time complexity; Asymptotic notations: Big O notation, omega notation, theta notation and little o notation, probabilistic analysis, amortized complexity; Divide and Conquer: General method, binary search, quick sort, merge sort, Strassen's matrix multiplication.

UNIT-II	SEARCHING AND TRAVERSAL TECHNIQUES	Classes: 8

Disjoint set operations, union and find algorithms; Efficient non recursive binary tree traversal algorithms, spanning trees; Graph traversals: Breadth first search, depth first search, connected components, biconnected components.

UNIT-III	GREEDY METHOD AND DYNAMIC PROGRAMMING	Classes: 10

Greedy method: The general method, job sequencing with deadlines, knapsack problem, minimum cost spanning trees, single source shortest paths.

Dynamic programming: The general method, matrix chain multiplication optimal binary search trees, 0/1 knapsack problem, single source shortest paths, all pairs shortest paths problem, the travelling salesperson problem.

UNIT-IV	BACKTRACKING AND BRANCH AND BOUND	Classes: 9

Backtracking: The general method, the 8 queens problem, sum of subsets problem, graph coloring, Hamiltonian cycles; Branch and bound: The general method, 0/1 knapsack problem, least cost branch and bound solution, first in first out branch and bound solution, travelling salesperson problem.

UNIT-V	NP-HARD AND NP-COMPLETE PROBLEMS	Classes: 9

Basic concepts: Non-deterministic algorithms, the classes NP - Hard and NP, NP Hard problems, clique decision problem, chromatic number decision problem, Cook's theorem.

Text Books:

1. Ellis Horowitz, Satraj Sahni, Sanguthevar Rajasekharan, "Fundamentals of Computer Algorithms", Universities Press, 2nd Edition, 2008.
2. Alfred V. Aho, John E. Hopcroft, Jeffrey D, "The Design And Analysis Of Computer Algorithms", Pearson India, 1st Edition, 2013.

Reference Books:

1. Levitin A, "Introduction to the Design and Analysis of Algorithms", Pearson Education, 3rd Edition, 2012.
2. Goodrich, M. T. R Tamassia, "Algorithm Design Foundations Analysis and Internet Examples", John Wileyn and Sons, 1st Edition, 2001.
3. Base Sara Allen Vangelder, "Computer Algorithms Introduction to Design and Analysis", Pearson, 3rd Edition, 1999.

Web References:

1. http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html
2. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms
3. http://www.facweb.iitkgp.ernet.in/~sourav/daa.html

E-Text Books:

1. http://ebook/com/item/introduction_to_the_design_and_analysis_of_algorithms_3rd_edition_anany_levitin/
2. https://drive.google.com/file/d/0B_Y1VbyboEDBTDVxVXpVbnk4TVE/edit?pref=2&pli=1
3. http://www.amazon.com/Computer-Algorithms-Introduction-Design-Analysis/dp/0201612445

MOOC Courses:

1. https://www.coursera.org/learn/algorithm-design-analysis
2. http://www.online.stanford.edu/course/algorithms-design-and-analysis-part-1
3. https://www.onlinecourses.nptel.ac.in/noc16_cs04/preview

Course Home Page:

DIGITAL LOGIC DESIGN

III Semester: **CSE / IT**

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEC020	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Analyze and explore the uses of logic functions for building digital logic circuits
II. Explore the combinational logic circuits.
III. Examine the operation of sequential (synchronous and asynchronous) circuits.
IV. Know the concepts of basic memory system.

UNIT-I	NUMBERS SYSTEMS AND CODES	Classes: 09

Review of number systems, number base conversion; Binary arithmetic: Binary weighted and non-weighted codes; Complements: Signed binary numbers; Error detection and correcting codes; Binary logic.

UNIT-II	BOOLEAN ALGEBRA AND GATE LEVEL MINIMIZATION	Classes: 09

Postulates and theorems; representation of switching functions; SOP and POS forms; Canonical forms; Digital logic gates; Karnaugh Maps: Minimization using three variable; four variable; five variable K-Maps; Don't Care Conditions; NAND and NOR implementation; Other Two-level implementation; Exclusive –OR function.

UNIT-III	DESIGN OF COMBINATIONAL CIRCUITS	Classes: 09

Combinational circuits: Analysis and design procedure; Binary adder and subtractors; Carry look-a-head adder; Binary multiplier.

Magnitude comparator; BCD adder; Decoders; Encoders; Multiplexers; Demultiplexer.

UNIT-IV	DESIGN OF SEQUENTIAL CIRCUITS	Classes: 10

Combinational vs sequential circuits ; Latches, flip flops: RS flip flop, JK flip flop, T flip flop, D flip flop, Master-Slave flip flop, flip flops excitation functions; Conversion of one flip flop to another flip flop; Shift registers; Design of asynchronous and synchronous circuits; State table, state diagram, state reduction and state assignment for mealy and moore machines.

UNIT-V	MEMORY	Classes: 08

Random access memory; Types of ROM; Memory decoding; Address and data bus; Sequential memory; Cache memory; Programmable logic arrays; Memory hierarchy in terms of capacity and access time.

Text Book:

1. M. Morris Mano, "Digital Design", Pearson Education/PHI, 3rd Edition, 2001.

Reference Books:

1. Charles H. Roth Jr, "Fundamentals of Logic Design", Thomson Brooks/Cole, 5th Edition, 2004.
2. C. V. S. Rao, "Switching Theory and Logic Design, Pearson Education, 1st Edition, 2005.
3. M. Rafiquzzaman, "Fundamentals of Digital Logic and Micro Computer Design", John Wiley, 5th Edition, 2005.
4. Zvi. Kohavi, "Switching and Finite Automata Theory", Tata McGraw Hill, 2nd Edition, 1991.

Web References:

1. http://www.american.cs.ucdavis.edu/academic/ecs154a.sum14/postscript/cosc205.pdf
2. http://www.engrcs.com/courses/engr250/engr250lecture.pdf
3. http://www.ece.rutgers.edu/~marsic/Teaching/DLD/slides/lec-1.pdf
4. http://www.iare.ac.in

E-Text Books :

1. https://drive.google.com/file/d/0B4ChICvNGHlfN2NmODE1NjAtZWI5Zi00MmU0LWIyMmQtOTU3ZGUyMzAwODc1/view
2. https://accessengineeringlibrary.com/browse/digital-logic-design-and-computer-organization-with-computer-architecture-for-security
3. http://www.ece.rutgers.edu/~marsic/Teaching/DLD/syllabus.html

Course Home Page:

DISCRETE MATHEMATICAL STRUCTURES

III Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS013	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Describe the logical and mathematical foundations, and study abstract models of computation.
II. Illustrate the limitations of predicate logic.
III. Define modern algebra for constructing and writing mathematical proofs.
IV. Solve the practical examples of sets, functions, relations and recurrence relations.
V. Recognize the patterns that arise in graph problems and use this knowledge for constructing the trees and spanning trees.

UNIT-I	MATHEMATICAL LOGIC AND PREDICATES	Classes: 10

Mathematical logic: Statements and notations, connectives, well-formed formulas, truth tables, tautology, equivalence implication; Normal forms: Disjunctive normal forms, conjunctive normal forms, principle disjunctive normal forms, principle conjunctive normal forms; Predicate calculus: Predicative logic, statement functions, variables and quantifiers, free and bound variables, rules of inference, consistency, proof of contradiction, automatic theorem proving.

UNIT-II	RELATIONS, FUNCTIONS AND LATTICES	Classes: 10

Relations: Properties of binary relations, equivalence, transitive closure, compatibility and partial ordering relations, lattices, Hasse diagram; Functions: Inverse function, composition of functions, recursive functions; Lattices: Lattices as partially ordered sets; Definition and examples, properties of lattices, lattices as algebraic systems, sub lattices, direct product and homomorphism, some special lattices.

UNIT-III	ALGEBRAIC STRUCTURES AND COMBINATORICS	Classes: 10

Algebraic structures: Algebraic systems, examples and general properties, semi groups and monoids, groups, sub groups, homomorphism, isomorphism, rings.

Combinatory: The fundamental counting principles, permutations, disarrangements, combinations, permutations and combinations with repetitions, the binomial theorem, multinomial theorem, generalized inclusion exclusion principle.

UNIT-IV	RECURRENCE RELATION	Classes: 08

Recurrence relation: Generating functions, function of sequences calculating coefficient of generating function, recurrence relations, solving recurrence relation by substitution and generating functions, characteristics roots solution of homogeneous recurrence relation.

UNIT-V	GRAPHS AND TREES	Classes: 07

Graphs: Basic concepts of graphs, isomorphic graphs, Euler graphs, Hamiltonian graphs, planar graphs, graph coloring, digraphs, directed acyclic graphs, weighted digraphs, region graph, chromatic numbers; Trees: Trees, spanning trees, minimal spanning trees.

Text Books:

1. J. P. Tremblay, R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", Tata Mc Graw Hill, India, 1st Edition, 1997.
2. Joe L. Mott, Abraham Kandel, Theodore P. Baker, "Discrete Mathematics for Computer Scientists and Mathematicians", Prentice Hall of India Learning Private Limited, New Delhi, India, 2nd Edition, 2010.

Reference Books:

1. Kenneth H. Rosen, "Discrete Mathematics and Its Applications", Tata Mcgraw-Hill, New Delhi, India, 6th Edition, 2012.
2. C. L. Liu, D. P. Mohapatra, "Elements of Discrete Mathematics", Tata Mcgraw-Hill, India, 3rd Edition, 2008.
3. Ralph P. Grimaldi, B. V. Ramana, "Discrete and Combinatorial Mathematics - An Applied Introduction", Pearson Education, India, 5th Edition, 2011.
4. D. S. Malik, M. K. Sen, "Discrete Mathematical Structures: Theory and Applications", Thomson Course Technology, India, 1st Edition, 2004.

Web References:

1. http://www.web.stanford.edu/class/cs103x
2. http://www.cs.odu.edu/~cs381/cs381content/web_course.html
3. http://www.cse.iitd.ernet.in/~bagchi/courses/discrete-book
4. http://www.saylor.org/course/cs202/
5. http://www.nptel.ac.in/courses/106106094/
6. http://www.tutorialspoint.com/discrete_mathematics
7. http://www.dmtcs.org/dmtcs-ojs/index.php/dmtcs

E-Text Books:

1. https://people.eecs.berkeley.edu/~daw/teaching/cs70-s05/
2. http://home.anadolu.edu.tr/~eakyar/dersler/ayrik/kitap/kitap.pdf
3. http://45.63.83.30/graph-theory-keijo-ruohonen-pdf-tut.pdf
4. http://www.zib.de/groetschel/teaching/WS1314/BondyMurtyGTWA.pdf

Course Home Page:

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

III Semester: CSE | IV Semester: IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS003	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Understand fundamentals of object-oriented terminology and programming concepts in java.
II. Acquire basics of how to translate solution problem into object oriented form.
III. Develop programs in java for solving simple applications.
IV. Design and implement simple program that use exceptions and multithreads.

UNIT-I	OOP CONCEPTS AND JAVA PROGRAMMING	Classes: 08

OOP concepts: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, procedural and object oriented programming paradigm; Java programming: History of java, comments data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow statements, jump statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, exploring string class.

UNIT-II	INHERITANCE, INTERFACES AND PACKAGES	Classes: 10

Inheritance: Inheritance hierarchies, super and subclasses, member access rules, super keyword, preventing inheritance: final classes and methods, the object class and its methods; Polymorphism: Dynamic binding, method overriding, abstract classes and methods; Interface: Interfaces vs Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface; Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

UNIT-III	EXCEPTION HANDLING AND MULTI THREADING	Classes: 08

Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, checked and unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Multithreading: Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.

UNIT-IV	FILES, AND CONNECTING TO DATABASE	Classes: 10

Files: Streams, byte streams, character stream, text input/output, binary input/output, random access file operations, file management using file class; Connecting to Database: Connecting to a database, querying a database and processing the results, updating data with JDBC.

UNIT-V	GUI PROGRAMMING AND APPLETS	Classes: 09

GUI programming with Java: The AWT class hierarchy, introduction to swing, swing Vs AWT, hierarchy for swing components, containers, JFrame, JApplet, JDialog, JPanel; Overview of some swing components: JButton, JLabel, JTextField, JTextArea, simple applications; Layout management: Layout manager types: Border, grid and flow; Applets: Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets.

Text Books:

1. Herbert Schildt, Dale Skrien, "Java Fundamentals – A Comprehensive Introduction", McGraw-Hill, 1st Edition, 2013.
2. Herbert Schildt, "Java the Complete Reference", McGraw Hill, Osborne, 8th Edition, 2011.
3. T. Budd, "Understanding Object-Oriented Programming with Java", Pearson Education, Updated Edition (New Java 2 Coverage), 1999.

Reference Books:

1. P. J. Deitel, H. M. Deitel, "Java: How to Program", Prentice Hall, 6th Edition, 2005.
2. P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, CRC Press, 2007.
3. Bruce Eckel, "Thinking in Java", Prentice Hall, 4th Edition, 2006.
4. Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 2nd Edition, 2014.

Web References:

1. http://www.javatpoint.com/java-tutorial
2. http://www.javatutorialpoint.com/introduction-to-java/

E-Text Books:

1. http://bookboon.com/en/java-programming-language-ebooks
2. https://en.wikibooks.org/wiki/Java_Programming

Course Home Page:

COMPUTER ORGANIZATION AND ARCHITECTURE

III Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS004	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Understand the organization and architecture of computer systems and electronic computers.
II. Study the assembly language program execution, instruction format and instruction cycle.
III. Design a simple computer using hardwired and microprogrammed control methods.
IV. Study the basic components of computer systems besides the computer arithmetic.
V. Understand input-output organization, memory organization and management, and pipelining.

UNIT-I	INTRODUCTION TO COMPUTER ORGANIZATION	Classes: 08

Basic computer organization, CPU organization, memory subsystem organization and interfacing, input or output subsystem organization and interfacing, a simple computer levels of programming languages, assembly language instructions, instruction set architecture design, a simple instruction set architecture.

UNIT-II	ORGANIZATION OF A COMPUTER	Classes: 10

Register transfer: Register transfer language, register transfer, bus and memory transfers, arithmetic micro operations, logic micro operations, shift micro operations; Control unit: Control memory, address sequencing, micro program example, and design of control unit.

UNIT-III	CPU AND COMPUTER ARITHMETIC	Classes: 08

CPU design: Instruction cycle, data representation, memory reference instructions, input-output, and interrupt, addressing modes, data transfer and manipulation, program control.

Computer arithmetic: Addition and subtraction, floating point arithmetic operations, decimal arithmetic unit.

UNIT-IV	INPUT-OUTPUT ORGANIZATION AND MEMORY ORGANIZATION	Classes: 10

Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory; Input or output organization: Input or output Interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access.

UNIT-V	MULTIPROCESSORS	Classes: 09

Pipeline: Parallel processing, pipelining-arithmetic pipeline, instruction pipeline; Multiprocessors: Characteristics of multiprocessors, inter connection structures, inter processor arbitration, inter processor communication and synchronization.

Text Books:

1. M. Morris Mano, "Computer Systems Architecture", Pearson, 3rd Edition, 2007.
2. John D. Carpinelli, "Computer Systems Organization and Architecture", Pearson, 1st Edition, 2001.
3. Patterson, Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Morgan Kaufmann, 5th Edition, 2013.

Reference Books:

1. John. P. Hayes, "Computer System Architecture", McGraw-Hill, 3rd Edition, 1998.
2. Carl Hamacher, Zvonko G Vranesic, Safwat G Zaky, "Computer Organization", McGraw-Hill, 5th Edition, 2002.
3. William Stallings, "Computer Organization and Architecture", Pearson Edition, 8th Edition, 2010.

Web References:

1. https://www.tutorialspoint.com/computer_logical_organization/
2. https://www.courseera.org/learn/comparch
3. https://www.cssimplified.com/.../computer-organization-and-assembly-language-programming

E-Text Books:

1. https://www.groupes.polymtl.ca/inf2610/.../ComputerSystemBook.pdf
2. https://www.cse.hcmut.edu.vn/~vtphuong/KTMT/Slides/TextBookFull.pdf

Course Home Page:

DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY

III Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT101	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 39				Total Classes: 39		

OBJECTIVES:

The course should enable the students to:

I. Learn how to analyze a problem and design the solution for the problem.
II. Design and implement efficient algorithms for a specified application.
III. Identify and apply the suitable algorithm for the given real world problem.

LIST OF EXPERIMENTS

Week-1 **QUICK SORT**

Sort a given set of elements using the quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the 1st to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

Week-2 **MERGE SORT**

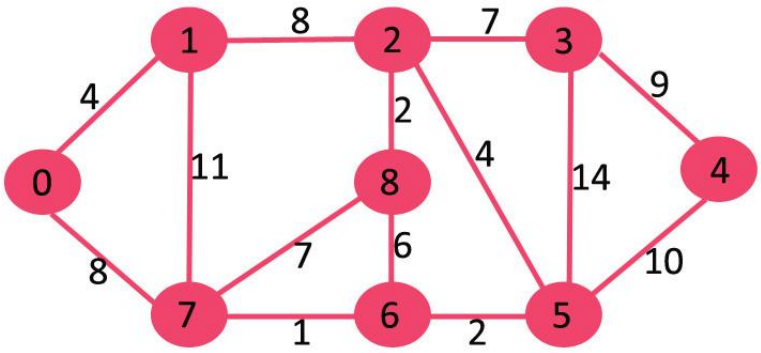
Implement merge sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

Week-3 **KNAPSACK PROBLEM**

Implement 0/1 Knapsack problem using Dynamic Programming.

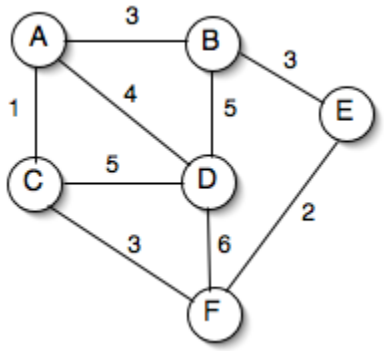
Week-4 **SHORTEST PATHS ALGORITHM**

From a given vertex in a weighted connected graph, find shortest paths from 0 to other vertices using Dijkstra's algorithm.



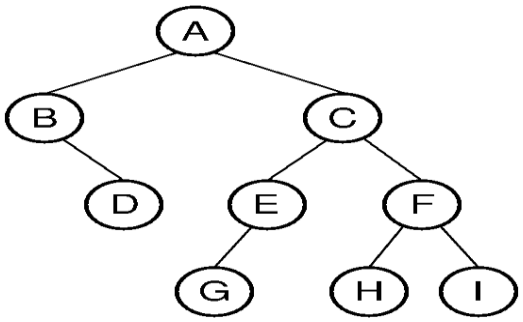
Week-5	MINIMUM COST SPANNING TREE

Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.



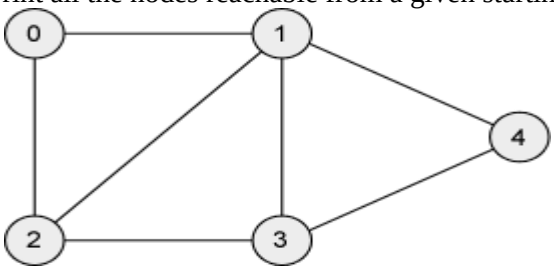
Week-6	TREE TRAVESRSALS

Perform various tree traversal algorithms for a given tree.

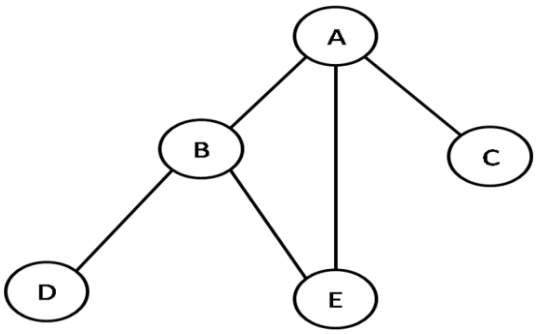


Week-7	GRAPH TRAVERSALS

a. Print all the nodes reachable from a given starting node in a digraph using BFS method.

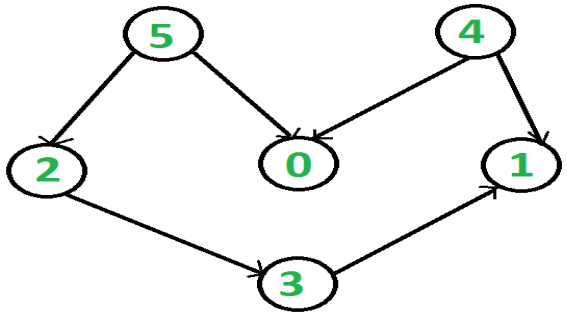


b. Check whether a given graph is connected or not using DFS method.



Week-8	WARSHALL'S ALGORITHM

a. Obtain the all pair shortest path



b. Compute the transitive closure of a given directed graph using Warshall's algorithm.

Week-9	SUM OF SUB SETS PROBLEM

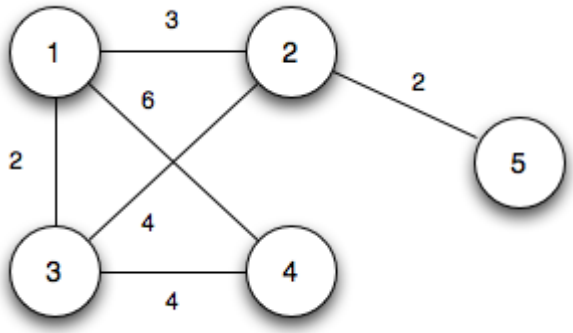
Find a subset of a given set S = {sl, s2,....., sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions {1, 2, 6} and {1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

Week-10	TRAVELLING SALES PERSON PROBLEM

Implement any scheme to find the optimal solution for the Traveling Sales Person problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation.

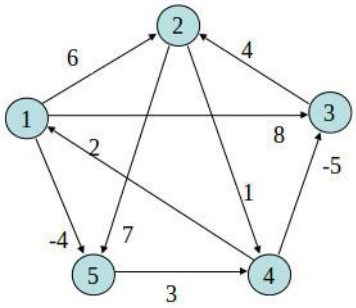
Week-11	MINIMUM COST SPANNING TREE

Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.



Week-12	ALL PAIRS SHORTEST PATHS

Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.



	1	2	3	4	5
1	0	6	8	∞	-4
2	∞	0	∞	1	7
3	∞	4	0	∞	∞
4	2	∞	-5	0	∞
5	∞	∞	∞	3	0

Week-13	**N QUEENS PROBLEM**

Implement N Queen's problem using Back Tracking.

Reference Books:

1. Levitin A, "Introduction to the Design and Analysis of Algorithms", Pearson Education, 2008.
2. Goodrich, M.T. R Tomassia, "Algorithm Design foundations Analysis and Internet Examples", John Wiley and Sons, 2006.
3. Base Sara, Allen Van Gelder, "Computer Algorithms Introduction to Design and Analysis", Pearson, 3rd Edition, 1999.

Web References:

1. http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html
2. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms
3. http://www.facweb.iitkgp.ernet.in/~sourav/daa.html

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Desktop Computer Systems: 36 nos

SOFTWARE: C programming Compiler (Open source)

OBJECT ORIENTED PROGRAMING THROUGH JAVA LABORATORY

III Semester: CSE | IV Semester: IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS103	Foundation	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 39				Total Classes: 39		

OBJECTIVES:

The course will enable the students to:

I. Practice object-oriented programs and build java applications.
II. Implement java programs for establishing interfaces.
III. Implement sample programs for developing reusable software components.
IV. Create database connectivity in java and implement GUI applications.

LIST OF EXPERIMENTS

Week-1 BASIC PROGRAMS

a. Try debug step by step with small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
b. Write a java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.
c. The Fibonacci sequence is defined by the following rule. The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a java program that uses both recursive and non-recursive functions.

Week-2 MATRICES, OVERLOADING, OVERRIDING

a. Write a java program to multiply two given matrices.
b. Write a java program to implement method overloading and constructors overloading.
c. Write a java program to implement method overriding.

Week-3 PALINDROME, ABSTRACT CLASS

a. Write a java program to check whether a given string is palindrome.
b. Write a java program for sorting a given list of names in ascending order.
c. Write a java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

Week-4 INTERFACE

Write a program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

Week-5	MULTITHREADING
a. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number. b. Write a java program that correct implements of producer consumer program.	
Week-6	**FILES**
a. Write a java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes. b. Write a java program that displays the number of characters, lines and words in a text file. c. Write a java program that reads a file and displays the file on the screen with line number before each line.	
Week-7	**FILES**
a. Suppose that table named table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using labels in grid layout. b. Write a java program that connects to a database using JDBC and does add, delete, modify and retrieve operations.	
Week-8	**JAVA PROGRAM WITH DATABASE**
a. Write a java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (/t). It takes a name or phone number as input and prints the corresponding other value from the hash table. Hint: Use hash tables. b. Implement the above program with database instead of a text file.	
Week-9	**FILES**
a. Write a java program that takes tab separated data (one record per line) from a text file and insert them into a database. b. Write a java program that prints the metadata of a given table.	
Week-10	**TRAFFIC LIGHT**
Write a java program that simulates a traffic light. The program lets the user select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with “STOP” or “READY” or ”GO” should appear above the buttons in selected color. Initially, there is no message shown.	
Week-11	**MOUSE EVENTS**
a. Write a java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. Use adapter classes. b. Write a java program to demonstrate the key event handlers.	
Week-12	**CALCULATOR**
Write a java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +,-,*, % operations. Add a text field to display the result. Handle any possible exception like divided by zero.	

Week-13	APPLET

a. Develop an applet that displays a simple message.
b. Develop an applet that receives an integer in one text field and computes its factorial value and returns it in another text field, when the button named "compute" is clicked.

Reference Books:

1. P. J. Deitel, H. M. Deitel, "Java for Programmers", Pearson Education, PHI, 4th Edition, 2007.
2. P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, 2nd Edition, 2007
3. Bruce Eckel, "Thinking in Java", Pearson Education, 4th Edition, 2006.
4. Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 5th Edition, 2010.

Web References:

1. www.niecdelhi.ac.in
2. https://www.linkedin.com/in/achin-jain-85061412
3. www.rank1infotech.com

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Desktop Computer Systems: 36 nos.

SOFTWARE: Java Development Kit (Open source)

DIGITAL LOGIC DESIGN LABORATORY

III Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEC116	Foundation	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES:

The course should enable the students to:

I. Build the concept of digital and binary system.
II. Design and analyze the combinational logic circuits.
III. Design and analyze the sequential logic circuits.

LIST OF EXPERIMENTS

Week-1	**STUDY OF LOGIC GATES.**
To study and verify the truth table of logic gates	
Week-2	**ADDERS AND SUBSTRACTORS**
Design and implementation of adders and subtractions using logic gates.	
Week-3	**BCD TO EXCESS-3 CODE CONVERTER**
Design and implementation of BCD to Excess-3 code using IC 7483.	
Week-4	**BINARY TO GRAY CODE CONVERTER**
Design and implementation of binary to gray code using logic gates.	
Week-5	**MULTIPLEXER AND DEMULTIPLEXER**
Design and implementation of 2-bit magnitude comparator using logic gates, 8-bit magnitude comparator using IC 7485.	
Week-6	**COMPARATORS**
Design and implementation of 16-bit odd/even parity checker/ generator using IC 74180.	
Week-7	**ENCODER AND DECODER**
Design and implementation of encoder and decoder using logic gates and study of IC 7445 and IC 74147.	
Week-8	**FLIPFLOPS**
Implementation of flip-flops using logic gates.	
Week-9	**SHIFT REGISTER**
Implementation of shift register using IC7495.	

Week-10	**STUDY OF ASYNCHRONOUS AND SYNCHRONOUS COUNTER**
Implementation of asynchronous and synchronous counter using IC7476.	
Week-11	**PRESETTABLE 4-BIT BINARY UP/DOWN COUNTER**
Design and implementation of up/down counter using IC74193.	
Week-12	**STUDY OF BCD COUNTER**
Design and implementation of BCD counter using IC7490.	
Reference Books:	
1. M. Morris Mano, "Digital Design", Pearson Education/PHI, 3rd Edition, 2007. 2. Zvi. Kohavi, "Switching and Finite Automata Theory", Tata McGraw-Hill, 2nd Edition, 2008.	
Web References:	
1. http://american.cs.ucdavis.edu/academic/ecs154a.sum14/postscript/cosc205.pdf 2. http://www.engrcs.com/courses/engr250/engr250lecture.pdf 3. http://www.ece.rutgers.edu/~marsic/Teaching/DLD/slides/lec-1.pdf 4. http://www.iare.ac.in	
Course Home Page:	

LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 36 STUDENTS

S. No	Name of the Equipment	Range
1	IC TRAINER KIT	-----
2	LOGIC GATE ICS	IC 7400, 7402, 7404, 7406, IC 7408, 7432, 7486
3	REGULATED POWER SUPPLY	0-30 V
4	PATCH CORDS	-------
5	IC'S	IC 7483, 7485, 74180, 7411, 7476

DATABASE MANAGEMENT SYSTEMS

IV Semester: CSE | III Semester: IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS005	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Understand the role of database management system in an organization and learn the database concepts.
II. Design databases using data modeling and data normalization techniques.
III. Construct database queries using relational algebra and calculus.
IV. Understand the concept of a database transaction and related database facilities.
V. Learn how to evaluate a set of queries in query processing.

UNIT-I	CONCEPTUAL MODELING	Classes: 10

Introduction to file and database systems: Database system structure, data models, introduction to network and hierarchical models, ER model, relational model.

UNIT-II	RELATIONAL APPROACH	Classes: 08

Relational algebra and calculus: Relational algebra, selection and projection, set operations, renaming, joins, division, examples of algebra queries, relational calculus, tuple relational calculus, domain relational calculus, expressive power of algebra and calculus.

UNIT-III	BASIC SQL QUERY	Classes: 10

SQL data definition; Queries in SQL: updates, views, integrity and security, relational database design.

Functional dependencies and normalization for relational databases up to five normal forms.

UNIT-IV	TRANSACTION MANAGEMENT	Classes: 09

Transaction processing: Introduction, need for concurrency control, desirable properties of transaction, schedule and recoverability, serializability and schedules; Concurrency control: Types of locks, two phases of locking, deadlock, time stamp based concurrency control, recovery techniques , concepts, immediate update, deferred update, shadow paging.

UNIT-V	DATA STORAGE AND QUERY PROCESSING	Classes: 08

Record storage and primary file organization, secondary storage devices, operations on files, heap file, sorted files, hashing techniques, and index structures for files; Different types of indexes, B tree, B+ tree, query processing.

Text Book:

Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, 4th Edition, 2002.

Reference Books:

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamental Database Systems", Pearson Education, 3rd Edition, 2003.
2. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 3rd Edition, 2003.
3. Hector Garcia Molina, Jeffrey D. Ullman, Jennifer Widom, "Database System Implementation", Pearson Education, United States, 1st Edition, 2000.
4. Peter Rob, Corlos Coronel, "Database System, Design, Implementation and Management", Thompson Learning Course Technology, 5th Edition, 2003.

Web References:

1. https://www.youtube.com/results?search_query=DBMS+onluine+classes
2. http://www.w3schools.in/dbms/
3. http://beginnersbook.com/2015/04/dbms-tutorial/

E-Text Books:

1. http://www.e-booksdirectory.com/details.php?ebook=10166
2. http://www.e-booksdirectory.com/details.php?ebook=7400re

Course Home Page:

WEB TECHNOLOGIES

IV Semester: CSE | V Semester: IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS006	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Design static and dynamic webpages using HTML, CSS and Java Script.
II. Apply tools to retrieve the information from the database.
III. Understand a well formed XML schemas for developing web applications
IV. Design and implement web services from the server and client side.

UNIT-I	INTRODUCTION TO HTML AND JAVA SCRIPT	Classes: 10

Introduction to html, fundamentals of HTML elements, Document body, text, hyperlink, lists, tables, color and images, frames; Cascading Style Sheets: Introduction, defining your own styles, properties and values in styles, style sheets, formatting blocks, and layers; JavaScript: JavaScript basics, variables, string manipulation, mathematical functions, statements, operators, arrays and functions.

UNIT-II	OBJECTS IN JAVASCRIPT AND XML	Classes: 08

Objects in JavaScript: Data and objects in JavaScript, regular expressions, exception handling, built-in objects, events; Dynamic HTML with JavaScript: Data validation, opening a new window, Rollover buttons, moving images, multiple pages in a single download, floating logos; XML: Basics XML, document type definition, xml schemas, Document Object Model, presenting XML.

UNIT-III	SERVLETS AND JSP	Classes: 08

Servlet: Lifecycle of a Servlet, a simple Servlet, the servlet API, the Javax.servlet package, reading Servlet parameters, the javax.servlet. HTTP package, Handling HTTP requests and responses, using cookies and sessions.

JSP: The anatomy of a JSP page, JSP processing, declarations, directives, expressions, code snippets, implicit objects, using beans in JSP pages, connecting to database in JSP.

UNIT-IV	INTRODUCTION TO PHP	Classes: 10

Introduction to PHP: Basics of PHP, downloading, installing, configuring PHP, programming in a web environment and the anatomy of a PHP page; Overview of PHP data types and concepts: Variables and data types, operators, expressions and statements, strings, arrays and functions.

UNIT-V	PHP AND DATABASE ACCESS	Classes: 09

PHP and database access: Basic database concepts, connecting to a MySQL database, retrieving and displaying results, modifying, updating and deleting data; MVC architecture: PHP and other web technologies: PHP and XML, PHP and AJAX.

Text Books:

1. Chris Bates, "Web Programming: Building Internet Applications", Wiley DreamTech, 2nd Edition, 2002.
2. Jeffrey C K Jackson, "Web Technologies", Pearson Education, 1st Edition, 2006.
3. Steven Holzner, "The Complete Reference PHP", Tata McGraw-Hill, 1st Edition, 2007.

Reference Books:

1. Hans Bergsten, "Java Server Pages", O" Reilly, 3rd Edition, 2003.
2. D. Flanagan, "Java Script", O'Reilly, 6th Edition, 2011.
3. Jon Duckett, "Beginning Web Programming", WROX, 2nd Edition, 2008.
4. Herbert Schildt, "Java the Complete Reference", McGraw Hill - Osborne, 8th Editon, 2011.

Web References:

1. https://www.vidyarthiplus.com/vp/thread-16509.html#.WFzQvVMrLDc
2. http://www.bdu.ac.in/centers/uic/docs/courseware/NME2-Notes/Unit1.pdf

E-Text Books:

1. http://bookboon.com/en/it-programming-ebooks
2. https://www.free-ebooks.net/category/internet-technology

Course Home Page:

THEORY OF COMPUTATION

IV Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT002	Foundation	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Comprehend abstract, mathematical models of computation and use them to solve computational problems.
II. Interpret the relationship between formal languages in Chomsky's hierarchy and different machines.
III. Analyze and explain the behavior of push-down automata.
IV. Understand the limits and capacities of Turing's machines to recognize languages.

UNIT-I	FINITE AUTOMATA	Classes: 10

Fundamentals: Alphabet, strings, language, operations; Introduction to finite automata: The central concepts of automata theory, deterministic finite automata, nondeterministic finite automata, an application of finite automata, finite automata with epsilon transitions.

UNIT-II	REGULAR LANGUAGES	Classes: 09

Regular sets, regular expressions, identity rules, constructing finite automata for a given regular expressions, conversion of finite automata to regular expressions, pumping lemma of regular sets, closure properties of regular sets (proofs not required), regular grammars-right linear and left linear grammars, equivalence between regular linear grammar and finite automata, inter conversion.

UNIT-III	CONTEXT FREE GRAMMARS	Classes: 08

Context free grammars and languages: Context free grammar, derivation trees, sentential forms, right most and leftmost derivation of strings, applications.

Ambiguity in context free grammars, minimization of context free grammars, Chomsky normal form, Greibach normal form, pumping lemma for context free languages, enumeration of properties of context free language (proofs omitted).

UNIT-IV	PUSHDOWN AUTOMATA	Classes: 09

Pushdown automata, definition, model, acceptance of context free language, acceptance by final state and acceptance by empty stack and its equivalence, equivalence of context free language and pushdown automata, inter conversion;(Proofs not required); Introduction to deterministic context free languages and deterministic pushdown automata.

UNIT-V	TURING MACHINE	Classes: 10

Turing machine: Turing machine, definition, model, design of Turing machine, computable functions, recursively enumerable languages, Church's hypothesis, counter machine, types of Turing machines (proofs not required), linear bounded automata and context sensitive language, Chomsky hierarchy of languages.

Text Book:

John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata, Theory, Languages and Computation", Pearson Education, 3rd Edition, 2007.

Reference Books:

1. John C Martin, "Introduction to Languages and Automata Theory", Tata McGraw-Hill, 3rd Edition, 2007.
2. Daniel I.A. Cohen, "Introduction to Computer Theory", John Wiley & Sons, 2nd Edition, 2004.

Web References:

1. https://www.tutorialspoint.com/automata_theory/index.htm
2. https://www.iitg.ernet.in/dgoswami/Flat-Notes.pdf

E-Text Books:

https://freefundkenotes.files.wordpress.com/2014/02/toc-klp-mishra.pdf

MOOC Courses:

1. http://nptel.ac.in/courses/111103016/
2. http://nptel.ac.in/courses/106106049/
3. http://onlinevideolecture.com/?course_id=1312
4. http://www.nptelvideos.in/2012/11/theory-of-computation.html

Course Home Page:

COMPUTER NETWORKS

IV Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT003	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Recognize modern network architectures from a design and performance perspective.
II. Understand the basics and challenges of network communication.
III. Provide an opportunity to do network programming using TCP/IP.
IV. Interpret the operation of the protocols that are used inside the Internet.

UNIT-I	INTRODUCTION TO PHYSICAL LAYER	Classes: 10

Introduction: Networks, network types, internet history, standards and administration; Network models: Protocol layering, TCP/IP protocol suite, the OSI model; Introduction to physical layer: Data and signals, transmission impairment, data rate limits, performance; Transmission media: Introduction, guided media, unguided media; Switching: Introduction, circuit switched networks, packet switching.

UNIT-II	INTRODUCTION TO DATA LINK LAYER	Classes: 09

Introduction: Link layer addressing; Error detection and correction: Cyclic codes, checksum, forward error correction; Data link control: DLC services, data link layer protocols, HDLC, point to point protocol, media access control: Random access, controlled access, channelization, connecting devices and virtual LAN: Connecting devices, virtual LAN.

UNIT-III	THE NETWORK LAYER	Classes: 08

Network layer design issues, routing algorithms, congestion control algorithms, quality of service, and internetworking.

The network layer in the internet: IPv4 addresses, IPv6, internet control protocols, OSPF (Open Shortest Path First), BGP (Border Gateway Protocol), IP, (Internet Protocol), ICMP (internet control message protocol.

UNIT-IV	THE TRANSPORT LAYER	Classes: 09

The transport service, elements of transport protocols, congestion control; The internet transport protocols: UDP (User Datagram Protocol), TCP (Transport Control Protocol), performance problems in computer networks, network performance measurement.

UNIT-V	INTRODUCTION TO APPLICATION LAYER	Classes: 07

Introduction, client server programming, WWW (World Wide Web) and HTTP (Hyper Text Transfer Protocol), FTP (File Transfer Protocol), E-mail, telnet, secure shell, DNS(Domain Naming System), SNMP (Simple Network Management Protocol).

Text Books:

1. Andrew S. Tanenbaum, David.J.Wetherall, "Computer Networks", Prentice-Hall, 5th Edition, 2010.
2. Behrouz A. Forouzan, "Data Communications and Networking", Tata McGraw-Hill, 5th Edition, 2012.

Reference Books:

1. Douglas E. Comer, "Internetworking with TCP/IP ", Prentice-Hall, 5th Edition, 2011.
2. Peterson, Davie, "Computer Networks", Elsevier, 5th Edition, 2011.
3. Comer, "Computer Networks and Internets with Internet Applications", 4th Edition, 2004.
4. Chwan Hwa Wu, Irwin, "Introduction to Computer Networks and Cyber Security", CRC Publications, 2014.

Web References:

1. http://computer.howstuffworks.com/computer-networking-channel.htm
2. http://www.ietf.org
3. http://www.rfc-editor.org/
4. https://technet.microsoft.com/en-us/network/default.aspx

E-Text Books:

1. http://www.freebookcentre.net/networking-books-download/Lecture-Notes-on-Computer-Networks.html
2. http://www.freebookcentre.net/networking-books-download/Introduction-to-Computer-Networks.html

MOOC Course

1. https://www.mooc-list.com/course/networking-introduction-computer-networking-stanford-university
2. https://lagunita.stanford.edu/courses/Engineering/Networking/Winter2014/about.

Course Home Page:

OPERATING SYSTEMS

IV Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS007	Foundation	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Understand the functionalities of main components in operating systems.
II. Analyze the algorithms used in memory and process management.
III. Understand the clock synchronization protocols
IV. Interpret the concepts of input and output storage for file management.

UNIT-I	INTRODUCTION	Classes: 10

Operating systems objectives and functions: Computer system architecture, operating systems structure, operating systems operations; Evolution of operating systems: Simple batch, multi programmed, time shared, personal computer, parallel distributed systems, real time systems, special purpose systems, operating system services, user operating systems interface; Systems calls: Types of systems calls, system programs, protection and security, operating system design and implementation, operating systems structure, virtual machines.

UNIT-II	PROCESS AND CPU SCHEDULING, PROCESS COORDINATION	Classes: 10

Process concepts: The process, process state, process control block, threads; Process scheduling: Scheduling queues, schedulers, context switch, preemptive scheduling, dispatcher, scheduling criteria, scheduling algorithms, multiple processor scheduling; Real time scheduling; Thread scheduling; Case studies Linux windows; Process synchronization, the critical section problem; Peterson's solution, synchronization hardware, semaphores and classic problems of synchronization, monitors.

UNIT-III	MEMORY MANAGEMENT AND VIRTUAL MEMORY	Classes: 08

Logical and physical address space: Swapping, contiguous memory allocation, paging, structure of page table.

Segmentation: Segmentation with paging, virtual memory, demand paging; Performance of demand paging: Page replacement, page replacement algorithms, allocation of frames, thrashing.

UNIT-IV	FILE SYSTEM INTERFACE, MASS-STORAGE STRUCTURE	Classes: 09

The concept of a file, access methods, directory structure, file system mounting, file sharing, protection, file system structure, file system implementation, allocation methods, free space management, directory implementation, efficiency and performance; Overview of mass storage structure: Disk structure, disk attachment, disk scheduling, disk management, swap space management; Dynamic memory allocation: Basic concepts; Library functions.

UNIT-V	DEADLOCKS, PROTECTION	Classes: 08

System model: Deadlock characterization, methods of handling deadlocks, deadlock prevention, dead lock avoidance, dead lock detection and recovery form deadlock system protection, goals of protection, principles of protection, domain of protection, access matrix, implementation of access matrix, access control, revocation of access rights, capability based systems, language based protection.

Text Books:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Principles", Wiley Student Edition, 8th Edition, 2010.
2. William Stallings, "Operating System- Internals and Design Principles", Pearson Education, 6th Edition, 2002.

Reference Books:

1. Andrew S Tanenbaum, "Modern Operating Systems", PHI, 3rd Edition, 2007.
2. D. M. Dhamdhere, "Operating Systems a Concept based Approach", Tata McGraw-Hill, 2nd Edition, 2006.

Web References:

1. www.smartzworld.com/notes/operatingsystems
2. www.scoopworld.in
3. www.sxecw.edu.in
4. www.technofest2u.blogspot.com

E-Text Books:

1. https://it325blog.files.wordpress.com/2012/09/operating-system-concepts-7-th-edition.pdf
2. http://mpathinveco.blog.com/2014/11/25/operating-systems-william-stalling-6th-edition/
3. http://www.e-booksdirectory.com/details.php?ebook=10050
4. http://www.e-booksdirectory.com/details.php?ebook=9907
5. http://www.e-booksdirectory.com/details.php?ebook=9460

Course Home Page:

DATABASE MANAGEMENT SYSTEMS LABORATORY

IV Semester: CSE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS104	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES:

The course should enable the students to:

I. Implement the basic knowledge of SQL queries and relational algebra.
II. Construct database models for different database applications.
III. Apply normalization techniques for refining of databases.
IV. Practice various triggers, procedures, and cursors using PL/SQL.

LIST OF EXPERIMENTS

Week-1 **CREATION OF TABLES**

1. Create a table called Employee with the following structure.

Name	Type
Empno	Number
Ename	Varchar2(20)
Job	Varchar2(20)
Mgr	Number
Sal	Number

a. Add a column commission with domain to the Employee table.
b. Insert any five records into the table.
c. Update the column details of job
d. Rename the column of Employ table using alter command.
e. Delete the employee whose empno is 19.

2. Create department table with the following structure.

Name	Type
Deptno	Number
Deptname	Varchar2(20)
location	Varchar2(20)

a. Add column designation to the department table.
b. Insert values into the table.
c. List the records of emp table grouped by deptno.
d. Update the record where deptno is 9.
e. Delete any column data from the table.

3. Create a table called Customer table

Name	Type
Cust name	Varchar2(20)
Cust street	Varchar2(20)
Cust city	Varchar2(20)

a. Insert records into the table.
b. Add salary column to the table.
c. Alter the table column domain.
d. Drop salary column of the customer table.
e. Delete the rows of customer table whose cust_city is 'hyd'.

Create a table called branch table.

Name	Type
Branch name	Varchar2(20)
Branch city	Varchar2(20)
asserts	Number

a. Increase the size of data type for asserts to the branch.
b. Add and drop a column to the branch table.
c. Insert values to the table.
d. Update the branch name column
e. Delete any two columns from the table

5. Create a table called sailor table

Name	Type
Sid	Number
Sname	Varchar2(20)
rating	Varchar2(20)

a. Add column age to the sailor table.
b. Insert values into the sailor table.
c. Delete the row with rating >8.
d. Update the column details of sailor.
e. Insert null values into the table.

6. Create a table called reserves table

Name	Type
Boat id	Integer
sid	Integer
day	Integer

a. Insert values into the reserves table.
b. Add column time to the reserves table.
c. Alter the column day data type to date.
d. Drop the column time in the table.
e. Delete the row of the table with some condition.

Week -2	QUERIES USING DDL AND DML

1. a. Create a user and grant all permissions to the user.
   b. Insert the any three records in the employee table and use rollback. Check the result.
   c. Add primary key constraint and not null constraint to the employee table.
   d. Insert null values to the employee table and verify the result.
2. a. Create a user and grant all permissions to the user.
   b. Insert values in the department table and use commit.
   c. Add constraints like unique and not null to the department table.
   d. Insert repeated values and null values into the table.
3. a. Create a user and grant all permissions to the user.
   b. Insert values into the table and use commit.
   c. Delete any three records in the department table and use rollback.
   d. Add constraint primary key and foreign key to the table.
4. a. Create a user and grant all permissions to the user.
   b. Insert records in the sailor table and use commit.
   c. Add save point after insertion of records and verify save point.
   d. Add constraints not null and primary key to the sailor table.
5. a. Create a user and grant all permissions to the user.
   b. Use revoke command to remove user permissions.
   c. Change password of the user created.
   d. Add constraint foreign key and not null.
6. a. Create a user and grant all permissions to the user.
   b. Update the table reserves and use savepoint and rollback.
   c. Add constraint primary key , foreign key and not null to the reserves table
   d. Delete constraint not null to the table column.

Week -3	QUERIES USING AGGREGATE FUNCTIONS

1. a. By using the group by clause, display the enames who belongs to deptno 10 along with average salary.
   b. Display lowest paid employee details under each department.
   c. Display number of employees working in each department and their department number.
   d. Using built in functions, display number of employees working in each department and their department name from dept table. Insert deptname to dept table and insert deptname for each row, do the required thing specified above.
   e. List all employees which start with either B or C.
   f. Display only these ename of employees where the maximum salary is greater than or equal to 5000.
2. a. Calculate the average salary for each different job.
   b. Show the average salary of each job excluding manager.
   c. Show the average salary for all departments employing more than three people.
   d. Display employees who earn more than the lowest salary in department 30
   e. Show that value returned by sign (n) function.
   f. How many days between day of birth to current date.

3. a. Show that two substring as single string.
   b. List all employee names, salary and 15% rise in salary.
   c. Display lowest paid emp details under each manager
   d. Display the average monthly salary bill for each deptno.
   e. Show the average salary for all departments employing more than two people.
   f. By using the group by clause, display the eid who belongs to deptno 05 along with average salary.
4. a. Count the number of employees in department 20
   b. Find the minimum salary earned by clerk.
   c. Find minimum, maximum, average salary of all employees.
   d. List the minimum and maximum salaries for each job type.
   e. List the employee names in descending order.
   f. List the employee id, names in ascending order by empid.
5. a. Find the sids ,names of sailors who have reserved all boats called "INTERLAKE
   Find the age of youngest sailor who is eligible to vote for each rating level with at least two such sailors.
   b. Find the sname , bid and reservation date for each reservation.
   c. Find the ages of sailors whose name begin and end with B and has at least 3 characters.
   d. List in alphabetic order all sailors who have reserved red boat.
   e. Find the age of youngest sailor for each rating level.
6. a. List the Vendors who have delivered products within 6 months from order date.
   b. Display the Vendor details who have supplied both Assembled and Sub parts.
   c. Display the Sub parts by grouping the Vendor type (Local or Non Local).
   d. Display the Vendor details in ascending order.
   e. Display the Sub part which costs more than any of the Assembled parts.
   f. Display the second maximum cost Assembled part.

Week - 4	**PROGRAMS ON PL/SQL**

1. a. Write a PL/SQL program to swap two numbers.
   b. Write a PL/SQL program to find the largest of three numbers.
2. a. Write a PL/SQL program to find the total and average of 6 subjects and display the grade.
   b. Write a PL/SQL program to find the sum of digits in a given number.
3. a. Write a PL/SQL program to display the number in reverse order.
   b. Write a PL / SQL program to check whether the given number is prime or not.
4. a. Write a PL/SQL program to find the factorial of a given number.
   b. Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table named areas, consisting of two columns radius and area.
5. a. Write a PL/SQL program to accept a string and remove the vowels from the string. (When 'hello' passed to the program it should display 'Hll' removing e and o from the world Hello).
   b. Write a PL/SQL program to accept a number and a divisor. Make sure the divisor is less than or equal to 10. Else display an error message. Otherwise Display the remainder in words.

WEEK -5	PROCEDURES AND FUNCTIONS

1. Write a function to accept employee number as parameter and return Basic +HRA together as single column.
2. Accept year as parameter and write a Function to return the total net salary spent for a given year.
3. Create a function to find the factorial of a given number and hence find NCR.
4. Write a PL/SQL block o pint prime Fibonacci series using local functions.
5. Create a procedure to find the lucky number of a given birth date.
6. Create function to the reverse of given number.

Week-6	TRIGGERS

1. Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old values and new values:

   CUSTOMERS table:

ID	NAME	AGE	ADDRESS	SALARY
1	Alive	24	Khammam	2000
2	Bob	27	Kadappa	3000
3	Catri	25	Guntur	4000
4	Dena	28	Hyderabad	5000
5	Eeshwar	27	Kurnool	6000
6	Farooq	28	Nellur	7000

2. Creation of insert trigger, delete trigger, update trigger practice triggers using the passenger database.
   Passenger(Passport_ id INTEGER PRIMARY KEY, Name VARCHAR (50) Not NULL,
   Age Integer Not NULL, Sex Char, Address VARCHAR (50) Not NULL);
   a. Write a Insert Trigger to check the Passport_id is exactly six digits or not.
   b. Write a trigger on passenger to display messages ‘1 Record is inserted’, ‘1 record is deleted’, ‘1 record is updated’ when insertion, deletion and updation are done on passenger respectively.
3. Insert row in employee table using Triggers. Every trigger is created with name any trigger have same name must be replaced by new name. These triggers can raised before insert, update or delete rows on data base. The main difference between a trigger and a stored procedure is that the former is attached to a table and is only fired when an INSERT, UPDATE or DELETE occurs.
4. Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert or update.
5. Trigger before deleting a record from emp table. Trigger will insert the row to be deleted into table called delete _emp and also record user who has deleted the record and date and time of delete.
6. Create a transparent audit system for a table CUST_MSTR. The system must keep track of the records that are being deleted or updated.

Week-7	PROCEDURES

1. Create the procedure for palindrome of given number.
2. Create the procedure for GCD: Program should load two registers with two Numbers and then apply the logic for GCD of two numbers. GCD of two numbers is performed by dividing the greater number by the smaller number till the remainder is zero. If it is zero, the divisor is the GCD if not the remainder and the divisors of the previous division are the new set of two numbers. The process is repeated by dividing greater of the two numbers by the smaller number till the remainder is zero and GCD is found.
3. Write the PL/SQL programs to create the procedure for factorial of given number.
4. Write the PL/SQL programs to create the procedure to find sum of N natural number.
5. Write the PL/SQL programs to create the procedure to find Fibonacci series.
6. Write the PL/SQL programs to create the procedure to check the given number is perfect or not.

Week-8	CURSORS

1. Write a PL/SQL block that will display the name, dept no, salary of fist highest paid employees**.**
2. Update the balance stock in the item master table each time a transaction takes place in the item transaction table. The change in item master table depends on the item id is already present in the item master then update operation is performed to decrease the balance stock by the quantity specified in the item transaction in case the item id is not present in the item master table then the record is inserted in the item master table.
3. Write a PL/SQL block that will display the employee details along with salary using cursors.
4. To write a Cursor to display the list of employees who are working as a Managers or Analyst.
5. To write a Cursor to find employee with given job and deptno.
6. Write a PL/SQL block using implicit cursor that will display message, the salaries of all the employees in the ‘employee’ table are updated. If none of the employee’s salary are updated we get a message 'None of the salaries were updated'. Else we get a message like for example, 'Salaries for 1000 employees are updated' if there are 1000 rows in ‘employee’ table.

Week-9	CASE STUDY: BOOK PUBLISHING COMPANY

A publishing company produces scientific books on various subjects. The books are written by authors who specialize in one particular subject. The company employs editors who, not necessarily being specialists in a particular area, each take sole responsibility for editing one or more publications.

A publication covers essentially one of the specialist subjects and is normally written by a single author. When writing a particular book, each author works with on editor, but may submit another work for publication to be supervised by other editors. To improve their competitiveness, the company tries to employ a variety of authors, more than one author being a specialist in a particular subject for the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams.

Week -10	CASE STUDY GENERAL HOSPITAL

A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP

and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. For the above case study, do the following.

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams.

Week -11	CASE STUDY: CAR RENTAL COMPANY

A database is to be designed for a car rental company. The information required includes a description of cars, subcontractors (i.e. garages), company expenditures, company revenues and customers. Cars are to be described by such data as: make, model, year of production, engine size, fuel type, number of passengers, registration number, purchase price, purchase date, rent price and insurance details. It is the company policy not to keep any car for a period exceeding one year. All major repairs and maintenance are done by subcontractors (i.e. franchised garages), with whom CRC has long-term agreements. Therefore the data about garages to be kept in the database includes garage names, addresses, range of services and the like. Some garages require payments immediately after a repair has been made; with others CRC has made arrangements for credit facilities. Company expenditures are to be registered for all outgoings connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources: Car hire, car sales, insurance claims must be kept of file. CRC maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car. These reservations can be made for any period of time up to one month. Casual customers must pay a deposit for an estimated time of rental, unless they wish to pay by credit card. All major credit cards are accepted. Personal details such as name, address, telephone number, driving license, number about each customer are kept in the database. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams.

Week-12	CASE STUDY: STUDENT PROGRESS MONITORING SYSTEM

A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BA, BA (Hons) M.Sc., etc) within the framework of the modular system. The college provides a number of modules, each being characterized by its code, title, credit value, module leader, teaching staff and the department they come from. A module is coordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed: Some modules require pre- requisites modules and some degree programmes have compulsory modules. The database is also to contain some information about students including their numbers, names, addresses, degrees they read for, and their past performance i.e. modules taken and examination results. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.
3. Create the logical data model i.e., ER diagrams.
4. Comprehend the data given in the case study by creating respective tables with primary keys and foreign keys wherever required.
5. Insert values into the tables created (Be vigilant about Master- Slave tables).
6. Display the Students who have taken M.Sc course.

7. Display the Module code and Number of Modules taught by each Lecturer.
8. Retrieve the Lecturer names who are not Module Leaders.
9. Display the Department name which offers 'English' module.
10. Retrieve the Prerequisite Courses offered by every Department (with Department names).
11. Present the Lecturer ID and Name who teaches 'Mathematics'.
12. Discover the number of years a Module is taught.
13. List out all the Faculties who work for 'Statistics' Department.
14. List out the number of Modules taught by each Module Leader.
15. List out the number of Modules taught by a particular Lecturer.
16. Create a view which contains the fields of both Department and Module tables. (Hint- The fields like Module code, title, credit, Department code and its name).
17. Update the credits of all the prerequisite courses to 5. Delete the Module 'History' from the Module table.

Reference Books:

1. Ramez Elmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.
2. Peter Rob, Carles Coronel, "Database System Concepts", Cengage Learning, 7th Edition, 2008.

Web References:

http://www.scoopworld.in

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Desktop Computer Systems: 36 nos

SOFTWARE: Oracle RDBMS.

WEB TECHNOLOGIES LABORATORY

IV Semester: CSE | V Semester: IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS105	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Demonstrate the ability to retrieve data from a database and present it in a web page.
II. Use FTP to transfer web pages to a server.
III. Construct pages that meet, guidelines for efficient download and cater to the needs of an identified audience.
IV. Evaluate the functions of specific types of web pages in relationship to an entire web site.
V. Create web pages that meet accessibility needs of those with physical disabilities and apply the effects of CSS in web page creation.

LIST OF EXPERIMENTS

Week -I **INSTALLATIONS**

Installation of XAMPP and WAMP servers .

Week-2 **HTML**

1. Create a table to show your class time table.
2. Use tables to provide layout to your HTML page describing your college infrastructure.
3. Use and tags to provide a layout to the above page instead of a table layout.

Week-3 **HTML**

1. Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.
2. Embed Audio and Video into your HTML web page.

Week -4 **HTML**

1. Create a webpage with HTML describing your department use paragraph and list tags.
2. Apply various colors to suitably distinguish key words, also apply font styling like italics, underline and two other fonts to words you find appropriate, also use header tags.
3. Create links on the words e.g. “Wi-Fi” and “LAN” to link them to Wikipedia pages.
4. Insert an image and create a link such that clicking on image takes user to other page.
5. Change the background color of the page; At the bottom create a link to take user to the top of the page.

Week -5 **HTML**

Develop static pages (using only HTML) of an online book store, the pages should resemble: www.amazon.com, the website should consist the following pages, home page, registration and user login, user profile page, books catalog, shopping cart, payment by credit card, order confirmation.

Week -6	CASCADING STYLE SHEET
Write an HTML page that contains a selection box with a list of 5 countries, when the user selects a country, its capital should be printed next to the list; Add CSS to customize the properties of the font of the capital (color, bold and font size).	
Week -7	**CASCADING STYLE SHEET**
Let your visitors change the style sheet on your web site, this script will let your visitors choose between five style sheets, which can create yourself or use the one's included.	
Week -8	**JAVASCRIPT**
1. Write a java script program to test the first character of a string is uppercase or not. 2. Write a pattern that matches e-mail addresses. 3. Write a java script function to print an integer with commas as thousands separators.	
Week-9	**JAVASCRIPT**
1. Write a java script program to sort a list of elements using quick sort. 2. Write a java script for loop that will iterate from 0 to 15 for each iteration, it will check if the current number is odd or even, and display a message to the screen. 3. Write a java script function which will take an array of numbers stored and find the second lowest and second greatest numbers, respectively.	
Week-l0	**JAVASCRIPT**
1. Write a java script program which compute, the average marks of the following students then this average is used to determine the corresponding grade. 2. Write a java script program to sum the multiples of 3 and 5 under 1000. 3. To design the scientific calculator and make event for each button using java script.	
Week-l1	**PHP**
1. A simple calculator web application that takes two numbers and an operator (+, -,/,*and %) from an HTML page and returns the result page with the operation performed on the operands. 2. Write php program how to send mail using PHP.	
Week-l2	**PHP**
1. Write php program to convert a string, lower to upper case and upper case to lower case or capital case. 2. Write php program to change image automatically using switch case.	
Week-l3	**PHP**
1. Write php program to calculate current age without using any pre-define function. 2. Write php program to upload image to the server using html and PHP.	
Week-l4	**PHP**
1. Write php program to upload registration form into database. 2. Write php program to display the registration form from the database.	

Week-l5	PHP

1. Write php program to update the registration form present in database.
2. Write php program to delete the registration form from database

Reference Books:

1. Uttam K Roy, "Web Technologies", Oxford University Press, 1st Edition, 2010.
2. Steven Holzner, "The Complete Reference PHP", Tata McGraw-Hill, 1st Edition, 2007

Web References:

1. http://www.scoopworld.in
2. http://www.sxecw.edu.in
3. http://www.technofest2u.blogspot.com
4. http://www.ptutorial.com/php-example/php-upload-image
5. http://www.ptutorial.com/php-example/php-change-case

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Desktop Computer Systems: 36 nos

SOFTWARE: XAMPP (Open Source)

OPERATING SYSTEMS LABORATORY

IV Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS106	Foundation	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES:

The course should enable the students to:

I. Implement the scheduling algorithms of operating system.
II. Practice the methodologies of file organization techniques.
III. Construct memory management techniques for analyzing memory utilization.
IV. Apply the techniques of deadlock avoidance and deadlock prevention in resource utilization.

LIST OF EXPERIMENTS

Week-L	**CPU SCHEDULING ALGORITHMS**

Simulate the following CPU scheduling algorithms
1. FCFS
2. SJF

Week-2	**CPU SCHEDULING ALGORITHMS**

Simulate the following CPU scheduling algorithms
1. Priority
2. Round robin

Week-3	**FILE ALLOCATION STRATEGIES**

Simulate all file allocation strategies
1. Sequential
2. Indexed
3. Linked

Week-4	**MVT AND MFT**

Simulate MVT and MFT

Week-5	**FILE ORGANIZATION TECHNIQUES**

Simulate file organization techniques
1. Single level
2. Two level

Week-6	**FILE ORGANIZATION TECHNIQUES**

Simulate file organization techniques
1. Hierarchical
2. DAG

Week-7	**BANKERS ALGORITHM**
Simulate Bankers algorithm for dead lock avoidance.	
Week-8	**BANKERS ALGORITHM**
Simulate Bankers algorithm for dead lock prevention.	
Week-9	**PAGE REPLACEMENT ALGORITHM**
Simulate page replacement algorithm: FIFO	
Week-l0	**PAGE REPLACEMENT ALGORITHM**
Simulate page replacement algorithm: LRU	
Week-l1	**PAGE REPLACEMENT ALGORITHM**
Simulate page replacement algorithm: LFU	
Week-l2	**PAGING TECHNIQUE**
Simulate paging technique of memory management.	

Reference Books: SS

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System Principles", Wiley Student Edition, 8th Edition, 2010.
2. William Stallings, "Operating System Internals and Design Principles", Pearson Education, 6th Edition, 2002.

Web References:

1. www.smartzworld.com/notes/operatingsystems
2. www.scoopworld.in
3. www.sxecw.edu.in
4. www.technofest2u.blogspot.com

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Desktop Computer Systems: 36 nos

SOFTWARE: C Programming compiler (Open source)

SOFTWARE ENGINEERING

V Semester: CSE | IV Semester: IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS008	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Learn how to elicitate requirements and develop software life cycles.
II. Understand the design considerations for enterprise integration and deployment.
III. Analyze testing methodologies.
IV. Prepare a project plan for a software project that includes estimates of size and effort, a schedule, resource allocation, configuration control, and project risk.

UNIT-I	SOFTWARE PROCESS AND PROJECT MANAGEMENT	Classes: 08

Introduction to software engineering, software process, perspective and specialized process models; Software project management: Estimation: LOC and FP based estimation, COCOMO model; Project scheduling: Scheduling, earned value analysis, risk management

UNIT-II	REQUIREMENTS ANALYSIS AND SPECIFICATION	Classes: 09

Software requirements: Functional and nonfunctional, user requirements, system requirements, software requirements document; Requirement engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management; Classical analysis: Structured system analysis, petri nets, data dictionary.

UNIT-III	SOFTWARE DESIGN	Classes: 09

Design process: Design concepts, design mode, design heuristic, architectural design architectural styles, architectural design, and architectural mapping using data flow.

User interface design: Interface analysis, interface design; Component level design: Designing class based components, traditional components.

UNIT-IV	IMPLEMENTATION AND TESTING	Classes: 10

Software testing fundamentals: Internal and external views of testing, white box testing, basis path testing, control structure testing, black box testing, regression testing, unit testing, integration testing, validation testing, system testing and debugging; Software implementation techniques: Coding practices, refactoring.

UNIT-V	PROJECT MANAGEMENT	Classes: 09

Estimation: FP based, LOC based, make/buy decision; COCOMO II: Planning, project plan, planning process, RFP risk management, identification, projection; RMMM: Scheduling and tracking, relationship between people and effort, task set and network, scheduling; EVA: Process and project metrics.

Text Books:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Tata McGraw-Hill International Edition, 7th Edition, 2010.
2. Ian Somerville, "Software Engineering", Pearson Education Asia, 9th Edition, 2011.

Reference Books:

1. Rajib Mall, "Fundamentals of Software Engineering", PHI Learning Private Limited, 3rd Edition, 2009.
2. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 1st Edition, 2010.

Web References:

1. http://www.softwareengineerinsider.com/articles/what-is-software-engineering.html
2. https://www.udacity.com/courses/software-engineering
3. http://www.tutorialspoint.com/software_engineering
4. http://computingcareers.acm.org/?page_id=12
5. http://en.wikibooks.org/wiki/Introduction_to_Software_Engineering

E-Text Books:

1. http://www.acadmix.com/eBooks_Download
2. http://www.freetechbooks.com/software-engineering-f15.html

Course Home Page:

MICROPROCESSORS AND INTERFACING

V Semester: CSE | VI Semester: IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEC021	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Understand the concept of microprocessor and familiarize the architecture of 8085and 8086 processor.
II. Analyze the assembly language programming using 8086 microprocessor.
III. Develop the knowledge of microprocessor based systems and interfacing techniques.
IV. Understand the concept of Interrupts and their significance in 8086.
V. Impart the basic concepts of serial and parallel bus standards.
VI. Understand the basic concept of advanced processor architectures.

UNIT-I	OVER OF 8086 MICROPROCESSOR	Classes: 08

Introduction to 8085 microprocessor. RISC and CISC processors, architecture of 8086 microprocessor, special functions of general purpose register, 8086 flag register and function of 8086 flags, addressing modes of 8086, instruction set of 8086, assembler directives, simple programs, procedures, and macros.

UNIT-II	PIN DIAGRAM OF 8086 AND AEESMBLY LANGUAGE PROGRAMMING	Classes: 09

Minimum mode and maximum mode of operation, timing diagram, memory interfacing to 8086 (Static RAM and EPROM), need for DMA, DMA data transfer method, interfacing with 8237/8257; Assembly language programs: Assembly language programs involving logical, branch and call instructions, sorting, evaluation of arithmetic expressions, string manipulation.

UNIT-III	8255 PROGRAMMABLE PERIPHERAL INTERFACE (PPI)	Classes: 09

Various modes of 8255 operation and interfacing to 8086; Interfacing keyboard, displays, 8279 Stepper motor and actuators, digital to analog and analog to digital converter interfacing.

Interrupt structure of 8086: Interrupt structure of 8086, Vector interrupt table, interrupt service routines; Introduction to DOS and BIOS interrupts, 8259 PIC architecture and interfacing cascading of interrupt controller and its importance.

UNIT-IV	SERIAL DATA TRANSFER SCHEMES	Classes: 10

Asynchronous and synchronous data transfer schemes, 8251 USART architecture and interfacing; TTL to RS 232C and RS232C to TTL conversion; Sample program of serial data transfer; Introduction to high-speed serial communications standards, USB.

UNIT-V	ADVANCED MICROPROCESSORS	Classes: 09

80286 microprocessor: Architecture, registers (Real/Protected mode), privilege levels, descriptor cache, memory access in GDT and LDT, multitasking, addressing modes; Flag register 80386: Architecture, register organization, memory access in protected mode, paging; 80486: Only the technical features

Text Books:

1. D. V. Hall, "Microprocessors and Interfacing", Tata McGraw-Hill Education, 3rd Edition 2013.
2. A.K Ray, K. M. Bhurchandani, "Advanced Microprocessors and Peripherals", Tata McGraw-Hill Education, 2nd Edition, 2006.
3. Savaliya M. T, "8086 Programming and Advance Processor Architecture", Wiley India Pvt., 1st Edition, 2012.

Reference Books:

1. N. Senthil Kumar, M. Saravanan, S. Jeevanathan, S. K. Shah," Microprocessors and Interfacing", Oxford University, 1st Edition, 2012.
2. Lyla B. Das, "The x86 Microprocessors", Pearson India, 2nd Edition, 2014
3. Daniel Tabak, "Advanced Microprocessors", Addison-Wesley, 2nd Edition, 1996.
4. Triebel, Singh, "The 8088 and 8086 Microprocessors", PHI, 4th Edition 2003.

Web References:

1. http://www.daenotes.com/electronics/digital-electronics/Intel-80858bitmicroprocessor#axzz2I9yUSe7I
2. https://www.smartzworld.com/notes/microprocessors-and-microcontrollers-mpmc/
3. http://www.iare.ac.in

E-Text Books:

1. http://www.www.jntubook.com
2. http://www.freepdfbook.com/micro-processors-and-interfacing/
3. http://engineersevanigam.blogspot.in/2013/07/microprocessors-and-interfacing-by.html
4. https://www.scribd.com/doc/153593067/Microprocessor-by-A-P-Godse-D-A-Godse

Course Home Page:

COMPILER DESIGN

V Semester: CSE / IT

Course Code	Category	Hours / WEEK			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT004	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Apply the principles of theory of computation to the various stages in the design of compilers.
II. Demonstrate the phases of the compilation process and able to describe the purpose and operation of each phase.
III. Analyze problems related to the stages in the translation process.
IV. Exercise and reinforce prior programming knowledge with a non-trivial programming project to construct a compiler.

UNIT-I	INTRODUCTION TO COMPILERS AND PARSING	Classes: 08

Introduction to compilers**:** Definition of compiler, interpreter and its differences, the phases of a compiler, role of lexical analyzer, regular expressions, finite automata, from regular expressions to finite automata, pass and phases of translation, bootstrapping, LEX-lexical analyzer generator; Parsing: Parsing, role of parser, context free grammar, derivations, parse trees, ambiguity, elimination of left recursion, left factoring, eliminating ambiguity from dangling-else grammar, classes of parsing, top-down parsing: backtracking, recursive-descent parsing, predictive parsers, LL(1) grammars.

UNIT-II	BOTTOM-UP PARSING	Classes: 09

Bottom-up parsing: Definition of bottom-up parsing, handles, handle pruning, stack implementation of shift-reduce parsing, conflicts during shift-reduce parsing, LR grammars, LR parsers-simple LR, canonical LR and Look Ahead LR parsers, error recovery in parsing, parsing ambiguous grammars, YACC-automatic parser generator.

UNIT-III	SYNTAX-DIRECTED TRANSLATION AND INTERMEDIATE CODE GENERATION	Classes: 10

Syntax-directed translation: Syntax directed definition, construction of syntax trees, S-attributed and L-attributed definitions, translation schemes, emitting a translation.

Intermediate code generation: Intermediate forms of source programs– abstract syntax tree, polish notation and three address code, types of three address statements and its implementation, syntax directed translation into three-address code, translation of simple statements, Boolean expressions and flow-of-control statements.

UNIT-IV	TYPE CHECKING AND RUN TIME ENVIRONMENT	Classes: 09

Type checking: Definition of type checking, type expressions, type systems, static and dynamic checking of types, specification of a simple type checker, equivalence of type expressions, type conversions, overloading of functions and operators; Run time environments: Source language issues, Storage organization, storage-allocation strategies, access to nonlocal names, parameter passing, symbol tables, and language facilities for dynamic storage allocation.

UNIT-V	CODE OPTIMIZATION AND CODE GENERATOR	Classes: 09

Code optimization: The principle sources of optimization, optimization of basic blocks, loops in flow graphs, peophole optimization; Code generator: Issues in the design of a code generator, the target machine, runtime storage management, basic blocks and flow graphs, a simple code generator, register allocation and assignment, DAG representation of basic blocks.

Text Book:

Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, "Compilers–Principles, Techniques and Tools", Pearson Education, Low Price Edition, 2004.

Reference Books:

1. Kenneth C. Louden, Thomson, "Compiler Construction– Principles and Practice", PWS Publishing, 1st Edition, 1997.
2. Andrew W. Appel, "Modern Compiler Implementation C", Cambridge University Press, Revised Edition, 2004.

Web References:

1. www.vssut.ac.in/lecture_notes/lecture1422914957.pdf
2. http://csenote.weebly.com/principles-of-compiler-design.html
3. http://www.faadooengineers.com/threads/32857-Compiler-Design-Notes-full-book-pdf-download
4. https://www.vidyarthiplus.com/vp/thread-37033.html#.WF0PhlMrLDc

E-Text Books:

1. http://www.e-booksdirectory.com/details.php?ebook=10166
2. http://www.e-booksdirectory.com/details.php?ebook=7400re

Course Home Page:

OPTIMIZATION TECHNIQUES

V Semester: CSE / IT / EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS012	Core	2	1	-	3	30	70	100
Contact Classes: 30	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Learn fundamentals of linear programming through optimization.
II. Understand and apply optimization techniques to industrial applications.
III. Apply the dynamic programming and quadratic approximation to electrical and electronic problems and applications.

UNIT-I	**LINEAR PROGRAMMING**	**Classes: 09**

Definition, characteristics and phases, types of models, operations research models, applications, linear programming problem formulation, graphical solution, simplex method; Artificial variables techniques: Two-phase method, Big-M method.

UNIT-II	**TRANSPORTATION AND ASSIGNMENT PROBLEMS**	**Classes: 09**

Transportation problem, formulation, optimal solution, unbalanced transportation problem, degeneracy, assignment problem, formulation, optimal solution, variants of assignment problem, traveling salesman problem.

UNIT-III	**SEQUENCING AND THEORY OF GAMES**	**Classes: 09**

Sequencing: Introduction, flow-shop sequencing, n jobs through two machines, n jobs through three machines, job shop sequencing, two jobs through m machines.

Theory of games: Introduction, terminology, solution of games with saddle points and without saddle points, 2 x 2 games, dominance principle, m x 2 and 2 x n games, graphical method.

UNIT-IV	**DYNAMIC PROGRAMMING**	**Classes: 09**

Introduction: Terminology, Bellman's principle of optimality, applications of dynamic programming shortest path problem, linear programming problem.

UNIT-V	**QUADRATIC APPROXIMATION**	**Classes: 09**

Quadratic approximation methods for constrained problems: Direct quadratic approximation, quadratic approximation of the Legrangian function, variable metric methods for constrained optimization.

Text Books:

1. A Ravindran, "Engineering Optimization", John Wiley & Sons Publications, 4th Edition, 2009.
2. Hillier, Liberman, "Introduction to Operation Research", Tata McGraw-Hill, 2nd Edition, 2000.

Reference Books:

1. Dr. J K Sharma, "Operation Research", Mac Milan Publications, 5th Edition, 2013.
2. Ronald L. Rardin, "Optimization in Operation Research", Pearson Education Pvt. Limited, 2005.
3. N V S Raju, "Operation Research", S M S Education, 3rd Revised Edition, .

Web References:

1. http://www2.informs.org/Resources/
2. http://www.mit.edu/~orc/
3. http://www.ieor.columbia.edu/
4. http://www.universalteacherpublications.com/univ/ebooks/or/Ch1/origin.htm
5. http://www.wolfram.com/solutions/OperationsResearch/

E-Text Books:

1. http://engineeringstudymaterial.net/ebook/new-optimization-techniques-in-engineering-godfrey/
2. http://www.freetechbooks.com/urban-operations-research-logistical-and-transportation-planning-methods-t486.html

Course Home Page:

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

V Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS015	Skill	2	1	-	3	30	70	100
Contact Classes: 30	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the market dynamics namely demand elasticity of demand and pricing in different market structures.
II. Analyze how capital budgeting decisions are carried out for selecting the best investment proposal.
III. Learn how organizations make important investment and financing decisions.
IV. Analyze a company's financial statements and come to a reasoned conclusion about the financial situation of the company.
V. Acquire the basics of how to analyze and interpret the financial statements through ratio analysis.

UNIT-I	INTRODUCTION AND DEMAND ANALYSIS	Classes: 07

Definition, nature and scope of business economics; Demand analysis; Demand determinants, law of demand and its exceptions; Elasticity of demand: Definition, types, measurement and significance of elasticity of demand, demand forecasting, factors governing demand forecasting.

UNIT-II	PRODUCTION AND COST ANALYSIS	Classes: 10

Production function; Isoquants and isocosts, MRTS, least cost combination of inputs, Cobb-Dougles production function, internal and external economies of scale, cost analysis; Cost concepts: Break even analysis (BEA), determination of break-even point (simple problems), managerial significance.

UNIT-III	MARKETS AND NEW ECONOMIC ENVIRONMENT	Classes: 08

Types of competition and markets, features of perfect competition, monopoly and monopolistic competition, price-output determination in case of perfect competition and monopoly business.

Features and evaluation of different forms of business organizations: Sole proprietorship, partnership, joint stock company, public enterprises and their types.

UNIT-IV	CAPITAL BUDGETING	Classes: 10

Capital and its significance, types of capital, estimation of fixed and working capital requirements, methods and sources of raising capital, capital budgeting: features of capital budgeting proposals; Methods of capital budgeting: Payback period, accounting rate of return(ARR), net present value method and internal rate of return method (simple problems).

UNIT-V	INTRODUCTION TO FINANCIAL ACCOUNTING AND FINANCIAL ANALYSIS	Classes : 10

Financial accounting objectives, functions, importance; Accounting concepts and accounting conventions -double-entry book keeping, journal, ledger, trial balance; Final accounts: Trading account, profit and loss account and balance sheet with simple adjustments; Financial analysis: Analysis and interpretation of liquidity ratios, activity ratios, capital structure ratios and profitability ratios (simple problems), Du Pont chart.

Text Books:

1. Aryasri, "Managerial Economics and Financial Analysis", TMH publications, 4th Edition, 2012.
2. M. Kasi Reddy, Saraswathi, "Managerial Economics and Financial Analysis", PHI Publications, New Delhi, 2nd Edition, 2012.
3. Varshney, Maheswari, "Managerial Economics", Sultan Chand Publications, 11th Edition, 2009.

Reference Books:

1. S. A. Siddiqual, A. S. Siddiqual, "Managerial Economics and Financial Analysis", New Age International Publishers, Hyderabad, Revised 1st Edition, 2013.
2. S. N. Maheswari, S. K. Maheswari, "Financial Accounting", Vikas publications, 3rd Edition, 2012.
3. J. V. Prabhakar Rao, P. V. Rao, "Managerial Economics and Financial Analysis", Maruthi Publishers, Reprinted Edition, 2011.
4. Vijay Kumar, Appa Rao, "Managerial Economics and Financial Analysis", Cengage Publications, 1st Edition, Paperback, 2011.

Web References:

1. https:// www.slideshare.net/glory1988/managerial-economics-and- financial analysis
2. https:// thenthata.web4kurd.net/mypdf/managerial-economics-and- financial analysis
3. https:// bookshallcold.link/pdfread/managerial-economics-and-financial analysis
4. https:// www.gvpce.ac.in/syllabi/Managerial Economics and financial analysis

E-Text Book:

1. https:// books.google.co.in/books/about/Managerial economics and financial analysis
2. http://www. ebooktake.in/pdf/title/managerial-economics-and-financial analysis
3. http://all4ryou.blogspot.in/2012/06/mefa-managerial-economics and financial analysis
4. http://books.google.com/books/about/Managerial economics and financial analysis
5. http://www.scribd.com/doc/37684926

Course Home Page:

SOFTWARE ENGINEERING LABORATORY

V Semester: CSE | IV Semester: IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS107	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 27				Total Classes: 27		

OBJECTIVES:

The course should enable the students to:

I. Select suitable software development process model for the given scenario.
II. Classify the requirements and prepare software requirement documents for analyzing the projects.
III. Understand the different design techniques and their implementation.
IV. Apply various testing methodologies for validating design models.

Week-l ROLE OF SOFTWARE

Background: Software has made the world a global village today. The impact of software spans across almost all aspect of human life. All organizations, Institutions and companies are leveraging the potentials of software in automating the critical functions and eliminating manual interventions. Software is also a predominant are for trade and export especially for the countries like India. Domains like health care, Airlines , financial Services, Insurance , retails, Education, and many more have exploited software and still there a lot of the scope for software to create impact and add values in multiple dimensions.

Problem Description: In the context of this background, identify the areas (or application or systems) how software has been leveraged extensively in the following domains

1. Health Care
2. Airlines
3. Banking Insurance
4. Retail
5. Education

Week-2 SOFTWARE CRISIS

Background: In the early years of computers applications, the focus of the development and innovation were on hardware. Software was largely views as an afterthought. Computer programming was an art. Programmers did not follow any disciplined or formalized approaches. This way of doing things was adequate for a while, until the sophisticated of computer applications outgrow. Software soon took over and more functions which were done manually. A software houses begin to develop for widespread distribution. Software development projects produced thousands of source program statement. With the increase in the size and complexity of the software, following situation resulted is collectively termed as software crisis.

1. Time Slippage
2. Cost Slippage
3. Failure at customer Site
4. Intractable Error after delivery

Problem Description: In the context of this background, for each of the scenario mentioned below, identify the most appropriate problem related to software crisis and mention the same in the table provided.

Scenario A: Railways reservation software was delivered to the customer and was installed in one of the

metro station at 12.00 AM (mid-night) as per the plan. The system worked quite fine till the next day 12.00 PM (noon). The system crashed at 12.00 PM and the railways authorities could not continue using software for reservation till 02.00 M. It took two hours to fix the defect in the software in the software.

Scenario B: A polar satellite launch vehicle was scheduled for the launch on August 15th. The auto-pilot of the rocket to be delivered for integration of the rocket on may 15th. The design and development of the software for the auto-pilot more effort because of which the auto-pilot was delivered for the integration on June 15th (delayed by a month). The rocket was launched on Sep 15th (delayed by a month).

Scenario C: Software for financial systems was delivered to the customer. Customer informed the development team about a mal-function in the system. As the software was huge and complex, the development team could not identify the defect in the software.

Scenario D: Due to the defect in the software for the baggage handling system. There was also of & 2M of revenues for the airport authorities.

Scenario	Situation (as given A to D)
A	
B	
C	
D	

Week-3 REQUIREMENT DEVELOPMENT

Background: Requirement engineering produces a specification of what a system should do. The intention of requirement engineering is to provide a clear definition of requirement of the systems. This phase is a very important phase because, if the customer requirements are not clearly understood, the ambiguity can get into the other phase of the development. To avoid such issues, requirement has to be elicited using the right elicitation techniques, to be analyzed effectively, specified clearly and verified thoroughly. All activities are collectively termed as requirement development activities.

Problem Description: Identify the requirement development activities associated with each of the following scenarios,

a. Joe is creating an online survey questionnaire for requesting user feedback on the desired features of the application to be developed.
b. Mark is preparing a formal document which includes all of the desired features identified by the survey.
c. Jack identified an incomplete requirement statement
d. Jones is identifying all security related requirement and separating them from the performance related requirements
e. Merlin a team member is sent to client to observe the business case and collect typical user requirements
f. Leo is team member is working on requirement and ensuring that requirement collected should not be vague and unclear.
g. Lee is conducting a facilitated meeting with the stakeholder to capture the requirements.
h. Amit a team member is distributing questionnaires to stack holder for gathering user requirements.

Scenario	Requirement Development Activities
A	
B	
C	
D	
E	
F	
G	
H	

Week-4	REQUIREMENT CLASSIFICATION AND VERIFICATION

A. **Background:** Functional requirements (FRs) specify the software functionality that the developer must build into the product to enable users accomplish their tasks, thereby satisfying the business requirements. Nonfunctional requirement as the name suggest, are those requirements which are not directly concerned with the specific functions delivered by the system. Many non-functional requirements (NFRs) related to the system as a whole rather than to individual functional requirements. While failure to meet an individual functional may degrade the system, failure to meet a non-functional system requirement may make whole system unusable. NFR's are of di reliability requirements etc.

Problem Description: Classify the following requirement by selecting the appropriate option.

1. ATM machine shall validate PIN of the user during login along with bio-metric verification.
2. "Peak transaction-20,000calls inVolume(s)abusyhour,average duration 20 Secs, grade of services 99.98%.
3. "Brahe System sounds the alarmShallfor10seconds at frequency of 100H when the brake is applied".
4. "Mean Time Failure (MTTF) to -There should be no more than three Severity-1 outage per month".

B. **Background:** Software requirements specification formally captures the requirements of the software to be developed. Hence it is important that requirements are free from defects like incorrect or conflicting requirements.

Problem Description: Identify the requirements in the given SRS(Premium University Placement Portal) for following issues,

1. Incorrect requirements
2. Ambiguous requirements
3. Missing requirements
4. Conflicting requirements
5. Incomplete requirements

Week-5	SOFTWARE DESIGN PRINCIPLES

Background: A good object oriented design not only meets the specified requirements but also addresses implicit requirements. There are five design principles which address most of the implicit requirements:
Software Design Principles:

1. Abstraction: Focus on solving a problem by considering the relevant details and ignoring the irrelevant
2. Encapsulation: Wrapping the internal details, thereby making these details inaccessible. Encapsulation separates interface and implementation, specifying only the public interface to the clients, hiding the details of implementation.
3. Decomposition and Modularization: Dividing the problem into smaller, independent, interactive subtasks for placing different functionalities in different components
4. Coupling & Cohesion: Coupling is the degree to which modules are dependent on each other. Cohesion is the degree to which a module has a single, well defined task or responsibility. A good design is one with loose coupling and strong cohesion.
5. Sufficiency, Completeness and Primitiveness: Design should ensure the completeness and sufficiency with respect to the given specifications in a very simple way as possible.

Problem Description: Which of the following design principle(s) have been violated in the following scenarios?

1. Abstraction
2. Decomposition and Modularization
3. Coupling & Cohesion
4. Encapsulation
5. Sufficiency, Completeness and Primitiveness
6. All

No.	Description	Principle Being Violated
1	Important information of a module is directly accessible by other modules.	
2	Too many global variables in the program after implementing design	
3	Code breaks in unexpected places	
4	Unfulfilled requirements in the code after the design has been implemented	
5	Cyclic dependencies among classes	
6	Huge class doing too many unrelated operations	
7	Several unrelated functionalities/tasks are carried out by a single module	
8	All data of all classes in public	
9	Design resulting in spaghetti code	
10	An algorithm documented as part of design is not understandable by the programmers	

Week-6 INTEGRATION TESTING

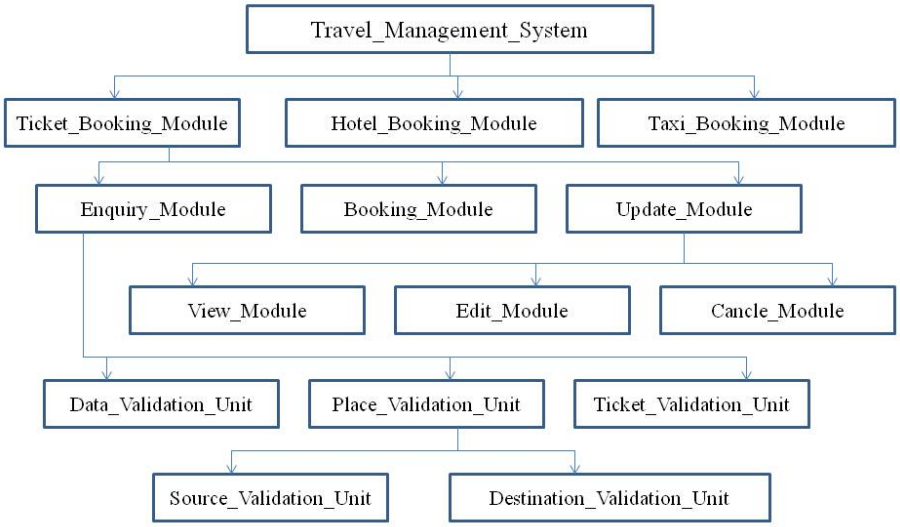
Background: Integration testing is carried out after the completion of unit testing and before the software is delivered for system testing. In top down integration testing, dummy stubs are required for bottom level modules. Similarly in bottom up testing, dummy drivers are required for top level modules.

Problem Description: Consider the scenario of development of software for Travel, Management System (TMS) is in progress. The TMS software has 3 major modules namely Ticket_Booking_Module, Hotel_Booking_Module and Taxi_Booking_Module. The Ticket_Booking_Module has 3 sub modules namely Enquiry_Module, Booking_Module and Update_Module. The enquiry module uses Date_Validation_Unit, Ticket_Validation_Unit and Place_Validation_Unit.

In the context of the given scenario, identify the usage of stub or driver for the following situations.

1. Except the Ticket_validation_Unit, the coding and unit testing of all other modules, sub modules and units of TMS are completed. The top-down integration is in progress for the TMS software. To carry out the integration testing, which among the following is necessary?
   A Stub for Ticket_Validation_Unit, A Driver For Ticket_Validation_Unit, A Stub for Enquiry_Module A Driver for Enquiry_Module, A Stub For Ticket_Booking_Module, A Driver For Ticket_Booking_Module
2. The coding and unit testing of all the module, sub modules and units of TMS are completed except the Update_Module (coding and testing for Edit_Module, Cancel_Module and View_Module are also completed). The bottom-up integration is to be started for the TMS software. Mention any stub or driver needed to carry out the integration testing?

3. Except the Taxi_Booking_Module, the coding and unit testing of all other modules, sub modules and units of TMS are completed. The top-down integration is to be started for the TMS software. Mention any stub or driver needed to carry out the integration testing.



Week-7 PERFORMANCE TESTING

Background: Performance testing tests the non-functional requirements of the system. The different types of performance testing are load testing, stress testing, endurance testing and spike testing.

Problem Description: Identify the type of performance testing for the following:

1. A space craft is expected to function for nearly 8 years in space. The orbit control system of the spacecraft is a real-time embedded system. Before the launch, the embedded software is to be tested to ensure that it is capable of working for 8 years in the space. Identify the suitable performance testing category to be carried out to ensure that the space craft will be functioning for 8 years in the space as required.
2. Global Education Centre (GEC) at Infosys Mysore provides the training for fresh entrants. GEC uses an automated tool for conducting objective type test for the trainees. At a time, a maximum of 2000 trainees are expected to take the test. Before the tool is deployed, testing of the tool was carried out to ensure that it is capable of supporting 2000 simultaneous users. Indicate the performance testing category?
3. A university uses its web based portal for publishing the results of the students. When the results of an examination were announced on the website recently on a pre-planned date, the web site crashed. Which type of performance testing should have been done during web-site development to avoid this unpleasant situation?
4. During unexpected terrorist attack, one of the popular websites crashed as many people logged into the web-site in a short span of time to know the consequences of terrorist attack and for immediate guidelines from the security personnel. After analyzing the situation, the maintenance team of that website came to know that it was the consequences of unexpected load on the system which had never happened previously. Which type of performance testing should have been done during web-site development to avoid this unpleasant situation?

Scenarios	Performance Testing Type
Scenario 1	
Scenario 2	
Scenario 3	
Scenario 4	

Week-8	REGRESSION TESTING

Background: Enhancements are introduction of new features to the software and might be released in different versions. Whenever a version is released, regression testing should be done on the system to ensure that the existing features have not been disturbed.

Problem Description: Consider the scenario of development of software for Travel Management System (TMS) discussed in previous assignment. TMS has been developed by Infosys and released to its customer Advance Travel Solutions Ltd. (ATSL). Integration testing, system testing and acceptance testing were carried out before releasing the final build to the customer. However, as per the customer feedback during the first month of usage of the software, some minor changes are required in the Enquiry Module of the TMS. The customer has approached Infosys with the minor changes for upgrading the software. The development team of Infosys has incorporated. Those changes, and delivered the software to testing team to test the upgraded software. Which among the following statement is true?

a. Since minor changes are there, integration of the Enquiry Module and quick system testing on Enquiry module should be done.
b. The incorporation of minor changes would have introduced new bugs into other modules, so regression testing should be carried out.
c. Since the acceptance testing is already carried out, it is enough if the team performs sanity testing on the Enquire module.
d. No need of testing any module.

Week-9	SOFTWARE METRICS

Background: There are some metrics which are fundamental and the rest can be derived from these. Examples of basic (fundamental) measures are size, effort, defect, and schedule. If the fundamental measures are known, then we can derive others. For example if size and effort are known, we can get Productivity (=size/effort). If the total numbers of defects are known we can get the Quality (=defect/size) and so on.

Problem Description: Online loan system has two modules for the two basic services, namely Car loan service and House loan service.

The two modules have been named as Car_Loan_Module and House_Loan_Module. Car_Loan_Module has 2000 lines of uncommented source code. House_Loan_Module has 3000 lines of uncommented source code. Car_Loan_Module was completely implemented by Mike. House_Loan_Module was completely implemented by John. Mike took 100 person hours to implement Car_Loan_Module. John took 200 person hours to implement House_Loan_Module. Mike's module had 5 had 6 defects. With respect to the context given, which among the following is an INCORRECT statement?

Choose one:

1. John's quality is better than Mike.
2. John's productivity is more than Mike.
3. John introduced more defects than Mike.
4. John's effort is more than Mike.

Reference Books:

1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", Tata McGraw-Hill International Edition, 7th Edition, 2009.
2. Ian Somerville, "Software Engineering", Pearson Education, 8th Edition, 2008.

Web References:

1. http://www.tutorialspoint.com
2. http://www.webopedia.com
3. http://vlabs.iitkgp.ernet.in/se/

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Desktop Computer Systems: 36 nos

SOFTWARE: Borland together, LATEX.

MICROPROCESSORS AND INTERFACING LABORATORY

V Semester: CSE | VI Semester: IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEC115	Foundation	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 42				Total Classes: 42		

OBJECTIVES:

The course will enable the students to:

I. Developing of assembly level programs and provide the basics of the microprocessors.
II. Provide solid foundation on interfacing the external devices to the processor according to the user requirements to create novel products and solutions for the real time problems.
III. Understand various interfacing circuits necessary for various applications.

LIST OF EXPERIMENTS

Week-1 **DESIGN A PROGRAM USING MASM & 8086 MICROPROCESSOR**

Design and develop an assembly language program using 8086 microprocessor and to show the following aspects.

i. Programming
ii. Execution
iii. Debugging

To demonstrate win 862 software and Trainer kit for 8086 microprocessor.

Week-2 **8 AND 16 BITARITHMETIC OPERATIONS**

d. Write an ALP program to perform 8 Bit arithmetic operations using MASM software and 8086.
e. Write an ALP program to perform 16 Bit arithmetic operations using MASM software and 8086.

Week-3 **PALINDROME, ABSTRACT CLASS**

a. Write an ALP program to perform multi byte addition and subtraction
b. Write an ALP program to perform 3*3 matrix multiplication and addition

Week-4 **PROGRAMS TO SORT NUMBERS**

a. Write an ALP program to perform ascending order using 8086
b. Write an ALP program to perform descending order using 8086

Week-5 **PROGRAMS TO LCM &HCF NUMBERS**

a. Write an ALP program to find the LCM & HCF of given numbers.
b. Write an ALP program to find square and cube of a given numbers.

Week-6 **PROGRAMS FOR STRING MANIPULATIONS OPERATIONS**

a. Write an ALP program to insert or delete a byte in the given string.
b. Write an ALP program to search a number/character in a given string.

Week-7 **PROGRAMS FOR STRING MANIPULATIONS OPERATIONS**

a. Write an ALP program to move a block of data from one memory location to the other.
b. Write an ALP program for reverse of a given string.

Week-8	**PROGRAMS FOR STRING MANIPULATIONS OPERATIONS**
a. Write an ALP program to find the number of even and odd numbers in the given string. b. Write an ALP program to generate a Fibonacci series.	
Week-9	**CODE CONVERTIONS**
a. Write an ALP program to convert packed BCD to Unpacked BCD. b. Write an ALP program to convert packed BCD to ASCII. c. Write an ALP program to convert hexadecimal to ASCII.	
Week-10	**INTERFACING ADC & DAC DEVICES**
a. Write an ALP program to convert analog to digital using 8086. b. Write an ALP program to convert digital to analog using 8086.	
Week-11	**GENARATE SQUARE,SINE & TRIANGLE WAVES**
Write an ALP program to generate Saw tooth and staircase wave forms.	
Week-12	**INTERFACING STEPPER MOTOR**
a. Write an ALP program to rotate stepper motor in clockwise direction. b. Write an ALP program to rotate stepper motor in anti clockwise direction.	
Week-13	**PARALLEL AND SERIAL COMMUNICATION**
a. Parallel communication between two microprocessors using 8255. b. Serial communication between two microprocessor kits using 8251.	
Week-14	**INTERFACING TRAFFIC LIGHT CONTROLLER AND TONE GENERATOR**
a. Write a program to interface traffic light controller. b. Write an ALP program to interface tone generator.	
Reference Books:	
1. D. V. Hall, "Microprocessors and Interfacing", Tata McGraw-Hill Education, 3rd Edition 2013. 2. A. K Ray, K. M. Bhurchandani, "Advanced Microprocessors and Peripherals", Tata McGraw-Hill Education, 2nd Edition 2006. 3. Lyla B. Das, "The x86 Microprocessors", Pearson India, 2nd Edition, 2014.	
Web References:	
1. http://nptel.ac.in/courses/106108100/ 2. http://www.eazynotes.com/pages/microprocessor/8086-programs.html 3. http://80864beginner.com/	
Course Home Page:	
SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS **HARDWARE:** Desktop Computer Systems: 36 nos **SOFTWARE:** Application Software: MASM, Keil µVision Tools	

LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 36 STUDENTS

S. No	Name of the Equipment	Range
1	Regulated Power Supply	0-5V & 12V DC
2	DSRO	0-20 MHz
3	8086 Trainer Kits with keyboard	43 No's
4	8051 Trainer kits with keyboard	40 No's
5	Serial Interface cable	45 No's
6	Stepper Motors	45 No's
7	A/D Device	14 No's
8	A/D and Dual D/A Devices	27 No's
9	Dual D/A Devices	14 No's
10	PPI 8255	12 No's
11	USART 8251	7 No's
12	Keyboard/ Seven segment controller	7 No's
13	Traffic Light Controller	3 No's
14	RTC/ Tone generator	3 No's
15	Elevator	2 No's
16	SRAM and DRAM	2 No's
17	DMA Controller	1 No's
18	LCD Display	40 No's
19	Timer/Counter, UART and Interrupt	44 No's
20	Keyboard	40 No's

TECHNICAL WRITING AND CONTENT DEVELOPMENT LABORATORY

V Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS106	Skill	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Improve their ability to develop technical writing.
II. Upgrade with content development techniques.
III. Endow with organizing technical writing.

UNIT-I	**TECHNICAL WRITING**	**Classes: 10**

Technical vocabulary; Introduction, significance, purpose, structure, principles, types and samples of letters, memos, e-mails, resume, proposals, and technical reports.

UNIT-II	**STRUCTURE OF TECHNICAL WRITING**	**Classes: 09**

Tips for good technical writing; Instruction manuals; Technical description; Research paper; Dissertation; Thesis; Uses of technical writing.

UNIT-III	**TECHNICAL CONTENT DEVELOPMENT**	**Classes: 08**

Document design and layout; Papers; Articles; E-book formats.

Forums; Multimedia tutorials; Wikis; Blogs; Websites.

UNIT-IV	**PROOF READING PROCESS**	**Classes: 09**

Definition, purpose, difference between content and copy, editing, competing priorities, elements of structure, style and appearance, evaluation, overall organizing, clarity of expression, grammatical accuracy, correctness of layout.

UNIT-V	**WRITING IN YOUR OWN UNIQUE VOICE**	**Classes: 09**

Guidelines for writing good descriptions; Organizing content; Analyzing audience; Preparing an outline.

Text Books:

Hand Book of Technical Writing and Content Development.

Reference Book:

Meenakshi Raman, Sangeeta Sharma, "Technical Communication", Oxford Publishers, 1st Edition, 2004.

Web References:

1. https://www.techwhirl.com/what-is-technical-writing/
2. https://www.mit.edu/me-ugoffice/communication/technical-writing
3. https://www.vocabulary.com/dictionary/technical

E-Text Books:
1. www.ebooksgo.org/ 2. www.e-booksdirectory.com
Course Home Page:

OBJECT ORIENTED ANALYSIS AND DESIGN

VI Semester: CSE | V Semester : IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS009	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Develop the skills to analyze and design object-oriented problems.
II. Create design patterns to solve problems based on object oriented concepts.
III. Understand the various processes and techniques for building object-oriented software systems.
IV. Prepare unified modeling techniques for case studies.

UNIT-I	STRUCTURAL MODELLING	Classes: 10

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, architecture, software development life cycle; Classes, relationships, common mechanisms and diagrams.

UNIT-II	ADVANCED BEHAVIORAL MODELING	Classes: 08

Advanced classes, advanced relationships, interfaces, types and roles, packages, terms, concepts, modeling techniques for class and object diagrams; Interactions: Interaction diagrams; Use cases: Use case diagrams, activity diagrams.

UNIT-III	ARCHITECTURAL MODELING	Classes: 08

Events and signals, state machines, processes and threads, time and space.

State chart diagrams, component diagrams, deployment diagrams.

UNIT-IV	DESIGN PATTERN	Classes: 09

GRASP: Designing objects with responsibilities, creator, information expert, low coupling, high cohesion, design patterns, creational, factory method, structural, bridge, adaptor, behavioral, strategy.

UNIT-V	APPLYING DESIGN PATTENS	Classes: 10

System sequence diagrams, relation between sequence diagrams and use case logical architecture and UML package diagram, logical architecture refinement; Case study: The next gen POS system, inception, use case modeling, relating use cases, include, extend and generalization, domain models, domain model refinement.

Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education, 2nd Edition, 2004.
2. Craig Larman, "Applying UML and Patterns: An Introduction to Object Oriented Analysis and Design and Iterative Development", Pearson Education, 3rd Edition, 2005.

Reference Books:

1. Simon Bennett, Steve Mc Robb, Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Tata McGraw-Hill Education, 4th Edition, 2010.
2. Pascal Roques, "Modeling Software Systems Using UML2", WILEY- Dreamtech India Pvt. Ltd, 2nd Edition, 2007.

Web References:

1. https://www.tutorialspoint.com/uml/uml_overview.html
2. https://www.utdallas.edu/~chung/OOAD/M03_1_StructuralDiagrams.ppt
3. https://onedrive.live.com/download?cid=99CBBF765926367

E-Text Books:

1. https://www.utdallas.edu/UML2.0/Rumbaugh
2. https://www.utdallas.edu/~chung/SP/applying-uml-and-patterns.pdf

Course Home Page:

LINUX PROGRAMMING

VI Semester: CSE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS010	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Interpret the Linux utilities to control the resources.
II. Learn basic concepts of shell scripts and file structures.
III. Understand the concepts of process creation and interruption for multitasking applications.
IV. Explore memory allocation and inter process communication methods.
V. Provide support for distributed and network applications in Linux environment.

UNIT-I	INTRODUCTION TO LINUX UTILITIES	Classes: 08

Linux utilities: A brief history of UNIX, architecture and features of UNIX, introduction to vi editor. General purpose utilities, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands; Text processing and backup utilities: Text processing utilities and backup utilities; SED: Scripts, operation, addresses, commands; AWK: Execution, fields and records, scripts, operation, patterns, actions, associative arrays, string and mathematical functions, system commands in awk, applications.

UNIT-II	WORKING WITH THE BOURNE AGAIN SHELL (BASH)	Classes: 10

Shell: Shell responsibilities, types of shell, pipes and i/o redirection, shell as a programming language, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, quoting, test command, control structures, arithmetic in shell, interrupt processing, functions, and debugging scripts; File structure and directories: Introduction to file system, file descriptors, file types, file system structure; File metadata: Inodes; System calls for file I/O operations: open, create, read, write, close, lseek, dup2, file status information-stat family; File and record locking: fcntl function, file permissions, file ownership, links; Directories: Creating, removing and changing directories, obtaining current working directory, directory contents, scanning directories.

UNIT-III	PROCESS AND SIGNALS	Classes: 09

Process: Process identifiers, process structure: process table, viewing processes, system processes, process scheduling; Starting new processes: Waiting for a process, process termination, zombie processes, orphan process, system call interface for process management, fork, vfork, exit, wait, waitpid, exec.

Signals: Signal functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets.

UNIT-IV	DATA MANAGEMENT AND INTER PROCESS COMMUNICATION	Classes: 10

Data Management: Managing memory: malloc, free, realloc, calloc; File locking: Creating lock files, locking regions, use of read and write with locking, competing locks, other lock commands, deadlocks; Inter process communication: Pipe, process pipes, the pipe call, parent and child processes, named pipes,

semaphores, shared memory, message queues; Shared memory: Kernel support for shared memory, APIs for shared memory, shared memory example; Semaphores: Kernel support for semaphores, APIs for semaphores, file locking with semaphores.		
UNIT-V	**SOCKETS**	**Classes: 08**
Introduction to sockets: Socket, socket connections, socket attributes, socket addresses, socket system calls for connection oriented protocol and connectionless protocol, socket communications, comparison of IPC mechanisms.		

Text Books:

1. W. Richard, Stevens, "Advanced Programming in the UNIX Environment", Pearson Education, 1st Edition, 2005.
2. Sumitabha Das, "Unix Concepts and Applications", Tata McGraw-Hill, 4th Edition, 2006.
3. Neil Mathew, Richard Stones, "Beginning Linux Programming", Wrox, Wiley India, 4th Edition, 2011.

Reference Books:

1. Sumitabha Das, "Your Unix the Ultimate Guide", Tata McGraw-Hill, 4th Edition, 2007.
2. W. R. Stevens, S. A. Rago, "Advanced Programming in the Unix Environment Pearson Education, 2nd Edition, 2009.
3. B. A. Forouzan, R. F. Gilberg, "Unix and Shell Programming", Cengage Learning, 3rd Edition, 2005.

Web References:

1. http://www.linux-tutorial.info/
2. http://www.ee.surrey.ac.uk/Teaching/Unix/
3. http://www.tutorialspoint.com/listtutorials/linux/1
4. http://linuxcommand.org/learning_the_shell.php

E-Text Books:

1. http://vic.gedris.org/Manual-ShellIntro/1.2/ShellIntro.pdf
2. http://www.freeos.com/guides/lsst/

Course Home Page:

DATAWAREHOUSING AND DATAMINING

VI Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT006	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Understand data warehouse and online analytical processing technology for data mining.
II. Make mining association with rules in large databases, do classification and prediction with different techniques.
III. Conceptualize the architecture of a data warehouse and the need for pre-processing.
IV. Develop and understand data mining applications and trends of data mining.
V. Analyze the major techniques of preprocessing for different types of data.

UNIT-I	DATAWAREHOUSING	Classes: 08

Introduction to data mining: Motivation, importance, definition of data mining, kinds of data mining, kinds of patterns, data mining technologies, kinds of applications targeted, major issues in data mining; Preprocessing: data objects and attribute types, basic statistical descriptions of data, data visualization, data quality, data cleaning, data integration, data reduction, data transformation and data discretization.

UNIT-II	BUSINESS ANALYSIS	Classes: 10

Data warehouse and OLAP technology for data mining, what is a data warehouse, multi-dimensional data model, data warehouse architecture, data warehouse implementation, development of data cube technology, data warehousing to data mining; Data preprocessing: Data summarization, data cleaning, data integration and transformation data reduction, discretization and concept hierarchy generation.

UNIT-III	DATMINING	Classes: 10

Data mining primitives: Define a data mining, data mining query language, designing graphical user interfaces based on a data mining query language.

Concept description: Characterization and comparison, analytical characterization, mining class comparison, mining, descriptive statistical measures in large databases.

UNIT-IV	ASOCIATION RULE MINING AND CLASSIFICATION	Classes: 10

Mining frequent patterns, associations and correlations, mining methods, mining various kinds of association rules, correlation analysis, constraint based association mining, classification and prediction, basic concepts, decision tree induction, Bayesian classification, rule based classification, classification by back propagation.

UNIT-V	CLUSTERING AND TRENDS IN DATAMINING	Classes: 07

Cluster analysis: Types of data, categorization of major clustering methods, K-means partitioning methods, hierarchical methods, density based methods, grid based methods, model based clustering methods, clustering, high dimensional data, constraint based cluster analysis, outlier analysis; Trends in data mining: Data mining applications, data mining system products and research prototypes, social impacts of data mining.

Text Books:

1. Jiawei Han, Michelin Kamber, "Data Mining-Concepts and techniques", Morgan Kaufmann Publishers, Elsevier, 2nd Edition, 2006.
2. Alex Berson, Stephen J. Smith, "Data Warehousing Data Mining and OLAP", Tata McGraw-Hill, 2nd Edition, 2007.

Reference Books:

1. Arun K Pujari, "Data Mining techniques", Universities Press, 3rd Edition, 2005
2. Pualraj Ponnaiah, "Data Warehousing Fundamentals", Wiley, Student Edition, 2004.
3. E. Balagurusamy, "Programming in ANSI C", McGraw-Hill Education, 6th Edition, 2012.
4. Ralph Kimball, "The Data Warehouse Life Cycle Toolkit", Wiley, Student Edition, 2006.
5. Vikram Pudi, P Radha Krishna, "Data Mining", Oxford University, 1st Edition, 2007.

Web References:

1. http://www.anderson.ucla.edu
2. https://www.smartzworld.com
3. http://iiscs.wssu.edu

E-Text Books:

1. https://www.cisco.com/application/pdf/en/us/guest/products/ps2011/c2001/ccmigration_09186a00802342cf.pdfhttps://www.jntubook.com
2. http://ftp.utcluj.ro/pub/users/cemil/dwdm/dwdm_Intro/0_5311707.pdf.

MOOC Course

https://3ca1513rbm.wordpress.com

Course Home Page:

OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY

VI Semester: CSE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS108	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 39				Total Classes: 39		

OBJECTIVES:

The course should enable the students to:

I. Design use cases and develop the use case model.
II. Capture a business process model.
III. Practice the object oriented analysis and design through UML on a particular application.
IV. Explore tools that support UML and object oriented software development.

LIST OF EXPERIMENTS

Week-1	**SOFTWARE REQUIREMENTS SPECIFICATION**

Introduction to UML Diagrams. Create SRS for Recruitment System.

Week-2	**USE CASE DIAGRAM**

a. Passport Automation System
b. Book bank management system
c. Online course reservation system
d. Foreign trading system
e. Conference Management System
f. BPO Management System

Week-3	**ACTIVITY DIAGRAM**

a. Passport Automation System
b. Book bank management system
c. Online course reservation system
d. Foreign trading system
e. Conference Management System
f. BPO Management System

Week-4	**DOMAIN MODEL**

Identity the conceptual classes and Develop a domain model with UML Class diagram for passport automation system

Week-5	**SCENARIOS**

Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.

Week-6	**STATE CHART DIAGRAM**
Draw a state chart diagram for a. Passport Automation System b. Book bank management system c. Online course reservation system	
Week-7	**STATE CHART DIAGRAM**
a. Foreign trading system b. Conference Management System c. BPO Management System	
Week-8	**ARCHITECTURE DIAGRAM**
Identify the User Interface, Domain objects, and Technical services.	
Week-9	**ARCHITECTURE DIAGRAM**
Draw the partial layered, logical architecture diagram with UML package diagram notation	
Week-10	**COMPONENT DIAGRAM**
Draw a Component diagram for a. Passport Automation System b. Book bank management system c. Online course reservation system	
Week-11	**COMPONENT DIAGRAM**
Draw a Component diagram for a. Foreign trading system b. Conference Management System c. BPO Management System	
Week-12	**DEPLOYMENT DIAGRAMS**
Draw a Component diagram for a. Passport Automation System b. Book bank management system c. Online course reservation system	
Week-13	**DEPLOYMENT DIAGRAMS**
Draw a Component diagram for a. Foreign trading system b. Conference Management System c. BPO Management System	
Reference Books:	
1. Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", McGraw-Hill Education, 4th Edition, 2010. 2. Pascal Roques, "Modeling Software Systems Using UML 2", WILEY- Dreamtech India Pvt. Ltd, 2nd Edition, 2007.	

Web References:

1. https://www.tutorialspoint.com/uml/uml_overview.html
2. https://www.utdallas.edu/~chung/OOAD/M03_1_StructuralDiagrams.ppt
3. https://onedrive.live.com/download?cid=99CBBF765926367

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Intel Desktop Systems: 36 nos

SOFTWARE: System software: Windows 7.
Application software's: IBM Rational Rose 7.0.

LINUX PROGRAMMING LABORATORY

VI Semester: CSE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS109	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 39				Total Classes: 39		

OBJECTIVES:

The course should enable the students to:

I. Analyze the Linux utilities and Linux environment.
II. Learn the fundamentals of shell scripting/programming.
III. Understand the basic Linux administration.
IV. Implement inter process communication and management concepts.

LIST OF EXPERIMENTS

Week-1 **GENERAL PURPOSE UTILITIES COMMANDS**

Learning installation and upgradation of the Linux operating system.
Basic Linux commands: User and session management commands: useradd, groupadd, userdel, groupdel, passwd; General purpose utilities: echo, printf, bc,who, whoami, tty, uname, clear, ls.

Week-2 **FILE SYSTEM, TEXT PROCESSING COMMANDS AND VI EDITOR**

Linux commands: cat-create a file, append a file and open a file. file, wc, cp, rm, mv, more, head,tail, gzip, gunzip. vi editor- commands, navigation commands and creating a vi editor file.

Week-3 **SED, GREP,EGREP,FGREP**

1. Finding a file containing a particular text string
2. Regular expressions in grep command.
3. Search multiple words / string pattern using grep command on bash shell
4. Illustrate by writing script that will print, message “Hello World, in Bold and Blink effect, and in different colors like red, brown etc using echo commands.
5. Write a program that will output the desired patterns

```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
```

Week-4 **BASIC SHELL SCRIPTING**

1. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers.
2. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it.
3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions.

Week-5	SHELL SCRIPTING
1. Write a program to generate Fibonacci series 2. Write a program to check whether given string is palindrome or not 3. Write a shell script to find factorial of a given integer.	
Week-6	**INPUT OUTPUT REDIRECTIONS AND COMMAND SUBSTITUTIONS**
1. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported. 2. Write a shell script that accepts a list of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files. 3. Write a shell script to list all of the directory files in a directory.	
Week-7	**AWK SCRIPT**
1. Write an awk script to count the number of lines in a file that do not contain vowels. 2. Write an awk script to find the number of characters, words and lines in a file. 3. Write an awk script to calculate average marks of each student. 4. Write an awk script to replace a string in a file.	
Week-8	**PATTERN SCANNING AND PROCESSING SCRIPTS**
1. Write a C program that makes a copy of a file using standard I/O and system calls. 2. Illustrate to redirect the standard input (stdin) and the standard output (stdout) of a process, so that scanf (). 3. Write an reads from the pipe and printf () writes into the pipe.	
Week-9	**PATTERN SCANNING AND PROCESSING SCRIPTS**
1. Write a program that takes one or more file/directory names as command line input and reports the following information on the file. A. File type. B. Number of links. C. Time of last access. D. Read, write and execute permissions. 2. Write a C program to emulate the Unix ls –l command. 3. Write a C program to list for every file in a directory, its inode number and file name.	
Week-10	**PROCESS ATTRIBUTES AND USAGE OF FORK( )**
1. Write a C program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen. 2. Write a C program to create a zombie process. 3. Write a C program that illustrates how an orphan is created.	
Week-11	**USAGE OF PIPES AND NAMED PIPES**
1. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex:- ls –l | sort 2. Write C programs that illustrate communication between two unrelated processes using named pipe. 3. Write a C program to create a message queue with read and write permissions to write 3 messages to it	

Week-12	SYNCHRONIZATION AND LOCKING TECHNIQUES

1. Write a C program to allow cooperating processes to lock a resource for exclusive use, using a) Semaphores b) flock or lockf system calls.
2. Write a C program that illustrates suspending and resuming processes using signals.
3. Write a C program that implements a producer-consumer system with two processes. (using Semaphores).

Week-13	CLIENT SEVER IMPLEMENTATION USING SOCKETS AND SHARED MEMORY

1. Write client and server programs (using c) for interaction between server and client processes using Unix domain sockets.
2. Write client and server programs (using c) for interaction between server and client processes using Internet domain sockets.
3. Write a C program that illustrates two processes communicating using shared memory.

Reference Books

1. W. Richard, Stevens, "Advanced Programming in the UNIX Environment", Pearson Education, 1st Edition, 2005.
2. Sumitabha Das, "Unix Concepts and Applications", Tata McGraw Hill, 4th Edition, 2006.
3. Neil Mathew, Richard Stones," Beginning Linux Programming", Wrox, Wiley India, 4th Edition, 2011.

Web Reference:

1. https://www-uxsup.csx.cam.ac.uk/pub/doc/suse/suse9.0/userguide-9.0/ch24s04.html
2. http://linuxcommand.org/lc3_lts0060.php

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Intel Desktop Systems: 36 nos

SOFTWARE: System software: Linux, Windows 7.
Application software's: Fedora.

DATAWAREHOUSING AND DATAMINING LABORATORY

VI Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT102	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES:

The course should enable the students to:

I. Understand the need of Data Warehouses over Databases, and the difference between usage of operational and historical data repositories.
II. Able to differentiate between RDBMS schemas & Data Warehouse Schemas.
III. Get a clear idea of various classes of Data Mining techniques, their need, scenarios (situations) and scope of their applicability.
IV. Implement association rule for mining and also implement the clustering technique.

LIST OF EXPERIMENTS

Week-1	**PREPROCESSING**
Simulate preprocessing methods dataset student and labor in weka.	
Week-2	**ASSOCIATION RULE**
1. Simulate association rule process on dataset contact lenses. arff using apriori algorithm in weka. 2. Simulate Association rule process on dataset test. arff using apriori algorithm in weka.	
Week-3	**CLASSIFICATION RULE BY J48**
Simulate of classification rule process on dataset student. arff using j48 algorithm in weka.	
Week-4	**CLASSIFICATION RULE BY J48**
Demonstration of classification rule process on dataset employee. arff using j48 algorithm.	
Week-5	**CLASSIFICATION RULE BY ID3**
Demonstration of classification rule process on dataset employee. arff using id3 algorithm.	
Week-6	**CLASSIFICATION RULE BY NAÏVE BAYES**
Demonstration of classification rule process on dataset employee. arff using naïve bayes.	

Week-7	**CLASSIFICATION RULE BY K-MEANS**
Demonstration of clustering rule process on dataset iris. arff using simple k-means	
Week-8	**CLUSTERING**
Demonstration of clustering rule process on dataset student. arff using simple k- means this macro to print the elements of the array.	
Week-9	**CLUSTERING BY K-MEANS**
Implement k-means algorithm algorithm.	
Week-10	**DECISION TREE**
Implement decision tree classification algorithm.	
Week-11	**ASSOCIATION RULE MINING BY APRIORI ALGORITHM.**
Implement Apriori algorithm.	
Week-12	**ASSOCIATION RULE MINING BY FP- GROWTH ALGORITHM.**
Implement FP- growth algorithm.	

Reference Books:

1. J. Han, M. Kamber, "Data Mining: Concept and Techniques", Academic Press, Morgan Kanfman Publishers, 3rd Edition, 2008.
2. Alex Berson, Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw-Hill, 10th Edition, 2007.
3. Pieter Adrians, DolfZantinge, "Data Mining", Addison Wesley, Peter V, 2000.

Web References:

1. https://www.tutorialspoint.com
2. http://www.anderson.ucla.edu
3. https://www.smartzworld.com
4. http://iiscs.wssu.edu

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Intel Desktop Systems: 36 nos

SOFTWARE: Application software: Weka

CLOUD APPLICATION DEVELOPMENT

VII Semester: CSE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS011	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Understand the concepts of cloud computing for developing the cloud applications.
II. Implement task scheduling algorithms and virtualization.
III. Analyze the security issues in cloud environments.

UNIT-I	INTRODUCTION AND CLOUD APPLICATION DEVELOPMENT	Classes: 09

Introduction: Definition, characteristics, benefits, challenges of cloud computing, cloud models: service-IaaS-PaaS-SaaS, deployment-public, private, hybrid, community; Cloud services: Amazon, Google, Azure, online services, open source private clouds, SLA; Applications: Healthcare, energy systems, transportation, manufacturing, education, government, mobile communication, application development; Cloud application development: Amazon web services: EC2 instances, connecting clients, security rules, launch an EC2 Linux instance and connect it, create EC2 placement group, to use S3 in java, to manage SQS services in C#, to install simple notification service on Ubuntu 10.04.

UNIT-II	CLOUD ARCHITECTURE, PROGRAMMING MODEL	Classes: 09

Cloud Architecture, programming model: NIST reference architecture, architectural styles of cloud applications, single, multi, hybrid cloud site, redundant, non redundant, 3 tier, multi tier architectures; Programming model: Compute and data intensive; Compute intensive model: Parallel computation, BSP, workflows, coordination of multiple activities - zoo keeper; Data intensive model: Big data - map reduce programming model, map reduce in cloud; map reduce applications: Hadoop distributed file system, Grep the web, graph processing- SSSP, SSSP in map reduce, Pregl programming model, other big data programming models.

UNIT-III	CLOUD RESOURCE VIRTUALIZATION	Classes: 09

Cloud resource virtualization: Basics of virtualization, types of virtualization techniques, merits and demerits of virtualization, full vs Para - virtualization, virtual machine monitor/hypervisor - virtual machine basics, taxonomy of virtual machines, process vs system virtual machines.

Emulation: Interpretation and binary translation, HLL, virtual machines, storage, desktop and application virtualization, applying virtualization.

UNIT-IV	CLOUD RESOURCE MANAGEMENT AND SCHEDULING	Classes: 09

Cloud Resource Management and Scheduling: Policies and mechanisms for resource management, resource bundling, combinatorial , fair queuing, start time fair queuing, borrowed virtual time, cloud scheduling subject to deadlines, scheduling map reduce applications subject to deadlines, resource management and application scaling.

UNIT-V	CLOUD SECURITY	Classes: 09
Cloud Security: Risks, privacy and privacy impacts assessments; Multi-tenancy issues, security in VM, OS, virtualization system security issues and vulnerabilities; Virtualization system-specific attacks: Technologies for virtualization-based security enhancement, legal; Compliance issues: Responsibility, ownership of data, right to penetration test, local law where data is held, examination of modern security standards (eg: PCIDSS), how standards deal with cloud services and virtualization, compliance for the cloud provider vs compliance for the customer.		
Text Books:		
1. Dan Marinescu, "Cloud Computing: Theory and Practice", M K Publishers, 1st Edition, 2013. 2. Kai Hwang, Jack Dongarra, Geoffrey Fox, " Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", M K Publishers, 1st Edition, 2011.		
Reference Books:		
1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", McGraw Hill, 1st Edition, 2009. 2. Arshdeep Bahga, "Cloud Computing: A Hands on Approach", Vijay Madisetti Universities Publications, 1st Edition, 2013.		
Web References:		
1. http://searchcloudcomputing.techtarget.com/definition/cloud-computing. 2. http://in.pcmag.com/networking-communications-software/38970/feature/what-is-cloud-computing.		
E-Text Books:		
1. http://www.pds.ewi.tudelft.nl/ 2. http://csrc.nist.gov/publications/nistpubs. 3. http://cloudipedia.com/wp-content/uploads/2009/11/cloud_computing_made_easy.pdf.		
Course Home Page:		

SOFTWARE TESTING METHODOLOGY

VII Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT008	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Understand the concept of software testing objectives, process criteria, strategies and methods.
II. Demonstrate various software testing issues and solutions in software like unit test, integration, regression and system testing.
III. Demonstrate the techniques and skills on how to use modern software testing tools to support software testing projects.
IV. Understand important concepts of complexity metrics and object oriented metrics.

UNIT-I	INTRODUCTION TO TESTING	Classes: 10

Introduction: Purpose of testing, dichotomies, model for testing, consequences of bugs, taxonomy of bugs. Flow graphs and path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II	TRANSACTION FLOW TESTING	Classes: 08

Transaction flow testing: Transaction flows, transaction flow testing techniques, dataflow testing, basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT-III	LEVELS OF TESTING	Classes: 09

Domain testing: Domains and paths, nice and ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

Logic based testing: Overview, decision tables, path expressions, kv charts, and specifications.

UNIT-IV	PATH PRODUCTS	Classes: 08

Paths, path products and regular expressions: Path products and path expression, reduction procedure, applications, regular expressions and flow anomaly detection.

UNIT-V	TRANSITION TESTING	Classes: 10

State, state graphs and transition testing: State graphs, good and bad state graphs, state testing, testability tips.

Text Book:

Boris Beizer, "Software Testing Techniques", Dreamtech Press, 2nd Edition, 2003.

Reference Books:

1. P. C. Jorgenson, "Software Testing: A Craftmen's Approach", Auerbach Publications, 3rd Edition, 2013.
2. Perry, "Effective Methods of Software Testing", John Wiley, 2nd Edition, 1999.
3. P. Nageswara Rao, "Software Testing Concepts and Tools", DreamTech Press, 2nd Edition, 2007.

Web References:
1. http://www.qatutorial.com/?q=Software_Test_Metrics 2. http://softwaretestingfundamentals.com/unit-testing/ 3. http://qainsights.com/challenges-in-test-automation/ 4. http://www.softwaretestinghelp.com/manual-and-automation-testing-challenges/
E-Text Books:
1. http://www.softwaretestinghelp.com/practical-software-testing-new-free-ebook-download/ 2. http://www.guru99.com/software-testing.html 3. http://www.fromdev.com/2012/04/8-best-software-testing-books-every-qa.html 4. https://onlinecourses.nptel.ac.in/noc16_cs16/preview
MOOC Course
1. https://www.udacity.com/course/software-testing--cs258 2. https://www.utest.com/search-result/tag/Test%20Cycles 3. https://www.edureka.co/software-testing
Course Home Page:

BIG DATA AND BUSINESS ANALYTICS

VII Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS012	Core	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Optimize business decisions and create competitive advantage with Big data analytics.
II. Understand several key big data technologies used for storage, analysis and manipulation of data.
III. Recognize the key concepts of Hadoop framework, map reduce.
IV. Demonstrate the concepts in Hadoop for application development.

UNIT-I	INTRODUCTION TO BIG DATA	Classes: 08

Big Data and its importance: Four V's of big data; Drivers for big data: Introduction to big data analytics, big data analytics applications.

UNIT-II	BIG DATA TECHNOLOGIES	Classes: 09

Hadoop's parallel world: Data discovery open source technology for big data analytics, cloud and big data predictive analytics, mobile business intelligence and big data crowd sourcing analytics, inter and trans firewall analytics, information management.

UNIT-III	PROCESSING BIG DATA AND INTRODUCTION TO MAP REDUCE	Classes: 09

Integrating disparate data stores: Mapping data to the programming framework, connecting and extracting data from storage, transforming data for processing, subdividing data in preparation for hadoop map reduce.

Employing hadoop map reduce 1: Creating the components of hadoop map reduce jobs, distributing data processing across server farms, executing hadoop map reduce jobs.

UNIT-IV	HADOOP MAP REDUCE	Classes: 09

Employing hadoop map reduce 2: Monitoring the progress of job flows, the building blocks of hadoop map reduce, distinguishing hadoop daemons, investigating the hadoop distributed file system selecting appropriate; Execution modes: Local, pseudo-distributed, fully distributed.

UNIT-V	ADVANCED ANALYTICS PLATFORM	Classes: 10

Installing and running hadoop: Real-time architecture, orchestration and synthesis using analytics engines, discovery using data at rest, implementation of big data analytics, bigdata convergence, analytics business maturity model.

Text Books:

1. Mohanthy S, Jagadeesh M, Srivatsa H, "Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics", Apress /Springer (India), 1st Edition, 2013.
2. Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", Wiley Publications, 2nd Edition, 2014.

3. Albright, Winston, “Business Analytics”, Cengage Learning, 6th Edition, 2015.
4. DT Editorial Services, “Big Data”, Dream Tech Press, 2nd Edition, 2015.

Reference Books:

1. Michael Minelli, Michele Chambers, Ambiga Dhiraj, “Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today’s Business”, Wiley CIO Series, 1st Edition, 2013.
2. Tom White, “Hadoop: The Definitive Guide”, O’Reilly, 3rd Edition, 2012.
3. Rajiv Sabherwal, Irma Becerra- Fernandez, “Business Intelligence –Practice, Technologies and Management”, John Wiley, 1st Edition, 2011.
4. Arvind Sathi, “Big Data Analytics: Disruptive Technologies for Changing the Game”, IBM Corporation, 1st Edition, 2012.

Web References:

1. https://www.sas.com/en_us/insights/analytics/big-data-analytics.html
2. https://www.searchbusinessanalytics.techtarget.com/definition/big-data-analytics
3. https://www.webopedia.com

E-Text Books:

1. https://www.books.google.co.in/books?id=rkWPojgfeM8C&printsec=frontcover&dq=HIGH+PERFORMANCE+COMPUTING.
2. http://www.datameer.com/pdf/big-data-analytics-ebook.pdf?mkt_tok.

Course Home Page:

CLOUD APPLICATION DEVELOPMENT LABORATORY

VII Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS110	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Learn to run virtual machines of different configuration .
II. Develop Big data application using Hadoop.
III. Exposed to tool kits for cloud environment.
IV. Developing web services/Applications in cloud framework.

LIST OF EXPERIMENTS

Week-1	**VIRTUALIZATION**
Install Oracle Virtual box and create two VMs on your laptop.	
Week-2	**VIRTUALIZATION**
Install Turbo C in guest OS and execute C program.	
Week-3	**VIRTUALIZATION**
Test ping command to test the communication between the guest OS and Host OS.	
Week-4	**HADOOP**
Install Hadoop single node setup.	
Week-5	**HADOOP**
Develop a simple hadoop application called Word Count. It counts the number of occurrences of each word in a given input set.	
Week-6	**HADOOP**
Develop hadoop application to count no of characters, no of words and each character frequency.	
Week-7	**HADOOP**
Develop hadoop application to process given data and produce results such as finding the year of maximum usage, year of minimum usage.	

Week-8	**HADOOP**
Develop hadoop application to process given data and produce results such as how many female and male students in both schools the results should be in following format. GP-F #number GP-M #numbers MS-F #number MS-M #number	
Week-9	**CLOUD PROGRAMMING**
Establish an AWS account. Use the AWS Management Console to launch an EC2 instance and connect to it.	
Week-10	**CLOUD PROGRAMMING**
Design a protocol and use Simple Queue Service(SQS)to implement the barrier synchronization after the first phase.	
Week-11	**CLOUD PROGRAMMING**
Use the Zookeeper to implement the coordination model in Problem 10.	
Week-12	**CLOUD PROGRAMMING**
Develop a Hello World application using Google App Engine.	
Week-13	**CLOUD PROGRAMMING**
Develop a Guestbook Application using Google App Engine.	
Week-14	**WINDOWS AZURE**
Develop a Windows Azure Hello World application using.	
Week-15	**PIPES**
Create a Mashup using Yahoo! Pipes.	

Reference Books

1. Dan Marinescu, "Cloud Computing: Theory and Practice", M K Publishers, 1st Edition, 2013.
2. Kai Hwang, Jack Dongarra, Geoffrey Fox, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", M K Publishers, 1st Edition, 2013.
3. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", McGraw-Hill, 1st Edition, 2009.
4. Arshdeep Bahga, Vijay Madisetti, "Cloud computing A Hands on Approach", Universities Publications, 1st Edition, 2013.

Web References:

1. http://www.howtogeek.com/196060/beginner-geek-how-to-create-and-use-virtual-machines/
2. http://www.tutorialspoint.com/hadoop/
3. https://aws.amazon.com/

4. http://www.tutorialspoint.com/zookeeper/
5. https://cloud.google.com/appengine/docs/java/gettingstarted/creating-guestbook
6. https://www.google.co.in/?gfe_rd=cr&ei=SZIJWOnpIanqugTDyrewCw&gws_rd=ssl#q=yahoo+pipes+mashup+tutorial.

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR 36 STUDENTS:

HARDWARE: Standalone desktops with internet facility: 36 nos.

SOFTWARE: Globus Toolkit or equivalent Eucalyptus or Open Nebula.

SOFTWARE TESTING METHODOLOGY LABORATORY

VII Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT104	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES:

The course should enable the students to:

I. Learn the importance of web testing tool and bug tracking tool.
II. Develop test case and test plan document for banking application.
III. Learn to write system specifications of any application and report various bugs in it.
IV. Use automated functional testing tool like Quick Test Professional.

LIST OF EXPERIMENTS

Week-1	**CONSTRUCTS**

Write programs in C language to demonstrate the working of the following constructs:
a) while b) switch c) for d) if-else e) do-while

Week-2	**SYSTEM SPECIFICATIONS**

a. Study the system specifications of ATM system and report various bugs in it.
b. Study the system specifications of banking application and report various bugs in it.

Week-3	**TEST CASES**

a. Write the test cases for ATM system.
b. Write the test cases for banking application.

Week-4	**TEST PLAN**

Create a test plan document for any application (e.g. Library management system).

Week-5	**TESTING TOOL**

Study of any testing tool (e.g. Win runner).

Week-6	**SELENIUM**

Study of web testing tool (e.g. Selenium).

Week-7	**BUG TRACKING TOOL**

Study of bug tracking tool (e.g. Bugzilla).

Week-8	**BUGBIT**
Study of bug tracking tool (e.g. Bugbit).	
Week-9	**TEST MANAGEMENT TOOL**
Study of any test management tool (e.g. Testdirector).	
Week-10	**OPEN SOURCE TESTING TOOL**
Study of any Open Source Testing Tool (e.g. Test Link).	
Week-11	**AUTOMATED FUNCTIONAL TESTING TOOL**
Study of QTP (Quick Test Professional) automated functional testing tool.	
Week-12	**INTROSPECTION OF MATRIX MULTIPLICATION**
A program written in C language for matrix multiplication fails, introspect the causes for its failure and write down the possible reasons for its failure.	

Reference Books:

1. Boris Beizer, "Software Testing Techniques", DreamTech Press, 2nd Edition, 2000.
2. Dr. K. V. K. K. Prasad, "Software Testing Tools", DreamTech Press, Revised Edition, 2004.
3. Perry, "Effective methods of Software Testing", John Wiley, 2nd Edition, 1999.
4. Paul Jorgensen, "Software Testing: A Craftsman's Approach", Auerbach Publications, 3rd Edition, 2012.
5. P. C. Jorgensen, "Software Testing", Auerbach Publications, 3rd Edition, 2000.

Web References:

1. https://www.bugzilla.org/about/
2. http://www.seleniumhq.org/docs/01_introducing_selenium.jsp
3. http://www.softwaretestinghelp.com/popular-bug-tracking-software/
4. http://www.guru99.com/testlink-tutorial-complete-guide.html
5. http://www.softwaretestingstuff.com/2007/10/test-director.html

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR 36 STUDENTS:

HARDWARE: Desktop Computers with 4 GB RAM 36 nos.

SOFTWARE: Application Software: Win runner, Selenium, Bugzilla, Bugbit, Testdirector, Testlink (Open Source)

BIG DATA AND BUSINESS ANALYTICS LABORATORY

VII Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS111	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Optimize business decisions and create competitive advantage with Big Data analytics.
II. Practice java concepts required for developing map reduce programs.
III. Impart the architectural concepts of Hadoop and introducing map reduce paradigm.
IV. Practice programming tools PIG and HIVE in Hadoop eco system.
V. Implement best practices for Hadoop development.

LIST OF EXPERIMENTS

Week-1 **INSTALL VMWARE**

Installation of VMWare to setup the Hadoop environment and its ecosystems.

Week-2 **HADOOP MODES**

a. Perform setting up and Installing Hadoop in its three operating modes.
   i. Standalone.
   ii. Pseudo distributed.
   iii. Fully distributed.
b. Use web based tools to monitor your Hadoop setup.

Week-3 **USING LINUX OPERATING SYSTEM**

Implementing the basic commands of LINUX Operating System – File/Directory creation, deletion, update operations.

Week-4 **FILE MANAGEMENT IN HADOOP**

Implement the following file management tasks in Hadoop:
   i. Adding files and directories
   ii. Retrieving files
   iii. Deleting files

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies the minto HDFS using one of the above command line utilities.

Week-5 **MAPREDUCE PROGRAM 1**

Run a basic word count Map Reduce program to understand Map Reduce Paradigm.

Week-6 **MAPREDUCE PROGRAM 2**

Write a Map Reduce program that mines weather data.
Hint: Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented.

Week-7	**MAPREDUCE PROGRAM 3**
Implement matrix multiplication with Hadoop Map Reduce.	
Week-8	**MAPREDUCE PROGRAM 4**
Write a Map Reduce program that makes the dataset to be compressed.	
Week-9	**MAPREDUCE PROGRAM 5**
Write a Map Reduce program to run sorting techniques to the relevant data.	
Week-10	**PIG LATIN LANGUAGE - PIG**
Installation of PIG.	
Week-11	**PIG COMMANDS**
Write Pig Latin scripts sort, group, join, project, and filter your data.	
Week-12	**PIG LATIN MODES**
Implement the Pig Latin scripts in two different modes: Local mode and HDFS mode and run the different scripts and UDF's.	
Week-13	**PIG PROGRAM**
Run the Pig Latin Scripts to find a max temp for each and every year.	
Week-14	**HIVE**
Installation of HIVE.	
Week-15	**HIVE OPERATIONS**
Use Hive to create, alter, and drop databases, tables, views, functions, and indexes.	
Reference Book:	
1. Jay Liebowitz, "Big Data And Business Analytics Laboratory", CRC Press.	
Web References:	
1. Hadoop : http://hadoop.apache.org/ 2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home 3. Pig latin: http://pig.apache.org/docs/r0.7.0/tutorial.html	
Course Home Page:	
SOFTWARE AND HARDWARE REQUIREMENTS FOR 36 STUDENTS: **HARDWARE:** 36 numbers of Intel Desktop Computers with 4 GB RAM. **SOFTWARE:** VMWare, HADOOP.	

INFORMATION SECURITY

VIII Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS013	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Learn the basic categories of threats to computers and networks.
II. Understand various cryptographic algorithms and be familiar with public-key cryptography.
III. Apply authentication functions for providing effective security.
IV. Analyze the application protocols to provide web security.
V. Discuss the place of ethics in the information security area.

UNIT-I	**ATTACKS ON COMPUTERS AND COMPUTER SECURITY**	**Classes: 08**

Attacks on computers and computer security: Introduction, the need for security, security approaches, principles of security, types of security attacks, security services, security mechanism, a model for network security; Cryptography concepts and techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT-II	**SYMMETRIC KEY CIPHERS**	**Classes: 10**

Symmetric key ciphers: Block cipher principles and algorithms (DES, AES, Blowfish), differential and linear cryptanalysis, block cipher modes of operation, stream ciphers, RC4 location, and placement of encryption function, key distribution; Asymmetric key ciphers: Principles of public key cryptosystems, algorithms (RSA Diffie - Hellman, ECC) key distribution.

UNIT-III	**MESSAGE AUTHENTICATION ALGORITHM AND HASH FUNCTIONS**	**Classes: 08**

Message authentication algorithm and hash functions: Authentication requirements, functions, message, authentication codes, hash functions, secure hash algorithm, whirlpool, HMAC, CMAC, digital signatures, knapsack algorithm.

Authentication application: Kerberos, X.509 authentication service, public – key infrastructure, biometric authentication.

UNIT-IV	**E-MAIL SECURITY**	**Classes: 10**

E-mail Security: Pretty Good Privacy; S/MIMI IP Security: IP security overview, IP security architecture, authentication header, encapsulating security payload, combining security associations, key management.

UNIT-V	**WEB SECURITY**	**Classes: 09**

Web security: Web security considerations, secure socket layer and transport layer security, secure electronic transaction intruders; Virus and firewalls: Intruders, intrusion detection password management, virus and related threats, countermeasures, firewall design principles; Types of firewalls Case Studies on Cryptography and security: Secure inter-branch payment transactions, cross site scripting vulnerability, virtual electronics.

Text Books:

1. William Stallings, "Cryptography and Network Security", Pearson Education, 4th Edition, 2005.
2. Atul Kahate, "Cryptography and Network Security", McGraw-Hill, 2nd Edition, 2009.

Reference Books:

1. C K Shymala, N Harini, Dr. T R Padmanabhan, "Cryptography and Network Security", Wiley India, 1st Edition, 2016.
2. Behrouz A. Forouzan Debdeep Mukhopadhyay, "Cryptography and Network Security", McGraw-Hill, 2nd Edition, 2010.

Web References:

1. http://bookboon.com/en/search?q=INFORMATION+SECURITY
2. https://books.google.co.in/books/about/Cryptography_Network_Security_Sie_2E.html?id=Kokjwdf0E7QC
3. https://books.google.co.in/books/about/Information_Security.html?id=Bh45pU0_E_4C

E-Text Books:

1. https://books.google.co.in/books/about/Information_Security.html
2. http://www.amazon.in/Cryptography-Network-Security-Behrouz-Forouzan/dp/007070208X

Course Home Page:

MACHINE LEARNING

VIII Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS014	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Apply knowledge of computing and mathematics appropriate to the discipline.
II. Illustrate the concepts of machine learning and related algorithms.
III. Understand the dimensionality problems using linear discriminants.
IV. Study various statistical models for analyzing the data.
V. Learn clustering algorithms for unlabeled data.

UNIT-I	TYPES OF MACHINE LEARNING	Classes: 09

Concept learning: Introduction, version spaces and the candidate elimination algorithm; Learning with trees: Constructing decision trees, CART, classification example.

UNIT-II	LINEAR DISCRIMINANTS	Classes: 09

Perceptron (MLP): Going forwards, backwards, MLP in practices, deriving back; Propagation support vector Machines: Optimal separation, kernels.

UNIT-III	BASIC STATISTICS	Classes: 09

Averages, variance and covariance, the Gaussian; The bias-variance tradeoff Bayesian learning: Introduction, Bayes theorem, Bayes optimal classifier, naïve Bayes classifier.

Graphical models: Bayesian networks, approximate inference, making Bayesian networks, hidden Markov models, the forward algorithm.

UNIT-IV	EVOLUTIONARY LEARNING	Classes: 09

Genetic Algorithms, genetic operators; Genetic programming; Ensemble learning: Boosting, bagging; Dimensionality reduction: Linear discriminate analysis, principal component analysis (JAX-RPC).

UNIT-V	CLUSTERING	Classes: 09

Similarity and distance measures, outliers, hierarchical methods, partitional algorithms, clustering large databases, clustering with categorical attributes, comparison.

Text Books:

1. Tom M. Mitchell, "Machine Learning ", McGraw Hill, 1st Edition, 2013.
2. Stephen Marsland, "Machine Learning - An Algorithmic Perspective ", CRC Press, 1st Edition, 2009.

Reference Books:

1. Margaret H Dunham, "Data Mining", Pearson Edition, 2nd Edition, 2006.
2. Galit Shmueli, Nitin R Patel, Peter C Bruce, "Data Mining for Business Intelligence", John Wiley and Sons, 2nd Edition, 2007.
3. Rajjal Shinghal, "Pattern Recognition and Machine Learning", Springer-Verlag, New York, 1st Edition, 2006.

Web References:

1. Httd://ww.udemy.com/MachineLearning/Online_Course
2. https://en.wikipedia.org/wiki/Machine_learning

E-Text Books:

1. http://www.e-booksdirectory.com/details.php?ebook=1118
2. http://www.otexts.org/sfml

Course Home Page:

C# AND .NET FRAMEWORK

I Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS501	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the syntax of basic C# programming constructs.
II. Create and use new types (enumerations, classes, and structures), and understand the differences between reference types and value types.
III. Implement custom collection classes that support enumeration.
IV. Explore on dynamic languages for creating web applications.

UNIT-I	INTRODUCING TO C#	Classes: 10

Introducing C# andthe .NET platform: The philosophy of .NET, the .NET solution, building blocks of the .NET platform(the CLR, CTS, and CLS), an overview of .NET assemblies, understanding the CTS, CLS, and CLR, the assembly / namespace / type distinction, exploring an assembly using ildasm.exe, exploring an assembly using reflector, the platform independent nature of .NET; Building C# application: The role of the .NET framework 4.0 SDK, building C# applications using csc.exe, building NET applications using notepad++, building .NET applications using C# development, building .NET applications using visual C# 2010 express, building .NET applications using visual studio 2010.

UNIT-II	CORE C# PROGRAMMING	Classes: 09

Core C# programming constructs part - I: The anatomy of simple C# program, environment class, the system, Console class, system data types and C# shorthand notation, working with string data, narrowing and widening data type local variables, C# iteration constructs, decision constructs and the relational / equality operators; Core programming constructs part-II: Methods and parameter modifiers, understanding C# arrays, understanding the enum type, understanding the structure type, understanding value types and reference types, understanding C# nullable type.

UNIT-III	UNDERSTANDING INHERITANCE AND POLYMORPHISM	Classes: 08

Inheritance: The basic mechanics of inheritance, revising visual studio class diagrams, defining the pillars of OOP, the first pillar, the second pillar of OOP, the third pillar of OOP, understanding base class / derived class casting rules, the master parent class.

Understanding structured exception handling: ODE to errors, bugs, and exceptions, the role of .NET exception handling, the simplest possible example, configuring the state of an exception, types of exceptions, processing multiple exceptions.

UNIT-IV	DELEGATES AND EVENTS WITH .NET ASSEMBLIES	Classes: 08

Delegates and events**:** Understanding the .NET delegate type, defining a delegate type in C#, the system multicast delegate and system, delegate base classes, the simple possible delegate example, sending object state notification using delegates; Programming with .NET assemblies: Configuring .NET assemblies, defining custom namespaces, the role of .NET assemblies, understanding the format of a .NET assembly,

building and consuming a single-file assembly, building and consuming a multi file assembly, understanding private assembly, understanding shared assembly, consuming a shared assembly, configuring shared assemblies, understanding publisher policy assemblies, understanding the<codebase> element, the system, configuration namespace.

UNIT-V	ADO.NET PROGRAMMING WITH C#	Classes: 10

ADO.NET part - I: The connected layer, a high-level definition of ADO.NET, understanding ADO.NET data provider, additional ADO.NET namespaces, the types of the system, data, namespace, abstracting data providers using interfaces, creating the auto lot database, the ADO.NET data provider factory model, understanding the connected layer of ADO.NET, working with data readers, building a reusable data access library, creating a console ui-based front end, understanding database transactions; ADO.NET part - II: Disconnected layer understanding the disconnected layer of ADO.NET, understanding the role of the dataset, working with data columns, working with data rows, working with data tables, binding with data adapters, adding disconnected functionality to autolotdal.dll, multi tabled dataset objects and data relationships, the windows forms database code into a class library, programming with LINQ to dataset.

Text Books:

1. Andrew Troelsen, "Pro C# and the .NET 4 Platform", Springer (India) Private Limited, New Delhi, India, 5th Edition, 2010.
2. S. Thamarai Selvi, R. Murugesan, "A Textbook on C#", Pearson Education, 1st Edition, 2003.

Reference Books:

1. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, New Delhi, India, 5th Edition, 2004.
2. Herbert Schildt, "The Complete Reference: C#", Tata McGraw-Hill, New Delhi, India, 7th Edition, 2004.
3. Simon Robinson, Christian Nagel, Karli Watson, Jay Gl, "Professional C#", Wiley& Sons, India, 3rd Edition, 2006.

Web References:

1. https://www.cs.colorado.edu/~kena/classes/5448/
2. https://www.c-sharpcorner.com/
3. https://www.tutorialspoint.com/csharp/
4. http://www.completecsharptutorial.com/

E-Text Books:

1. http://www.c-sharpcorner.com/ebooks/
2. http://www.freebookcentre.net/MicroSoftTech/Microsoft-Dotnet-Books-Download.html

Course Home Page:

ADVANCED JAVA PROGRAMMING

I Group: CSE/ IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS502	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Practice object-oriented programs and build java applications.
II. Implement java programs for establishing interfaces.
III. Implement sample programs for developing reusable software components.
IV. Create database connectivity in java and implement GUI applications.

UNIT-I	INTRODUCTION TO ADVANCED JAVA	Classes: 09

Introduction: Advanced GUI, Graphics, and JavaBeans, web services, enterprise java, enterprise case study, XML; Advanced swing graphical user interface components: Introduction, web browser Using JEditorPane and JToolbar, swing applications, JSplitPane and JTabbedPane, multiple-document interfaces, drag and drop, internationalization, accessibility, internet and World Wide Web resources.

UNIT-II	MVC, GRAPHICS AND JSP	Classes: 09

Model-View-Controller: Introduction, Model-View-Controller architecture, observable class and observer interface, JList, JTable, JTree; Graphics programming with java 2D and java 3D: 2D API, 3D API; JavaBeans Component Model: Introduction, using beans in Foret for java community edition, preparing a class to be a JavaBean, creating a JavaBean: Java archive files, JavaBean properties, bound; Properties, Indexed properties and custom events, customizing JavaBeans for BuliderTools.

UNIT-III	SECURITY AND JAVA DATABASE CONNECTIVITY	Classes: 09

Introduction: Java Cryptography Extension(JCE), digital signatures, java policy files, digital signatures for java code authentication, Secure Socket Layer(SSL).

Java Database Connectivity (JDBC): Introduction, relational-database model, relational database overview, Structured Query Language (SQL), creating database books in cloud space, manipulating databases with JDBC, Case Study: Address-Book application.

UNIT-IV	JAVA WIRELESS APPLICATIONS DEVELOMENT AND J2ME	Classes: 09

Introduction: Welcome servlet overview, Tip test servlet overview, Java 2 micro edition, Tip test MIDlet overview; Session EJBs and distributed transactions: Introduction, EJB overview, session beans, EJB transactions, internet and World Wide Web Resources.

UNIT-V	APPLICATION SERVERS AND JAVA SPACES	Classes: 09

Introduction, J2EE specification and benefits, commercial application servers, deploying the dietel bookstore on BEFA Web logic, deploying the dietel bookstore on IBM Web sphere, internet and world wide web resources; Java Spaces: Introduction, Java Spaces service properties, java Space service, discovering the Java Space service, Java Space interface, method snapshot; Java Management Extension (JMX): Introduction, installation, Case Study, internet and World Wide Web Resources.

Text Books:

1. H. M. Deitel , P. J. Deitel Deitel, S. E. Santry Deitel, "Advanced Java 2 Platform How to Program", Prentice Hall, 1st Edition, 2014.
2. Patrick Naughton, Herbert Schildt, "The Complete Reference Java 2", TMH, 5th Edition, 2002.
3. Hans Bergsten, "Java Server Pages", O'Reilly, 3rd Edition, 2003.
4. Sharanam Shah, Vaishali Shah, "Struts 2 with Hibernate 3 Project for Beginners", Shroff Publishers and Private Limited, 3rd Edition, 2009.

Reference Books:

1. Sebesta, "Programming World Wide Web", Pearson Core, 8th Edition, 2008.
2. Marty Hall, Larry Brown, "Servlets and Java Server Pages Volume 1: Core Technologies", Pearson Education, 2nd Edition, 1998.

Web References:

1. http://engineeringppt.blogspot.in/2010/01/advance-java-web-technology.html
2. http://www.scoopworld.in/2015/02/ajwt-ppt-lab-materials-cse.html
3. http://www.javatpoint.com/hibernate-tutorial
4. http://www.javatpoint.com/struts-2-SessionAware-interface
5. http://www.dblab.ntua.gr/~gtsat/collection/Java%20books

E-Text Books:

1. http://www.freetechbooks.com/advanced-programming-for-the-java-2-platform-t36.html
2. https://www.mkyong.com/featured/top-5-free-java-ebooks/
3. http://www.e-booksdirectory.com/listing.php?category=226

Course Home Page:

ADVANCED COMPUTER ARCHITECTURE

I Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS503	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the concept of micro-architectural design of processors.
II. Analyze performance improvement and power savings in current processors.
III. Study the different multiprocessor architectures and related issues.
IV. Improve the knowledge on performance issues of memory and I/O systems.

UNIT-I	FUNDAMENTALS OF COMPUTER DESIGN	Classes: 08

Fundamentals of computer design: Defining computer architecture, trends in technology, power in integrated circuits and cost, measuring and reporting performance, quantitative principles of computer design; Instruction set principles: Classifying ISA, design issues.

UNIT-II	INSTRUCTION -LEVEL PARALLELISM	Classes: 09

ILP concepts: Pipelining overview, compiler techniques for exposing ILP; Dynamic branch prediction; Dynamic scheduling; Multiple instructions issue; Hardware based speculation; Static scheduling; Limitations of ILP; Case studies of contemporary microprocessors.

UNIT-III	DATA-LEVEL PARALLELISM	Classes: 09

ILP software approach: Compiler techniques, static branch protection, VLIW approach, hardware support for more ILP at compile time, hardware verses software solutions.

Multivector and SIMD computers: Vector processing principles, multivector multiprocessors, compound vector processing, SIMD computer organizations, the connection machine CM-5; Loop level parallelism.

UNIT-IV	MEMORY AND I/O	Classes: 09

Introduction; cache performance: Reducing cache miss penalty and miss rate, Reducing hit time, Main memory and performance, Memory technology; Types of storage devices: Buses, RAID, Reliability, availability and dependability; Virtual memory; I/O performance measures: Designing an I/O system.

UNIT-V	MULTIPROCESSORS AND THREAD -LEVEL PARALLELISM	Classes: 10

Introduction; Symmetric shared-memory architectures; Performance of Symmetric shared-memory architectures; Distributed shared memory and directory-based coherence; Basics of synchronization; Models of memory consistency; Multithreading.

Text Books:

John L Hennessey and David A Patterson, "Computer Architecture A Quantitative Approach", Morgan Kaufmann/ Elsevier, 5th Edition, 2012.

Reference Books:

1. Kai Hwang, Faye Briggs, “Computer Architecture and Parallel Processing”, McGraw-Hill International Edition, 2000.
2. Sima D, Fountain T, Kacsuk P, ”Advanced Computer Architectures: A Design Space Approach”, Addison Wesley, 2000.
3. David E. Culler, Jaswinder Pal Singh, Anoop Gupta, “Parallel Computer Architecture, A Hardware / Software Approach”, Elsevier.

Web References:

1. http://www.annaunivedu.in/2012/09/cs2354-advanced-computer-architecture.html#ixzz4NWBtPL5E
2. http://lecturesppt.blogspot.in/2010/03/advanced-computer-architecture.html
3. https://docs.google.com/document/d/1Th4xOMyIGt5uY5fHXaLGAr4AlnaxuQop4LbZWHXPrOg
4. http://lecturesppt.blogspot.in/2010/03/advanced-computer-architecture.html

E-Text Books:

1. http://www.freebookcentre.net/ComputerScience-Books-Download/Advanced-Computer-Architecture-(PDF-76P).html
2. http://www.freebookcentre.net/CompuScience/Free-Computer-Architecture-Books-Download.html

Course Home Page:

ADVANCED OPERATING SYSTEM

I Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT501	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the fundamentals of operating systems.
II. Gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols.
III. Gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols.
IV. Know the components and management aspects of real time, mobile operating systems.

UNIT-I	PROCESS SYNCHRONIZATION	Classes: 10

Overview: Introduction, why advanced operating systems, synchronization mechanisms; Processes and threads: Process scheduling; Deadlocks: Detection, prevention and recovery; Models of resources; Memory management techniques.

UNIT-II	DISTRIBUTED OPERATING SYSTEMS	Classes: 10

Introduction, issues in distributed operating system; Architecture; Communication networks; Communication primitives: message passing mode, remote procedure calls, design issues in RPC;

UNIT-III	DISTRIBUTED RESOURCE MANAGEMENT	Classes: 09

Distributed file systems; Design issues; Distributed shared memory algorithms for implementing distributed shared memory; Issues in load distributing.

Scheduling algorithms; Synchronous and asynchronous check pointing and recovery; Fault tolerance, two phase commit protocol, non blocking commit protocol; Security and protection.

UNIT-IV	REAL TIME AND MOBILE OPERATING SYSTEMS	Classes: 08

Basic model of real time systems: Characteristics, applications of real time systems; Real time task scheduling; Handling resource sharing; Mobile operating systems: Micro kernel design; Client server resource access; Processes and threads; Memory management.

UNIT-V	CASE STUDIES	Classes: 08

Linux system: Design principles; Kernel modules; Process management scheduling; Memory management; Input output management; File system; Interprocess communication; IoS and android: Architecture and sdk framework; Media layer, services layer, core os layer .

Text Books:

1. Mukesh Singhal, Niranjan G. Shivaratri, "Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems", Tata McGraw-Hill, 2001.
2. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Concepts", John Wiley & Sons, 7th Edition, 2004.

Reference Books:

1. Daniel P Bovet and Marco Cesati, "Understanding the Linux kernel", O'Reilly, 3rd Edition, 2005.
2. Rajib Mall, "Real-Time Systems: Theory and Practice", Pearson Education India, 2006.
3. Neil Smyth, "iPhone iOS 4 Development Essentials – X code", Payload media, 4th Edition, 2011.

Web References:

1. https://www.scribd.com/doc/166936614/Advanced-Concepts-in-Operating-Systems.
2. lib.ewubd.edu/vufind/Record/3488/TOC.
3. https://docs.google.com/document/d/.../edit.

E-Text Books:

1. https://groups.google.com/d/msg/me-cse-2013-batch/.../q_R5aHACK3kJ.
2. https://it325blog.files.wordpress.com/2012/.../operating-system-concepts-7-th-edition by PB GALVIN - 2005.

MOOC Course

1. https://www.udacity.com/course/advanced-operating-systems--ud189.

Course Home Page:

PARALLEL PROGRAMMING USING CUDA

I Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT502	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the concepts parallel computers, data and temporal parallelism.
II. Learn structures of parallel computers.
III. Understand the concepts of operating systems for parallel computers.
IV. Understand parallel computing platform and application interface (CUDA).
V. Learn parallel programming with CUDA C.

UNIT-I	INTRODUCTION	Classes: 10

Why do we need high speed computing, how do we increase the speed of computers, history of parallel computers; Solving problems in parallelism: Utilizing temporal parallelism, utilizing data parallelism ,comparison of temporal and data parallel processing, data parallel processing with specialized processors.

UNIT-II	STRUCTURE OF PARALLEL COMPUTERS	Classes: 10

Structure of parallel computers: A generalized structure of a parallel computer; Classification of parallel computers; Vector computers, a typical vector super computer; Array processors; Shared memory parallel computers, distributed shared memory parallel computers, message passing parallel computers.

UNIT-III	OPERATING SYSTEMS FOR PARALLEL COMPUTERS	Classes: 09

Operating systems for parallel computers: Resource management; Process management, process synchronization, inter process communication.

Memory management; Input/output (disk arrays), basics of performance evaluation, performance measurement tools.

UNIT-IV	COMPUTER UNIFIED DEVICE ARCHITECTURE	Classes: 08

Computer unified device architecture: The age of parallel processing; The rise of GPU computing, CUDA, applications of CUDA, development environment; CUDA enabled graphics processors, Nvidia device driver, CUDA development tool kit, standard C compiler.

UNIT-V	CUDA C	Classes: 08

CUDA C: Introduction to CUDA C, first program, querying devices, using device properties, parallel programming in CUDA C; CUDA parallel programming summing vectors program.

Text Books:

1. Raja raman, C. Siva Ram Murthy, "Parallel Computers Architecture and Programming", PHI, 3rd Edition, 2009.
2. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, "Introduction to Parallel Computing", Pearson Education, 2nd Edition, 2008.

Reference Books:
1. Jason Sanders, Edward Kandrot, Addison Wesley "CUDA By Example", PHI, 3rd Edition, 2009. 2. Michel J. Quinn, "Parallel Computing Theory and Practice", Pearson Education, 2nd Edition, 2008.
Web References:
1. https://www.nvidia.com/object/cuda_home_new.html. 2. https://www.udacity.com/course/intro-to-parallel-programming. 3. http://www.nvidia.in › NVIDIA India › Technologies › GPU Computing.
E-Text Books:
1. https://www.Parallel-Computers-Architecture-Programming. 2. www.ssasit.ac.in/attachments/.../Parallel%20processing%20chapter%20-%202.pdf.
MOOC Course
1. https://developer.nvidia.com/udacity-cs344-intro-parallel-programming. 2. https://www.mooc-list.com/tags/parallel-programming.
Course Home Page:

MULTICORE ARCHITECTURES

I Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS504	Elective	3	-	-	3	30	70	100
Contact classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the recent trends in the field of computer architecture and identify performance related parameters.
II. Identify the need for parallel processing in real time case studies.
III. Expose on the problems related to multistage Interconnection networks.
IV. Explore on requirements of warehouse scale and embedded architectures.

UNIT-I	**FUNDAMENTALS OF QUANTITATIVE DESIGN AND ANALYSIS**	**Classes: 09**

Classes of computers, trends in technology, power, energy and cost, dependability, measuring, reporting and summarizing performance, quantitative principles of computer design, classes of parallelism, ILP, DLP, TLP and RLP, multithreading, SMT and CMP architectures, limitations of single core processors, the multi core era, case studies of multi core architectures.

UNIT-II	**DLP IN VECTOR, SIMD AND GPU ARCHITECTURES**	**Classes: 09**

Vector architecture, SIMD instruction set extensions for multimedia, graphics processing units, detecting and enhancing loop level parallelism, case studies.

UNIT-III	**TLP AND MULTIPROCESSORS**	**Classes: 09**

Symmetric and distributed shared memory architectures, cache coherence issues, performance issues, synchronization issues, models of memory consistency.

Interconnection networks: Buses, crossbar and multi-stage interconnection networks.

UNIT-IV	**RLP AND DLP IN WAREHOUSE-SCALE ARCHITECTURES**	**Classes: 09**

Programming models and workloads for warehouse-scale computers, architectures for warehouse-scale computing, physical infrastructure and costs, cloud computing, case studies.

UNIT-V	**ARCHITECTURES FOR EMBEDDED SYSTEMS**	**Classes: 09**

Features and requirements of embedded systems signal processing and embedded applications, the digital signal processor, embedded multiprocessors, case studies.

Text Books:

1. John L. Hennessey, David A. Patterson, "Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier, 5th Edition, 2012.
2. Kai Hwang, Naresh Jotwani, "Advanced Computer Architecture", Tata McGraw-Hill Education, 2nd Edition, 2011.

Reference Books:

1. Richard Y. Kain, "Advanced Computer Architecture: A Systems Design Approach", Prentice Hall, 2nd Edition, Illustrated, 1996.
2. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture: A Hardware/ Software Approach", Morgan Kaufmann / Elsevier, 1st Edition, 1998.

Web References:

1. http://www.gameenginebook.com.
2. http://dl.acm.org/citation.cfm?id=2855046.
3. http://web.engr.oregonstate.edu/~mjb/cs475/Handouts/moores.law.and.multicore.2pp.pdf

E-Text Books:

1. https://www.crcpress.com
2. http://www.e-booksdirectory.com/details.php?ebook=1118

Course Home Page:

DATABASE SECURITY

II Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS505	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the fundamentals of security related to database system.
II. Identify the security mechanisms to solve the problems.
III. Learn the essentials of secure software design.
IV. Understand various types of attacks and intruder detection system.
V. Identify the secure database model for new generations.

UNIT-I	**INTRODUCTION AND SECURITY MODEL-I**	**Classes: 10**

Introduction to databases security problems in databases security controls conclusions; Security models: Introduction access matrix model; Take-grant model; Acten model; PN model; Hartson and Hsiao's Model; Fernandez's model Bussolati and Martella's model for distributed databases.

UNIT-II	**SECURITY MODEL-II AND SECURITY MECHANISMS**	**Classes: 09**

Security models 2: Bell and LaPadula's model; Bib's model; Dion's model; Sea view model; Jajodia and Sandhu's model; The lattice model for the flow control conclusion; Security mechanisms: User identification/authentication; Memory protection; Resource protection; Control flow mechanisms isolation security functionalities in some operating systems; Trusted computer system evaluation criteria.

UNIT-III	**SECURITY SOFTWARE DESIGN**	**Classes: 08**

Introduction: A methodological approach to security software design; Secure operating system.

Design secure DBMS; Design security packages database security design.

UNIT-IV	**STATISTICAL DATABASE PROTECTION AND INTRUSION DETECTION SYSTEMS**	**Classes: 09**

Discovery introduction statistics concepts and definitions; Types of attacks; Inference controls evaluation criteria for control comparison; Introduction IDES system; RETISS system; ASES system.

UNIT-V	**MODELS FOR THE PROTECTION OF NEW GENERATION DATABASE SYSTEMS-1&DATABASE SYSTEMS-2**	**Classes: 09**

Models for the protection of new generation database Systems-1: A model for the protection of frame based systems; A model for the protection of object-oriented systems: SORION model for the protection of object-oriented databases; models for the protection of new generation database systems-2: The orion model, Jajodia and Kogan's model; A model for the protection of active databases conclusions.

Text Books:

1. Hassan A, Afyouni, "Database Security and Auditing: Protecting Data Integrity and Accessibility**",** Cengage Learning, 1st Edition, 2009.
2. Maria Grazia Fugini, Silvana Castano, Giancarlo Martella, "Database Security", Pearson Education, 1st Edition, 1994.

Reference Books:
1. Alfred Basta, Melissa Zgola," Database Security", Cengage Learning, 1st Edition, 2012.
Web References:
1. http://www.applicure.com/blog/database-security-best-practice 2. https://docs.oracle.com/cd/B19306_01/network.102/b14266/apdvntro.htm#DBSEG12000 3. http://www.cse.msu.edu 4. http://cms.gcg11.ac.in/
E-Text Books:
1. http://www.e-booksdirectory.com/details.php?ebook=10166 2. http://www.e-booksdirectory.com/details.php?ebook=7400re
Course Home Page:

CYBER SECURITY

II Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS506	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the core information assurance principles in n-tier web applications.
II. Identify the key components of cyber security network architecture.
III. Study on digital certificates, signatures and digital forensics for cyber crime investigation.
IV. Determine the elements of web hacking, cyber crime investigation process and tools.

UNIT-I	INTRODUCTION	Classes: 08

A web security forensic lesson, web languages, introduction to different web attacks, overview of n-tier web applications; Web servers: Apache, IIS, database servers.

UNIT-II	REVIEW OF COMPUTER SECURITY AND CYBER CRIMES ISSUES	Classes: 10

Public key cryptography, RSA, online shopping, payment gateways, unauthorized access to computers, computer intrusions, white collar crimes, viruses and malicious code, internet hacking and cracking, virus attacks, pornography, software piracy, intellectual property, mail bombs, exploitation, stalking and obscenity in internet, digital laws and legislation, law enforcement roles and responses.

UNIT-III	WEB HACKING BASICS AND INVESTIGATION	Classes: 08

Web hacking basics HTTP and HTTPS URL, web under the cover overview of java security reading the HTML source, applet security, servlets security, symmetric and asymmetric encryptions, network security basics, firewalls and IDS.

Investigation: Introduction to cyber-crime investigation, investigation tools, e-discovery, digital evidence collection, evidence preservation.

UNIT-IV	DIGITAL CERTIFICATES AND DIGITAL FORENSICS	Classes: 10

Digital certificates, hashing, message digest, and digital signatures; Digital forensics: Introduction to digital forensics, forensic software and hardware, analysis and advanced tools, forensic technology and practices.

UNIT-V	SECURING DATABASES, LAWS AND ACTS	Classes: 09

Basics, secure JDBC, securing large applications, cyber graffiti; Laws and acts: Laws and ethics, digital evidence controls, evidence handling procedures; Basics of Indian Evidence Act IPC and CRPC: Electronic communication privacy act, legal policies.

Text Books:

1. Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, "Guide to Computer Forensics and Investigations", Information Security Professionals, 4th Edition, 2009.
2. Stuart McClure, Saumil Shah, Shreeraj Shah, "Web Hacking: Attacks and Defense", Addison-Wesley Professional, 1st Edition, 2002.

Reference Books:

1. Kevin Mandia, Chris Prosise, Matt Pepe, "Incident Response and Computer Forensics ", Tata McGraw Hill, 1st Edition, 2006.
2. Garms, Jess, Daniel Somerfield, "Professional Java Security", Wrox Press, Illustrated Edition, 2001.
3. Robert M Slade, "Software Forensics", Tata McGraw-Hill, New Delhi, 1st Edition, 2005.

Web References:

1. http://www.mail.nih.gov/user/faq/tlsssl.htm
2. http://www.openssl.org/
3. http://www.ntsecurity.net/

E-Text Books:

1. https://www.mitre.org/sites/.../pr-13-1028-mitre-10-strategies-cyber-ops-center.pdf
2. https://www.coursera.org/specializations/cyber-security
3. https://www.ccdcoe.org/publications/books/NationalCyberSecurityFrameworkManual.pdf

Course Home Page:

NETWORK PROGRAMMING AND MANAGEMENT

II Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS507	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The student should be able to:

I. Understand the basic concepts of connection oriented communication over network.
II. Study the concepts of multiplexing in client server environment.
III. Explore on functions and protocols needed for connection less communication over networks.
IV. Understand the management concepts and practical issues of simple network management protocols.

UNIT-I	ELEMENTARY TCP SOCKETS	Classes: 08

Introduction to socket programming, overview of TCP/IP protocols, introduction to Sockets, socket address structures, byte ordering functions, address conversion functions, elementary TCP sockets, socket, connect, bind, listen, accept, read, write, close functions, iterative server, concurrent server.

UNIT-II	APPLICATION DEVELOPMENT	Classes: 10

TCP echo server, TCP echo client, posixsignal handling, server with multiple clients; Boundary conditions: Server process crashes, server host crashes, server crashes and reboots, server shutdown, I/O multiplexing, I/O Models, select function, shutdown function, TCP echo server (with multiplexing), poll function, TCP echo client (with multiplexing).

UNIT-III	SOCKET OPTIONS, ELEMENTARY UDP SOCKETS	Classes: 10

Socket options, getsocket and setsocket functions, generic socket options, IP socket options, ICMP socket options, TCP socket options, elementary UDP sockets, UDP echo server, and UDP echo client.

Multiplexing TCP and UDP sockets, domain name system, and gethostbyname function, Ipv6 support in DNS, gethostbyadr function, getservbyname and getserv by port functions.

UNIT-IV	ADVANCED SOCKETS	Classes: 08

Ipv4 and Ipv6 interoperability, threaded servers, thread creation and termination, TCP echo server using threads, mutexes, condition variables, raw sockets, raw socket creation, raw socket input, raw socket output, ping program, trace route program.

UNIT-V	SIMPLE NETWORK MANAGEMENT	Classes: 09

SNMP network management concepts, SNMP management information, standard MIB's, SNMPv1 protocol and practical issues, introduction to RMON, SNMPv2 andSNMPv3.

Text Books:

1. W. Richard Stevens, "UNIX Network Programming Vol-I", Pearson Education, 3rd Edition, 2008.
2. Mani Subramanian, "Network Management: Principles and Practice", Addison Wesley, 1st Edition, 2001.

Reference Books:

1. D.E. Comer, "Internetworking with TCP/IP Vol- III", (BSD Sockets Version), Pearson Education, 2nd Edition, 2003.
2. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", Addison Wesley, 3rd Edition, 1999.

Web References:

1. https://notes.shichao.io/unp/ch4/
2. https://books.google.co.in/books?isbn=8184317565
3. https://docs.oracle.com/cd/E19683-01/817-0573/transition-tbl-16/index.html
4. https://docs.oracle.com/cd/E26502_01/html/E35299/sockets-22932.html

E-Text Books:

1. www.freebookcentre.net › Networking Books
2. https://books.google.co.in/books?isbn=933250640X

Course Home Page:

SOFTWARE DEFINED NETWORKS

II Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS508	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Learn about software defined networking.
II. Demonstrate an emerging internet architectural framework.
III. Analyze architectures, algorithms, protocols and applications of data center networks.

UNIT-I	**CENTRALIZED AND DISTRIBUTED CONTROL PLANES**	**Classes: 08**

Introduction, distributed control planes; Centralized control planes open flow: Introduction; Hybrid Approaches SDN Controllers: Introduction General Concepts Layer 3 Centric Plexxi Cisco OnePK.

UNIT-II	**NETWORK PROGRAMMABILITY AND DATA CENTER CONCEPTS**	**Classes: 10**

Network programmability: Introduction, the management interface, the application-network divide, modern programmatic interfaces, I2RS, modern orchestration; Data center concepts and constructs: Introduction, the multitenant data center, the virtualized multitenant data center, SDN solutions for the data center network, LANs, EVPN, VxLan, NVGRE.

UNIT-III	**NETWORK FUNCTION VIRTUALIZATION AND NETWORK TOPOLOGY**	**Classes: 08**

Network function virtualization: Introduction, virtualization and data plane I/O, services engineered path, service locations and chaining, NFV at ETSI, Non-ETSI NFV Work.

Network topology and topological information abstraction: Introduction, network topology, traditional methods, LLDP, BGP-TE/LS, ALTO, I2RS topology.

UNIT-IV	**BUILDING AN SDN FRAMEWORK**	**Classes: 10**

Building an SDN framework: Introduction, build code first; ask questions later, the Juniper SDN framework, IETF SDN framework(s), open daylight controller/framework, policy, use cases for bandwidth scheduling, manipulation, and calendaring: introduction, bandwidth calendaring, big data and CSPF, expanding topology, use cases for data center overlays, big data, and network function virtualization, introduction, data center orchestration, puppet (DevOps Solution).

UNIT-V	**NETWORK FUNCTION VIRTUALIZATION (NFV)**	**Classes: 09**

Network Function Virtualization (NFV): Optimized big data, use cases for input traffic monitoring; Classification and triggered actions: Introduction, the firewall, firewalls as a service, network access control replacement, extending the use case with a virtual firewall, feedback and optimization, intrusion detection/threat mitigation.

Text Books:

Thomas D. Nadeau, Ken Gray "Software Defined Networks An Authoritative Review of Network Programmability Technologies", O'Reilly Media Publisher , 2nd Edition, 2013

Reference Books:

Paul Goransson, Chuck Black, Morgan Kaufmann, "Software Defined Networks: A Comprehensive Approach", 1st Edition, 2014.

Web References:

1. https://www.opennetworking.org/images/stories/downloads/sdn-resources/white-papers/wp-sdn-newnorm.pdf
2. http://www.menog.org/presentations/menog-15/341-MENOG_SDN_April.pdf

E-Text Books:

1. http://www.cse.wustl.edu/~jain/cse570-13/ftp/m_16sdn.pdf
2. https://www.cisco.com/c/dam/en/us/solutions/collateral/data-center-virtualization/application-centric-infrastructure/sdnfordummies.pdf

Course Home Page:

HIGH SPEED NETWORKS

II Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS509	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the basis of ATM and Frame Relay concepts.
II. Explore the concept of queuing analysis, behind traffic management and congestion control.
III. Knowledge on TCP flow and congestion control in ATM.
IV. Study on different levels of quality of service (QOS) to different applications

UNIT-I	HIGH SPEED NETWORKS	Classes: 08

Frame relay networks, asynchronous transfer mode, ATM protocol architecture, ATM logical connection, ATM cell, ATM service categories, AAL; High speed LANs: Fast ethernet, gigabit ethernet, fiber channel; wireless LANs: Applications, requirements, architecture of 802.11.

UNIT-II	CONGESTION TRAFFIC MANAGMNET	Classes: 10

Queuing analysis, queuing models, single server queues, effects of congestion, congestion control, traffic management, congestion control in packet switching networks, frame relay congestion control.

UNIT-III	TCP AND ATM CONGESTION CONTROL	Classes: 08

TCP flow control, TCP congestion control, retransmission, timer management, exponential RTO back off KARN's algorithm, window management, performance of TCP over ATM.

Traffic and congestion control in ATM: Requirements attributes, traffic management frame work, traffic control, ABR traffic management, ABR rate control, RM cell formats, ABR Capacity allocations, GFR traffic management.

UNIT-IV	INTEGRATED AND DIFFERETIAL SERVICES	Classes: 10

Integrated services architecture: Approach, components, services, queuing discipline, FQ, PS, BRFQ, GPS, WFQ, random early detection, differentiated services.

UNIT-V	PROTCOLS FOR QOS SUPPORT	Classes: 09

RSVP: Goals and characteristics, data flow, RSVP operations, protocol mechanisms, multiprotocol label switching, operations, label stacking, protocol details, RTP, protocol architecture, data transfer protocol, RTCP.

Text Books:

1. William Stallings, "High-Speed Networks: TCP/IP and ATM Design Principles", Prentice-Hall, Illustrated Edition, 1998.
2. William Stallings, "High Speed Networks and Internet", Pearson Education, 2nd Edition, 2002.
3. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, 2013.

Reference Books:

1. A. Shah, G. Ramakrishna, "FDDI – A High Speed Network", Prentice-Hall, Illustrated,1994.
2. Wolfgang Effelsberg, "High-Speed Networking for Multimedia Applications", Kluwer Academic Publishers, 1st Edition, 1996.
3. William Buchanan, "Handbook of Data Communications and Networks", Kluwer Academic Publications, 2nd Edition, Illustrated, 1999.
4. Jean Warland, Pravin Varaiya, "High Performance Communication Networks", Hardcourt Asia Pvt. Ltd., 2nd Edition, 2001.
5. Irvan Pepelnjk, Jin Guichard, Jeff Apcar ,"MPLS and VPN Architecture ", Cisco Press, Volume 1 and 2, 2003.

Web References:

1. www.iospress.nl/journal/journal-of-high-speed-networks/
2. http://whatis.techtarget.com/glossary/High-Speed-Networks
3. https://technet.microsoft.com/en-us/network/dd277646.aspx

E-Text Books:

1. https://books.google.co.in/books/about/High_speed_networks_and_internets.html?id
2. www.amazon.in/High-Speed-Networks-Internets-2e-STALLINGS/dp/817758569X
3. http://www.kiv.zcu.cz/~ledvina/vyuka/PDS/PDS-tut/HighSpeedNetworks/hsn0101.pdf

Course Home Page:

INTERNET OF THINGS

II Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS510	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the architecture of Internet of Things and connected world.
II. Explore on use of various hardware and sensing technologies to build IoT applications.
III. Illustrate the real time IoT applications to make smart world.
IV. Understand the available cloud services and communication API's for developing smart cities.

UNIT-I	INTRODUCTION TO INTERNET OF THINGS (IoT)	Classes: 08

Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT enabling technologies, IoT levels and deployment, domain specific IoTs.

UNIT-II	IoT AND M2M	Classes: 10

Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.

UNIT-III	IOT ARCHITECTURE AND PYTHON	Classes: 10

IoT Architecture: State of the art introduction, state of the art; Architecture reference model: Introduction, reference model and architecture, IoT reference model.

Logical design using Python: Installing Python, Python data types and data structures, control flow, functions, modules, packages, file handling.

UNIT-IV	IoT PHYSICAL DEVICES AND ENDPOINTS	Classes: 08

Introduction to Raspberry Pi interfaces (Serial, SPI, I2C), programming Raspberry PI with Python, other IoT devices.

UNIT-V	IoT PHYSICAL SERVERS AND CLOUD OFFERINGS	Classes: 09

Introduction to cloud storage models and communication APIs; WAMP: AutoBahn for IoT, Xively cloud for IoT; Case studies illustrating IoT design: Home automation, smart cities, smart environment.

Text Books:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on-Approach", VPT, 1st Edition, 2014.
2. Matt Richardson, Shawn Wallace, "Getting Started with Raspberry Pi", O'Reilly (SPD), 3rd Edition, 2014.

Reference Books:

1. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", John Wiley and Sons, 1st Edition, 2014.

2. Francis Da Costa, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, Apress Publications, 1st Edition, 2013.

Web References:

1. https://www.upf.edu/pra/en/3376/22580.
2. https://www.coursera.org/learn/iot.
3. https://bcourses.berkeley.edu.
4. www.innovianstechnologies.com.

E-Text Books:

1. https://mitpress.mit.edu/books/internet-things
2. http://www.apress.com

Course Home Page:

IMAGE PROCESSING

III Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS511	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the concepts of digital image processing methods and techniques.
II. Study the image techniques in spatial and frequency domain for image quality improvement.
III. Learn the image restoration and compression techniques for optimization.
IV. Explore on color image features and transformation techniques.

UNIT-I	INTRODUCTION	Classes: 10

Introduction: What is digital image processing, origins of digital image processing, examples of fields that use dip, fundamental steps in digital image processing, components of an image processing system; Digital image fundamentals: Elements of visual perception, a simple image formation model, basic concepts in sampling and quantization, representing digital images, spatial and gray-level resolution, zooming and shrinking digital images, some basic relationships between pixels, linear and nonlinear operations.

UNIT-II	IMAGE ENHANCEMENT IN THE SPATIAL DOMAIN	Classes: 10

Image enhancement in the spatial domain: Some basic gray level transformations, histogram processing, enhancement using arithmetic/logic operations, basics of spatial filtering, smoothing spatial filters, sharpening spatial filters, combining spatial enhancement methods; Image enhancement in the frequency domain: Introduction to the fourier transform and the frequency domain, smoothing frequency domain filters, sharpening frequency domain filters, homomorphic filtering.

UNIT-III	IMAGE RESTORATION AND FILTERING	Classes: 08

Image restoration: A model of the image degradation/restoration process, noise models, restoration in the presence of noise only spatial filtering, periodic noise reduction by frequency domain filtering,

Image filtering: Linear position invariant degradations, estimating the degradation function, inverse filtering, minimum mean square error (wiener) filtering, constrained least square filtering, and geometric mean filter.

UNIT-IV	IMAGE PROCESSING	Classes: 10

Color fundamentals: Color models, pseudo color image processing, basics of full-color image processing, color transformations, smoothing and sharpening, color segmentation, noise in color images, color image compression; Wavelets and multi resolution processing: Image pyramids, sub band coding, the haar transform, multi resolution expansions, wavelet transforms in one dimension, fast wavelet transform, wavelet transforms in two dimensions, wavelet packets; Image compression: Fundamentals, image compression models, error-free (lossless) compression, lossy compression.

UNIT-V	MORPHOLOGICAL IMAGE PROCESSING	Classes: 07

Morphological image processing: Preliminaries, dilation and erosion, opening and closing, the hit-or-miss transformation, some basic morphological algorithms; Image segmentation: Detection of discontinuities, edge linking and boundary detection, thresholding, region-based segmentation.

Text Books:

Rafael C Gonzalez, Richard E. Woods, "Digital Image Processing", PHI, 2nd Edition, 2005.

Reference Books:

1. K. Jain, "Fundamentals of Digital Image Processing", Pearson, 3rd Edition, 2004.
2. Scott. E. Umbaugh, "Digital Image Processing and Analysis", CRC Press, 2nd Edition, 2014.
3. S. Jayaraman, S. Esakkirajan, T.Veerakumar, "Digital Image Processing", McGraw-Hill Education. (India) Pvt. Ltd., 2013.

Web References:

1. http://www.efunda.com/math/math_home/math.cfm.
2. http://www.ocw.mit.edu/resources/#Mathematics.
3. http://www.sosmath.com/.
4. http://www.mathworld.wolfram.com/.

E-Text Books:

1. http://www.e-booksdirectory.com/details.php?ebook=10166.
2. http://www.e-booksdirectory.com/details.php?ebook=7400re.

Course Home Page:

PATTERN RECOGNITION

III Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT503	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand basic concepts in pattern recognition.
II. Learn the fundamental algorithms for pattern recognition.
III. Gain knowledge about state-of-the-art algorithms used in pattern recognition research.
IV. Understand pattern recognition theories, such as Bayes classifier, linear discriminant analysis.
V. Apply pattern recognition techniques in practical problems.

UNIT-I	PATTERN CLASSIFIER	Classes: 10

Overview of pattern recognition: Discriminant functions, supervised learning, parametric estimation; Maximum likelihood estimation: Bayesian parameter estimation; Problems with bayes approach, pattern classification by distance functions, minimum distance pattern classifier.

UNIT-II	CLUSTERING	Classes: 10

Unsupervised classification clustering for unsupervised learning and classification: Clustering concept, c means algorithm; Hierarchical clustering procedures: Graph theoretic approach to pattern clustering, validity of clustering solutions.

UNIT-III	STRUCTURAL PATTERN RECOGNITION	Classes: 09

Structural pattern recognition elements of formal grammars: String generation as pattern description, recognition of syntactic description.

Parsing; Stochastic grammars and applications: Graph based structural representation.

UNIT-IV	FEATURE EXTRACTION	Classes: 08

Feature extraction and selection entropy minimization: Karhunen-Loeve transformation, feature selection through functions approximation, binary feature selection.

UNIT-V	RECENT ADVANCES	Classes: 08

Fuzzy logic: Fuzzy pattern classifiers; Pattern classification using genetic algorithms, case study using fuzzy pattern classifiers and perception.

Text Books:

1. Robert J.Schalkoff, "Pattern Recognition: Statistical, Structural and Neural Approaches", John Wiley and Sons Inc., New York, 1st Edition, 2007.
2. Tou, Gonzales, "Pattern Recognition Principles", Wesley Publication Company, London, 1st Edition, 1974.
3. Duda R. O, Hart. P. E., "Pattern Classification and Scene Analysis", Wiley, New York, 2nd Edition, 1973.

Reference Books:

1. M. Narasimha Murthy, V. Susheela Devi, “Pattern Recognition”, Springer 2011.
2. S.Theodoridis, K.Koutroumbas, “Pattern Recognition”, Academic Press, 4th Edition, 2009.
3. C.M.Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.
4. R.O.Duda, P.E.Hart and D.G.Stork, “Pattern Classification”, John Wiley, 2nd Edition, 2001
5. Andrew Webb, “Statistical Pattern Recognition”, Arnold publishers, London, 2nd Edition, 1999.

Web References:

1. http://www.journals.elsevier.com/pattern-recognition
2. https://www.elsevier.com/journals/pattern-recognition/0031-3203/guide-for-authors
3. https://en.wikipedia.org/wiki/Pattern_recognition

E-Text Books:

1. http://store.elsevier.com/Pattern-Recognition/Sergios-Theodoridis/isbn-9781597492720/
2. http://www.springer.com/in/book/9780387310732
3. http://homepages.inf.ed.ac.uk/rbf/IAPR/researchers/PPRPAGES/pprbks.html

MOOC Course

1. https://www.coursera.org/courses?languages=en&query=pattern+recognition
2. https://ocw.mit.edu/courses/media-arts-and-sciences/mas-622j-pattern-recognition-and-analysis-fall-2006/

Course Home Page:

USER INTERFACE DESIGN

III Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT504	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Determine the characteristics of good user interface designs.
II. Recognize how a computer system may be modified to include human diversity.
III. Develop user interface design tools.
IV. Investigate the automatic generation of user interface s from high-level specifications.
V. Evaluate user interfaces and applications using a variety of methods.

UNIT-I	**INTRODUCTION**	**Classes: 10**

Human computer interface: Characteristics of graphics interface, direct manipulation graphical system; web user interface, popularity, characteristic and principles.

UNIT-II	**HUMAN COMPUTER INTERACTION**	**Classes: 10**

User interface design process: Obstacles, usability, human characteristics in design, human interaction speed, business functions; Requirement analysis, direct ,indirect methods, basic business functions, design standards, system timings; Human consideration in screen design structures of menus, functions of menus, contents of menu, formatting, phrasing the menu, selecting menu choice, navigating menus, graphical menus.

UNIT-III	**WINDOWS**	**Classes: 09**

Characteristics: Components, presentation styles, types, managements, organizations, operations.

Web systems: Device based controls characteristics, screen based controls, operate control, text boxes, selection control, combination control, custom control, presentation control.

UNIT-IV	**MULTIMEDIA**	**Classes: 08**

Text for web pages: Effective feedback, guidance and assistance, internationalization, accessibility; Icons, image, multimedia, coloring.

UNIT-V	**WINDOWS LAYOUT-TEST**	**Classes: 08**

Prototypes: Kinds of tests, retest, information search; Visualization, hypermedia; World wide web, software tools.

Text Books:

1. Wilbent. O. Galitz, "The Essential Guide to User Interface Design", John Wiley and Sons, 3rd Edition, 2001.
2. Ben Sheiderman, "Design the User Interface", Pearson Education, 2nd Edition, 1998.

Reference Books:

1. Alan Cooper, "The Essential of User Interface Design", Wiley – Dream Tech Ltd., 2nd Edition, 2002.

Web References:

1. http://blog.careerfoundry.com/ui-design/how-to-become-a-ui-designer
2. https://www.edx.org/course/user-experience-ux-design-human-factors-tsinghuax-70167012x-0
3. http://www.creativebloq.com/web-design/examples-ui-design-7133429

E-Text Books:

1. http://www.adhamdannaway.com/blog/ui-design/ui-design-books
2. http://www.springer.com/us/book/9789811024559
3. http://ps.fragnel.edu.in/~dipalis/prgdwnl/eguid.pdf
4. http://www.templatemonster.com/blog/top-10-user-interface-books

MOOC Course

1. https://www.coursera.org/specializations/interaction-design
2. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-831-user-interface-design-and-implementation-spring-2011/
3. https://www.edx.org/course/subject/design

Course Home Page:

ADVANCED DATABASES

III Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT505	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Define entity relationship model and transaction processing system.
II. Understand various storage structures for database.
III. Describe the distributed and parallel database processing.
IV. Describe object oriented database concepts and models.
V. Understand various advancements in database technology.

UNIT-I	ACTIVE DATABASES	Classes: 10

Syntax and Semantics (Starburst, Oracle, DB2): Taxonomy, applications, integrity management, workflow management, business rules, design principles, properties, rule modularization, rule debugging, IDEA methodology, open problems.

UNIT-II	TEMPORIAL AND OBJECT DATABASES	Classes: 10

Overview: Time domain, data types, associating facts with time, temporal query language; Transact-SQL (T-SQL): Time ontology, data model, language constructs; Implementation: System architecture, temporal support, support for TSQL2.

UNIT-III	COMPLEX QUERIES AND REASONING	Classes: 09

Logic of Query Languages: Relational calculi, relational algebra, recursive rules, syntax and semantics of data log, fix point semantics.

Implementation Rules and Recursion: Rule rewriting methods, compilation and optimization, recursive queries in SQL, open issues.

UNIT-IV	SPATIAL, TEXT AND MULTIMEDIA DATABASES	Classes: 08

Traditional Indexing Methods: Secondary keys, spatial access methods, text retrieval; Multimedia indexing: 1D time series, 2D color images, sub pattern matching.

UNIT-V	UNCERTAINITY IN DATABASES AND KNOWLEDGE BASES	Classes: 08

Introduction: Uncertainty in image database, uncertainty in temporal database, uncertainty in null value; Models of uncertainty; Uncertainty in relational databases: Lattice based relational databases, probabilistic relational databases.

Text Books:

1. Carlo Zaniolo, Stefano Ceri, "Advanced Database Systems", Morgan Kauffmann Publishers, VLDB Journal, 1st Edition, 1997.

Reference Books:

1. Raghu Ramakrishnan, "Database Management System", McGraw-Hill Publications, 3rd Edition, 2000.
2. Abraham Silberschatz, Henry F. Korth, S.Sudharshan, "Database System Concepts", Tata McGraw-Hill, 6th Edition, 2010.

Web References:

1. web.cs.wpi.edu/~cs561/s12/Lectures/activeDB/ActiveDB.pdf
2. www.cs.bu.edu/fac/gkollios/ada05/LectNotes/lect13-05.ppt
3. web.cs.ucla.edu/classes/cs240a/winter98/notes/node3.html
4. user.it.uu.se/~torer/kurser/mdb/2007/TermPapers/ErikZeitler.pdf
5. booksite.elsevier.com/9781558604438/slides/zanitem5.htm

E-Text Books:

1. http://www.faadooengineers.com/threads/3854-Computer-Science-Advanced-Database-Ebook-PDF-Download
2. http://codex.cs.yale.edu/avi/db-book/db5/slide-dir/
3. https://mitpress.mit.edu/books/advanced-database-techniques

MOOC Course:

1. https://www.edx.org/course/creating-programmatic-sql-database-microsoft-dat215-2x
2. https://www.edx.org/course/delivering-relational-data-warehouse-microsoft-dat216x-0

Course Home Page:

PARALLEL COMPUTING

III Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT506	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the parallel computing.
II. Analyze the Parallel programming platforms.
III. Evaluate the Principles of parallel algorithm design.
IV. Understand the Shared address space platforms.

UNIT-I	**INTRODUCTION AND HARDWARE TAXONOMY**	**Classes: 09**

Introduction: Paradigms of parallel computing, synchronous, vector/array, SIMD (single instruction, multiple data), systolic, asynchronous, MIMD (multiple instruction, multiple data), reduction paradigm; Hardware taxonomy: Flynn's classifications, handler's classifications; software taxonomy: Kung's taxonomy, SPMD (single program, multiple data).

UNIT-II	**ABSTRACT PARALLEL COMPUTATIONAL MODELS AND PERFORMANCE METRICS**	**Classes: 09**

Abstract parallel computational models: Combinational circuits, sorting network, PRAM (parallel random-access machine) models, interconnection RAMs, parallelism approaches, data parallelism, control parallelism; performance metrics: Laws governing performance measurements, metrics speedups, efficiency, utilization, communication overheads, single/multiple program performances, bench marks.

UNIT-III	**PARALLEL PROCESSORS AND PARALLEL PROGRAMMING**	**Classes: 09**

Parallel processors: Taxonomy and topology, shared memory multiprocessors, distributed memory networks, processor organization, static and dynamic interconnections, embeddings and simulations.

Parallel programming: Shared memory programming, distributed memory programming, object oriented programming, data parallel programming, functional and dataflow programming.

UNIT-IV	**PARALLELIZATION**	**Classes: 09**

Scheduling and parallelization: Scheduling parallel programs, loop scheduling, parallelization of sequential programs, parallel programming support environments.

UNIT-V	**SCHEDULING**	**Classes: 09**

Scheduling: Organizational features of processor arrays, multi processors and multi computers, mapping and scheduling aspects of algorithms, Coffman Graham scheduling algorithm for parallel processors.

Text Books:

1. Michel J.Quinn, "Parallel Computing Theory and Practice", McGraw-Hill, 2nd Edition, 1994.
2. T. G. Lewis, H. EI-Rewini, "Introduction to Parallel Computing. Prentice Hall, New Jersey, 1992.

Reference Books:

Albert y.Zomaya, "Parallel and Distributed Computing Hand book", McGraw -Hill Publications, 2nd Edition, 2005.

Web References:

1. https://computing.llnl.gov/tutorials/parallel_comp/
2. http://www.personal.kent.edu/~rmuhamma/Parallel/parallel.html
3. https://www2.cisl.ucar.edu/user-support/parallel-computing-concepts

E-Text Books:

1. http://pages.cs.wisc.edu/%7Etvrdik/cs838.html
2. http://larc.unt.edu/ian
3. http://www.netlib.org/utk/lsi/pcwLSI/text/

MOOC Course

1. https://ocw.mit.edu/courses/mathematics/18-337j-parallel-computing-fall-2011/
2. https://www.mooc-list.com/tags/parallel-computing

Course Home Page:

DISTRIBUTED DATABASES

III Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT507	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the fundamental principles and architecture of distributed database systems.
II. Familiar with the different methods and techniques distributed query processing.
III. Develop the understanding of choosing the optimized query execution plan for distributed queries.
IV. Able to design a multi database systems and can resolve problems of heterogeneous multi database systems in database integration strategies.

UNIT-I	OVERVIEW AND PRINCIPLES OF DISTRIBUTED DATABASES	Classes: 10

Features of distributed versus centralized databases; Levels of distribution transparency: Reference architecture for distributed databases, types of data fragmentation; Distributed transparency: Read only application, update application; Distributed database access primitives; Integrity constraints in distributed databases.

UNIT-II	GLOBAL QUERIES TO FRAGMENT QUEREIS	Classes: 10

Translation of global queries to fragment queries: Equivalence transformations for queries, transforming global queries into fragment queries, distributed grouping and aggregate function evaluation, parametric queries.

UNIT-III	OPTIMIZATION OF ACCESS STRATEGIES	Classes: 09

Optimization of access strategies: A framework for query optimization, join queries, general queries.

The management of distributed transactions: A framework for transaction management, supporting atomicity of distributed transactions, concurrency control for distributed transactions, architectural aspects of distributed transactions.

UNIT-IV	CONCURRENCY CONTROL	Classes: 08

Concurrency control: Foundation of distributed concurrency control, distributed deadlocks, and concurrency control based on timestamps, optimistic methods for distributed concurrency control.

UNIT-V	DISTRIBUTED DATABASE ADMINISTRATION	Classes: 08

Reliability: Basic concepts, non blocking commitment protocols, reliability and concurrency control, determining a consistent view of the network, detection and resolution of inconsistency, checkpoints and cold restart; Distributed database administration: Catalog management in distributed databases, authorization and protection.

Text Book:

Stefano Ceri, Giuseppe Pelagatti, "Distributed Database Principles and Systems", Tata McGraw-Hill, 1st Edition, 2010.

Reference Books:

M. Tamer Ozsu, Patrick Valduriez, "Principles of Distributed Database Systems", Pearson Education, 2nd Edition, 2010.

Web References:

1. www.cs.sjsu.edu/faculty/pollett/masters/Semesters/Fall06/Preethi/ddbms1.ppt
2. www.https://www.cs.purdue.edu/homes/bb/cs542-05Spr/Query.ppt
3. www.inf.unibz.it/dis/teaching/DDB/ln/ddb07.pdf
4. www.inf.unibz.it/dis/teaching/DDB/ln/ddb09.pdf

E-Text Books:

1. https://computerscienceebooks.wordpress.com/2011/12/05/adbms-ebook-advanced-database-management-system-complete-syllabus-free-ebook/
2. http://aries.ektf.hu/~hz/pdf-tamop/pdf-xx/Radvanyi-hdbms-eng2.pdf
3. https://me2013regulation.wordpress.com/2014/06/24/cp7202-advanced-databases-notes-e-books/
4. http://www.gupshupstudy.com/note/333033/advance-database-management-system-complete-ebook-and-lecture-notes-download

MOOC Course

1. https://www.class-central.com/mooc/454/coursera-web-intelligence-and-big-data
2. https://www.class-central.com/mooc/6309/coursera-cloud-computing-applications-part-2-big-data-and-applications-in-the-cloud

Course Home Page:

SOFTWARE DEVELOPMENT METHODOLOGY

IV Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT508	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand a broad and critical processes for engineering high quality software and the principles, concepts and techniques associated with software development.
II. Analyze and evaluate problems and draw the theoretical and technical knowledge to develop solutions and systems.
III. Apply range of skills focused on the analysis of requirements, design and implementation of reliable and maintainable software, with strong emphasis on engineering principles applied over the whole development lifecycle.
IV. Create An awareness of current research in software development, the analytical skills and research techniques for their critical and independent evaluation and their application to new problems.

UNIT-I	**INTRODUCTION, A GENERIC VIEW OF PROCESS AND PROCESS MODELS**	**Classes: 10**

Introduction to software engineering: The evolving role of software, changing nature of software, legacy software, software myths; A generic view of process: Software engineering , a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models, process models: the waterfall model, incremental process models, the unified process.

UNIT-II	**SOFTWARE REQUIREMENTS AND REQUIREMENTS ENGINEERING PROCESS**	**Classes: 10**

Software requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document; Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT-III	**DESIGN ENGINEERING, CREATING AN ARCHITECTURAL DESIGN AND MODELING COMPONENT-LEVEL DESIGN**	**Classes: 09**

Design engineering: Design process and design quality, design concepts, the design model, pattern based software design.

Creating an architectural design: **S**oftware architecture, data design, architectural styles and patterns, architectural design, assessing alternative architectural designs, mapping data flow into software architecture.

UNIT-IV	**TESTING STRATEGIES AND PRODUCT METRICS**	**Classes: 08**

Testing strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging; Product metrics: Software quality, frame work for product metrics, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT-V	RISK MANAGEMENT AND QUALITY MANAGEMENT	Classes: 08

Risk management: Reactive vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM(Risk Mitigation, Monitoring and Management), RMMM plan; Quality Management: Quality concepts, software quality assurance, software Reviews, formal technical reviews, statistical software quality assurance, software reliability, The ISO 9000 quality standards.

Text Books:

1. Roger S Pressman, "Software Engineering: A practitioner's Approach", McGraw-Hill International Edition, 6th Edition, 2005.
2. Ian Somerville, "Software Engineering", Pearson Education, 7th Edition, 2004.

Reference Books:

1. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 1st Edition, 2010.
2. Waman S Jawadekar , "Software Engineering : A Primer", Tata McGraw-Hill, 1st Edition, 2008
3. Rajib Mall, "Fundamentals of Software Engineering", PHI, 2nd Edition, 2005.
4. Diner Bjorner, "Software Engineering 1: Abstraction and Modeling", Springer International Edition, 2006.

Web References:

1. http://www.umsl.edu/~sauterv/analysis/Fall2013Papers/Buric/-5-references.html
2. https://toggl.com/developer-methods-infographic
3. https://www.w3.org/2001/sw/BestPractices/SE/

E-Text Books:

1. http://www.ebooksdirectory.com/listing.php?category=25
2. http://www.hongkiat.com/blog/free-ebooks-software-developers/
3. http://onlinevideolecture.com/ebooks/?subject=Software-Development

MOOC Course:

1. https://www.mooc-list.com/tags/software-development
2. https://www.udacity.com/course/software-development-process--ud805

Course Home Page:

SOFTWARE QUALITY MANAGEMENT

IV Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT509	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Analyze software quality models and quality measurement and metrics.
II. Understand quality plan, implementation and documentation and quality tools including case tools.
III. Evaluate quality control and reliability of quality process.
IV. Understand quality management system models and complexity metrics and customer satisfaction.
V. Remember international quality standards ISO, CMM.

UNIT-I	INTRODUCTION	Classes: 10

Software process assessment overview, assessment phases, assessment principles, assessment conduct, implementation consideration, quality management, quality assurance plan, considerations, verification and validation.

UNIT-II	CONFIGURATION MANAGEMENT	Classes: 10

Need for configuration management: Software product nomenclature, configuration management functions, baselines, responsibilities, need for automated tools, plan, SCM(Software Configuration Management) support functions, requirement phase design control, the implementation phase, test phase, SCM(Software Configuration Management) tools, configuration accounting and audit.

UNIT-III	SOFTWARE STANDARDS AND INSPECTION	Classes: 09

Definitions, reason for software standards, benefits, establishing standards, guidelines, types of reviews.

Inspection: Inspection of objectives, basic inspection principles, the conduct of inspection, inspection training.

UNIT-IV	TESTING AND MANAGING SOFTWARE QUALITY	Classes: 08

Testing: principles, types, planning, development, execution and reporting, tools and methods, real time testing, quality management paradigm, quality motivation, measurement criteria, establishing a software quality program, estimating software quality.

UNIT-V	DEFECT PREVENTION	Classes: 08

Principles of software defect prevention, process changes for defect prevention, defect prevention considerations, managements role, framework for software process change, managing resistance to software process change, case studies.

Text Book:

Watts S. Humphrey, "Managing the Software Process", Addison Wesley, 1st Edition, 1989.

Reference Books:

1. Tsum S.Chow, "Software Quality Assurance a Practical Approach", IEEE Computer Society Press, 1985.
2. Richard E. Fairley, "Software Engineering - A Practitioner's Approach", McGraw-Hill, 1982.

Web References:

1. http://www.win.tue.nl/~wstomv/edu/2ip30/references/#qualitymanagement
2. http://www.rstonehouse.co.uk/old-site/biblio.html
3. http://www.rspa.com/spi/sqa.html

E-Text Books:

1. https://www.scribd.com/doc/19378602/Quality-Management-eBook
2. http://www.artechhouse.com/Main/BillingCountry.aspx?ahbRedirect=1&pageurl=%2fMain%2fBooks%2fPractical-Guide-to-Software-Quality-Management-Sec-200.aspx
3. http://www.springer.com/us/book/9783319061054

MOOC Course

1. http://online-courses.startclass.com/l/59154/Software-Quality-Assurance
2. https://alison.com/learn/quality-management

Course Home Page:

SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

IV Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT510	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the challenges of advanced software design and the issues associated with large-scale software architectures, frameworks, patterns and components.
II. Understand the tools and techniques that may be used for the automatic analysis and evaluation of software.
III. Know the need for software architecture and the principles of the classic architectural styles.
IV. Understand the major approaches to automated software analysis achievable through static and dynamic analysis.

UNIT-I	SOFTWARE ARCHITECTURE	Classes: 09

Software architecture: What software architecture is and what it is not, architectural structures and views, architectural patterns, importance of software architecture, inhibiting or enabling a system's quality attributes.

UNIT-II	PATTERNS	Classes: 09

Patterns: Introduction about pattern, what makes a pattern, pattern categories, relationship between patterns, pattern description, patterns and software architecture, summary.

UNIT-III	PATTERNS AND SOFTWARE ARCHITECTURE	Classes: 09

Patterns and software architecture: Introduction, patterns in software architecture, enabling techniques for software architecture, non-functional properties of software architecture.

Architectural patterns: Introduction, layers, pipes and filters, black board, distributed systems: Broker, interactive systems: Model-view controller, presentation-abstraction control.

UNIT-IV	ARCHITECTURAL PATTERNS	Classes: 09

Architectural patterns: Adaptable systems, micro-kernel, reflection design patterns, structural decomposition, master-slave, access control, proxy.

UNIT-V	PATTERN SYSTEMS	Classes: 09

Pattern systems: Introduction to pattern system, pattern classification, pattern selection, pattern systems as implementation guidelines.

Text Books:

1. Len Bass, Paul Clement, Rick Kazman, "Software Architectures in Practice", Pearson, 3rd Edition, 2013.
2. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal, "Pattern Oriented Software Architecture: A System of Patterns", John Wiley and Sons, Volume 1, Reprinted, 2001.

Reference Books:

1. Alan Shalloway, James R Trott, Design Patterns Explained, A New Perspective on Object Oriented Design, Addison Wesley, 2nd Edition, 2005.
2. Mary Shaw and David Garlan: Software Architecture-Perspectives on an Emerging Discipline, PHI Learning, 2007.
3. James W Cooper, "Java Design Patterns, a Tutorial", Addison Wesley, 2000.
4. Eric Freeman, Elisabeth Freeman, "Head First Design Patterns", O'reilly Publications, 2004.

Web References:

1. http://www.ece.ubc.ca/~matei/EECE417/BASS/ch02lev1sec4.html
2. https://msdn.microsoft.com/en-in/library/ee658117.aspx
3. http://www.openloop.com/softwareEngineering/patterns/designPattern/dPattern_CommandProcessor.htm
4. http://xyuan.myweb.cs.uwindsor.ca/311/Lec11.pdf

E-Text Books:

1. http://www.oreilly.com/programming/free/files/software-architecture-patterns.pdf
2. http://wiki.hsr.ch/MasterModulSEA/files/LayersPatternPOSA1.pdf

MOOC Course

1. https://www.udacity.com/course/software-architecture-design--ud821
2. https://www.my-mooc.com/en/mooc/software-architecture-design--ud821/

Course Home Page:

SOFTWARE ENGINEERING AND ESTIMATION

IV Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT511	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Analyze and uunderstand basic software engineering methods and practices, and its applications.
II. Understand the software engineering practice& process models.
III. Understand design engineering, web applications, and software project management.
IV. Gain knowledge of the overall project activities.
V. Learn the role of project management including planning, scheduling, risk management.

UNIT-I	INTRODUCTION	Classes: 10

Introduction: Role of software engineer, software components, software characteristics, software crisis, software engineering processes, similarity and differences from conventional engineering processes, quality attributes; Assessment: How software engineering changes, software development life cycle (SDLC) models: Water fall model, prototype model, spiral model, evolutionary development models, iterative enhancement models, choosing a social relevant problem summary team report.

UNIT-II	REQUIREMENT ENGINEERING PROCESS	Classes: 10

Requirement engineering Process: Elicitation, analysis, documentation, review and management of user needs, feasibility study, information modeling, data flow diagrams, entity relationship diagrams, designing the architecture; Assessment: Impact of requirement engineering in their problem. Decision tables, SRS document, IEEE standards for SRS, architectural design, component level design, user interface design, webapp design, submission of SRS document for team project.

UNIT-III	QUALITY MANAGEMENT	Classes: 09

Quality concepts, review techniques, software quality assurance (SQA): Verification and validation, SQA plans, software quality frameworks.

Assessment: Framing SQA plan. ISO 9000 models, SEI-CMM model and their relevance to project management other emerging models like people CMM.

UNIT-IV	ESTIMATION	Classes: 08

Estimation: Software project estimation, decomposition techniques, empirical estimation models, estimation for object oriented projects, specialized estimation techniques; Testing Objectives: Unit testing, integration testing, acceptance testing, regression testing, testing for functionality and testing for performance, top-down and bottom-up testing.

UNIT-V	RISK MANAGEMENT	Classes: 08

Project management concepts: Process and project metrics, estimation for software projects, project scheduling, risk management, maintenance and reengineering; Assessment: Preparation of risk mitigation plan.

Text Books:

1. R. S. Pressman, "Software Engineering: A Practitioners Approach", McGraw-Hill, 7th Edition, 2010.
2. Rajib Mall, "Fundamentals of Software Engineering", PHI Publication, 3rd Edition, 2009.
3. PankajJalote, "Software Project Management in practice", Pearson Education, New Delhi, 2002.

Reference Books:

1. Pankaj Jalote, "Software Engineering, a Precise Approach", Wiley India, Wiley Precise Text book series, 2010.
2. Waman S Jawadekar, "Software Engineering: A Primer", Tata McGraw-Hill, 1st Edition, 2008.
3. Rajib Mall, "Fundamentals of Software Engineering", PHI, 3rd Edition, 2009.

Web References:

1. http://www.tutorialspoint.com/software_engineering
2. http://nptel.ac.in/courses/106101061/
3. http://www.tfzr.uns.ac.rs/emc/emc2011/Files/F%2003.pdf

E-Text Books:

1. http://ebook-dl.com/item/software-engineering-ian-sommerville
2. http://www.freetechbooks.com/agile-software-development-in-theory-and-practice-t723.html
3. http://www.ece.rutgers.edu/~marsic/books/SE/book-SE_marsic.pdf

Course Home Page:

SOFTWARE PROCESS AND PROJECT MANAGEMENT

IV Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT512	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand overall software development life cycle and adopt suitable processes.
II. Analyze, prioritize, and manage both functional and quality requirements.
III. Estimate efforts required, plan, and track the plans.
IV. Understand and apply configuration and quality management techniques.

UNIT-I	**DEVELOPMENT LIFE CYCLE PROCESSES**	**Classes: 10**

Overview of software development life cycle, introduction to processes, personal software process, team software process, unified processes, agile processes, choosing the right process.

UNIT-II	**REQUIREMENTS MANAGEMENT**	**Classes: 10**

Functional requirements and quality attributes, elicitation techniques, quality attribute workshop, analysis, prioritization, and trade off, architecture centric development method, requirements, documentation, and specification, change management, traceability of requirements.

UNIT-III	**ESTIMATION, PLANNING, AND TRACKING**	**Classes: 09**

Identifying and prioritizing risks, risk mitigation plans, estimation techniques, use case points, function points, COCOMO II, top down estimation, bottom up estimation.

Work break down structure, macro and micro plans, planning poker, wideband Delphi, documenting the plan, tracking the plan, earned value method.

UNIT-IV	**CONFIGURATION AND QUALITY MANAGEMENT**	**Classes: 08**

Identifying articrafts to be configured, naming conventions and version control, configuration control, quality assurance techniques, peer reviews, Fegan inspection, unit, registration, system, and acceptance testing, test data and test cases, bug tracking, casual analysis.

UNIT-V	**SOFTWARE PROCESS DEFINITION AND MANAGEMENT**	**Classes: 08**

Process elements, process architecture, relationship between elements, process modeling, process definition techniques, ETVX (Entry-Task-Validation-exit), process baselining, process assessment and improvement, CMMI, six sigma.

Text Books:

1. Pankaj Jalote, "Software Process Management in Practice", Pearson, Illustrated, 2002.
2. Walker Royce, "Software Project Management – A Unified Framework", Pearson Education, 1st Edition, 2002.

Reference Books:

1. Watts S.Humphrey, "PSP: A Self Improvement Process for Software Engineers", Addison Wesley, 1st Edition, 2005.
2. Chris F. Kemerer, "Software Project Management- Readings and Cases", McGraw-Hill, Illustrated Edition, 1997.
3. Watts S. Humphrey, "Introduction to the Team Software Process", Addison-Wesley, Illustrated Reprint, 2000.

Web References:

1. http://www.cs.ox.ac.uk/people/michael.wooldridge/teaching/soft-eng/lect05.pdf
2. https://www.crcpress.com/IntroductiontoSoftwareProjectManagement/Villafiorita/p/book/9781466550

E-Text Books:

1. https://cs.uwaterloo.ca/~apidduck/se362/Lectures/1intro.pdf
2. http://www.londoninternational.ac.uk/sites/default/files/computing-samples/co3353_ch1-3.pdf

MOOC Course

1. https://www.coursera.org/learn/software-processes-and-agile-practices
2. https://www.coursera.org/specializations/project-management
3. https://www.coursera.org/learn/reviews-and-metrics-for-software-improvements
4. https://www.coursera.org/learn/process-improvement

Course Home Page:

COMPONENT BASED SOFTWARE ENGINEERING

IV Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT513	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the essentials of component-based software engineering.
II. Analyze the main characteristics of components and component models.
III. Estimate software development processes for component-based systems.
IV. Understand relations between software architecture and component models.

UNIT-I	COMPONENT DEFINITION	Classes: 10

Definition of a software component and its elements, the component industry metaphor, component models and component services; The case for components: The business case for components, COTS(commercial-off-the-shelf).

UNIT-II	PLANNING TEAM ROLES	Classes: 10

Planning team roles for component based development, common high-risk mistakes; CBSE success factors: Integrating architecture, process, and organization, software engineering practices, practices of software engineering, Component Based Software Development, status of Component Based Software Engineering in Europe.

UNIT-III	DESIGN OF SOFTWARE COMPONENT INFRASTRUCTURES	Classes: 09

The design of software component infrastructures, software components and the UML, component infrastructures, business components, components and connectors.

An OPEN process for component based development, designing models of modularity and integration, software architecture, software architecture design principles, Product-Line architectures.

UNIT-IV	MANAGEMENT OF COMPONENT-BASED SOFTWARE SYSTEMS	Classes: 08

The Management of component based software systems, measurement and metrics for software components, implementing a practical reuse program for software components, selecting the right COTS software, software component project management, trouble with testing components, configuration management and component libraries, the evolution, maintenance, and management of component based software.

UNIT-V	COMPONENT TECHNOLOGIES	Classes: 08

Overview of the CORBA component model, Overview of COM+, overview of the EJB component model, Bonobo and Free Software GNOME components, choosing between COM+, EJB, and CCM, software agents as next generation software components.

Text Book:

George T. Heineman, William T. Councill, "Component Based Software Engineering: Putting the pieces together", Addison- Wesley, Illustrated, 2001.

Reference Books:

1. Clemens Szyperski, Dominik Gruntz , Stephan Murer, "Component Software: Beyond Object Oriented Programming:", Pearson Education, 2nd Edition, 2001.
2. Roger S. Pressman, "Software Engineering", Tata McGraw-Hill, 6th Edition, 2002.
3. Ian Sommerville, "Software Engineering", Pearson Education, 7th Edition, 2004.
4. Hans Van Vliet, "Software Engineering Principles and Practice", Wiley India Edition, 3rd Edition, 2006.

Web References:

1. http://liacs.leidenuniv.nl/~bonsanguemm/cbse.html
2. http://www.comp.leeds.ac.uk/ukpew09/papers/wlodek.pdf

E-Text Books:

https://doc.lagout.org/science/0_Computer%20Science/Software%20Engineering,%208th%20Editionpdf

MOOC Course

1. https://www.coursera.org/learn/androidapps
2. https://www.coursera.org/specializations/seo

Course Home Page:

ARTIFICIAL INTELLIGENCE

V Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS512	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand and study the fundamental concepts of artificial intelligence in problem solving.
II. Explore the methods of agents and reasoning patterns.
III. Introduce the concepts of knowledge representation and learning.
IV. Analyze and solve statistical learning methods using AI techniques.

UNIT-I	WHAT IS ARTIFICIAL INTELLIGENCE	Classes: 08

The AI problems, what is an AI technique, the levels of the model, the underlying assumption, problems; Problem spaces and search: Defining the problem as a state space search, production systems, problem characteristics and production system characteristics; Problem-solving: Uninformed search strategies; Informed search strategies: Heuristic search strategies, local search algorithms and optimization problems, backtracking search for csps.

UNIT-II	KNOWLEDGE AND REASONING	Classes: 10

Logical agents, knowledge-based agents, the wumpus world and propositional logic, reasoning patterns in propositional logic and agents based on propositional logic; First-order logic: Syntax and semantic of first-order logic, knowledge engineering in first-order logic; Inference in first-order logic: Propositional vs first-order inference, unification and lifting, forward chaining, backward chaining, resolution.

UNIT-III	KNOWLEDGE REPRESENTATION	Classes: 08

Ontological engineering, categories and objects, actions, situations and events, mental events and mental objects: The internet shopping world, reasoning systems for categories, truth maintenance systems.

Uncertain knowledge and reasoning: Uncertainty, acting under uncertainty, basic probability notation.

UNIT-IV	LEARNING	Classes: 10

Learning from observations, forms of learning, the axioms of probability, inference using full joint distributions, independence, Baye's rule and its use; Inductive learning: Learning decision trees, ensemble learning; Why learning works: Computational learning theory.

UNIT-V	STATISTICAL LEARNING METHODS	Classes: 09

Knowledge in learning: A logical formulation of learning, knowledge in learning; Neural networks; Fuzzy logic systems: Introduction, crisp sets, fuzzy sets, some fuzzy terminology, fuzzy logic control, sugeno style of fuzzy inference processing, fuzzy hedges, α cut threshold.

Text Books:

1. Elaine Rich, Kevin Knight , Shiva Shankar B Nair, "Artificial Intelligence", Tata McGraw-Hill, 3rd Edition, 2008.
2. Stuart J. Russell, Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education, 3rd Edition, 2013.

Reference Books:

1. George F. Luther, "Artificial Intelligence: Structures and Strategies for Complex Problem Solving", Pearson Education, 5th Edition, 2005.
2. Eugene Charniak , Drew McDermott, "Introduction to Artificial Intelligence", Addison – Wesley Series in Computer Science, Revised Edition,1985.

Web References:

1. http://www.udacity.com/
2. http://www.library.thinkquest.org/2705/
3. http://www.ai.eecs.umich.edu/
4. http://www.macs.hw.ac.uk/alison/ai3notes/chapter2_5.html

E-Text Books:

1. http://www.stpk.cs.rtu.lv/sites/all/.../Artificial%20Intelligence%20A%20Modern%20Approach.pdf
2. http://www.bookboon.com/en/artificial-intelligence-ebooks
3. http://www.onlineprogrammingbooks.com/ai-and-robotics
4. http://www.e-booksdirectory.com

Course Home Page:

SOFT COMPUTING

V Group : CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS513	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Illustrate the improved techniques and methodologies of soft computing that differ from conventional artificial intelligence.
II. Able to design and analyze on real life problems using various neural learning algorithms.
III. Conceptualize fuzzy logic and its implementation for various real world applications.
IV. Study the advantages and limitations of hybrid learning algorithms.

UNIT-I	INTRODUCTION TO SOFT COMPUTING	Classes: 08

Characteristic behavior of intelligent systems, knowledge based systems, knowledge representation and processing, soft computing characteristics; Constitutes of soft computing: Fuzzy logic and computing, neural computing, evolutionary computing, rough sets, probabilistic reasoning and machine learning.

UNIT-II	NEURAL NETWORKS	Classes: 10

Fundamental concepts and models of artificial neural systems: Biological neurons and their artificial models, models of artificial neural networks, neural processing, learning and adaptation, neural network learning rules and comparison; Linearly and non-linearly separable pattern classification; Perception convergence theorem; Multi-layer feed forward network: Delta learning rule for Multi perceptron layer, generalized delta learning rule, feed forward recall and error back propagation training, learning factors, character recognition application; Associative memory: Hopfield network, bidirectional associative memory, radial basis function networks.

UNIT-III	FUZZY LOGIC AND FUZZY SYSTEMS	Classes: 10

Evolution of fuzzy logic, fuzzy sets, fuzzy logic operations, fuzzy relations, fuzzy arithmetic and fuzzy measures, fuzzy rules and reasoning.

Fuzzy inference systems mamdani fuzzy model, sugeno fuzzy model, tsukamoto fuzzy model, fuzzy modeling and decision making, neuro-fuzzy modeling, input space partitioning and fuzzy modeling.

UNIT-IV	HYBRID SYSTEMS	Classes: 08

ANFIS (Adaptive neuro-fuzzy inference systems): Introduction, ANFIS Architecture, and hybrid learning algorithm; Advantages and limitations of ANFIS; Application of ANFIS/CANFIS for regression.

UNIT-V	APPLICATIONS OF SOFT COMPUTING TECHNIQUES	Classes:09

Applications of fuzzy in pattern recognition: Printed character recognition, inverse kinematics problems, automobile fuel efficiency prediction, soft computing for color recipe prediction, applications of evolutionary computing in image processing and computer vision, soft computing in mobile ad-hoc networks, soft computing in information retrieval and semantic web, soft computing in software engineering.

Text Books:

1. J. S. R. Jang, C. T. Sun, E. Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, Pearson Education,1st Edition, 2004.
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications," Wiley India, 3rd Edition, 2004.
3. S. N. Sivanandam, S. N. Deepa, "Principles of Soft Computing," Wiley India, 2nd Edition, 2005.
4. Laurene Fausett, "Fundamentals of Neural Networks: Architectures, Algorithms and Applications", Pearson Education, Inc, 1st Edition, 2008.

Reference Books:

1. Hagan T. Martin, H. B. Demuth, Mark Beale, "Neural Network Design," Thomson Learning. 1st Edition, 2004.
2. Satish Kumar, "Neural Networks – A Classroom Approach," Tata McGraw-Hill, 2nd Edition, 2005.
3. Kishan Mehrotra, Chilukuri. K. Mohan, Sanjay Ranka, "Elements of Artificial Neural Networks," Penram International Publishing India, 2nd Edition, 2004.
4. H. J. Zimmermann, "Fuzzy Set Theory and its Applications," Allied Publishers Ltd, 1st Edition, 2004.
5. John Hertz, Anders Krogh, Richard Palmer" Introduction to The Theory of Neural Computation", Addison –Wesley Publishing Company, 1st Edition, 1991.

Web References:

1. http://www.sctie.iitkgp.ernet.in/
2. http://www.rkala.in/softcomputingvideos.php
3. http://www.sharbani.org/home2/soft-computing-
4. http://www.myreaders.info/html/soft_computing.html

E-Text Books:

1. https://www.books.google.co.in/books?id=bVbj9nhvHd4C
2. https://www.books.google.co.in/books?id=GrZHPgAACAAJ&dq=1.+J.S.R.Jang,+C.T.Sun+and+E. Miz utani,+Neuro,+Fuzzy+and+Soft+Computing,+PHI,+2004,Pearson+Education.
3. http:// tradownload.com/.../soft-computing-techniques-by-sn-sivanandam-and-sn-deepa.html

Course Home Page:

ELEMENTS OF NEURAL COMPUTATION

V Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS514	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Illustrate on Artificial Intelligence techniques and problems.
II. Understand the neural networks structure, architecture and learning process.
III. Explore on single and multilayer perception in network learning process.
IV. Study the concepts of Radial Basis Function networks and fuzzy set theory.

UNIT-I	ARTIFICIAL INTELLIGENCE	Classes: 08

Introduction to artificial intelligence, artificial intelligence problems, artificial intelligence techniques, problems, problem space and search-defining the problem as a state space search, production system, problem characteristics; Heuristic search technologies: Generate and test hill climbing, best first search, problem reduction, constraint satisfaction, means end analysis.

UNIT-II	NEURAL NETWORKS	Classes: 10

Introduction: History of neural networks, structure and function of a biological neuron, models of a neuron, neural networks viewed as secreted graphs, feedback network architectures; Learning process: Error correction learning, memory based learning, Hebbian learning, competitive learning, Boltzmann learning.

UNIT-III	PERCEPTION AND HOPFIELD NETWORKS	Classes: 08

Single layer and multilayer perception: Adaptive filtering problem, learning curves, perception convergence theorem, multi-layer perception, back propagation, output representation and decision rules, network pruning techniques.

Hopfield networks: The Hopfield model, Hopfield networks, recurrent and bidirectional associative memories, counter propagation networks, artificial resonance theory.

UNIT-IV	REDIAL BASIS FUNCTION NETWORKS	Classes: 10

Introduction: Cover's theorem on the separability of patterns, interpolation problem, supervised learning as an III – posed hyper surface reconstruction problem, regularization theory, regularization networks, generalized radial basis function networks, XOR problem (revised) estimation of the regularization parameter, approximation properties of RBF networks.

UNIT-V	INTRODUCTION TO FUZZYSET THEORY	Classes: 09

Classical set Vs fuzzy set, properties of fuzzy sets, operations of fuzzy sets union, intersection, complement, T – norm and co T – norm; Fuzzy relations: Operations on fuzzy relations, cylindrical extensions interference rules , compositional rule of interference.

Text Books:

1. George F. Luger, "Artificial Intelligence – Structures and Strategies for Complex Problem Solving", Pearson Education, 4th Edition, 2003.
2. Philip D. Wesserman, "Neural Computing – Theory and Practice", Van Nostrand Rein hold, New York, Illustrated Edition, 2007.

Reference Books:

1. Elaine Rich, Kevin Knight, Shivashankar B. Nair, "Artificial Intelligence", Tata McGraw-Hill, 3rd Edition, 2008.
2. Russell, Norving, "Artificial Intelligence, A Modern Approach", Pearson Education, 2nd Edition, 2003.
3. Simon Haykin, "Neural Networks - A Comprehensive Foundation", Pearson Education Publications, 9th Edition, 2005.
3. Simon Haykin, "Neural Networks – A Comprehensive Foundation", Pearson Education, 9th Edition, 2005.
4. Akerkar Rajendra, "Introduction to Artificial Neural System", PHI Publishing House, Illustrated Edition, 2004.

Web References:

1. http://artint.info/html/ArtInt_1.html
2. http://neuralnetworksanddeeplearning.com/
3. https://www.doc.ic.ac.uk/~nd/surprise_96/journal/vol4/cs11/report.html

E-Text Books:

1. http://bookboon.com/en/artificial-intelligence-ebooks
2. http://lia.univ-avignon.fr/chercheurs/torres/livres/book-neuro-intro.pdf
3. http://www.inf.fu-berlin.de/inst/ag-ki/rojas_home/documents/1996/NeuralNetworks/neuron.pdf

Course Home Page:

COMPUTATIONAL INTELLIGENCE

V Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS515	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the basics of an evolutionary computing paradigms and its application in engineering optimization problems.
II. Explore the fundamentals of neural networks applications using neuro-modeling.
III. Illustrate the concepts of fuzzy sets and fuzzy logic of machine intelligence applications.
IV. Study on advances in neural networks for natural immune systems.

UNIT-I	INTRODUCTION TO COMPUTATIONAL INTELLIGENCE	Classes: 10

Computational intelligence paradigms: Artificial neural networks, evolutionary computation, swarm intelligence, artificial immune systems, fuzzy systems; Evolutionary computation: Generic evolutionary algorithm, representation the chromosome, initial population, fitness function, selection; Reproduction operators: Stopping conditions, evolutionary computation versus classical optimization; Genetic algorithms: Canonical genetic algorithm, crossover, mutation, control parameters, genetic algorithm variants, advanced topics; Genetic programming: Tree-based representation, initial population, fitness function, building block genetic programming; Evolutionary programming: Basic evolutionary programming, evolutionary programming operators, strategy parameters, evolutionary programming implementations, advanced topics.

UNIT-II	COMPUTATIONAL SWARM INTELLIGENCE	Classes: 08

Particle swarm optimization**:** Basic particle swarm optimization, social network structures, basic variations, advanced topics, applications; Ant algorithms: Ant colony optimization meta-heuristic, cemetery organization and brood care, advanced topics, applications.

UNIT-III	FUZZY SYSTEMS	Classes: 08

Fuzzy Sets**:** Formal definitions, membership functions, fuzzy operators, fuzzy set characteristics, fuzziness and probability.

Fuzzy logic and reasoning: Fuzzy logic, fuzzy inferencing; Fuzzy controllers: Components of fuzzy controllers, fuzzy controller types.

UNIT-IV	ARTIFICIAL NEURAL NETWORKS	Classes: 10

The artificial neuron: Calculating the net input signal, activation functions, artificial neuron geometry, artificial neuron learning; Supervised learning neural networks: Nsssseural network types, supervised learning rules, functioning of hidden units, ensemble neural networks; Unsupervised learning neural networks: Background, Hebbian learning rule, principal component learning rule, learning vector quantizer-i, self-organizing feature maps; Radial basis function networks: Learning vector quantizer-ii, radial basis function neural networks.

UNIT-V	ARTIFICIAL IMMUNE SYSTEMS	Classes: 09

Natural immune system: Classical view, antibodies and antigens, the white cells, immunity types, learning the antigen structure, the network theory, the danger theory; Artificial immune models**:** Artificial immune system algorithm, classical view models, clonal selection theory models.

Text Books:

Andries P. Engelbrecht, "Computational Intelligence", Wiley, 2nd Edition, 2007.

Reference Books:

1. Russell C. Eberhart, Yuhui Shi, "Computational Intelligence", Morgan Kaufmann, 1st Edition, 2007.
2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence A Logical Approach", Oxford University Press, New York, Illustrated, 1998.
3. Rutkowski, Leszek, "Computational Intelligence Methods and Techniques", Springer-Verlag Berlin Heidelberg, 1st Edition, 2008.
4. Dr. Russell Eberhart, Dr. Yuhui Shi, "Introduction to Computational Intelligence", Morgan Kauffman, 1st Edition, 2007.

Web References:

1. https://papers.harvie.cz/unsorted/computational-intelligence-an-introduction.pdf
2. https://www.cs.ubc.ca/~poole/ci/ch1.pdf
3. http://shahed.ac.ir/stabaii/Files/CompIntelligenceBook.pdf /

E-Text Books:

1. http://www3.u-toyama.ac.jp/tanglab/content51/filed/CI.pdf
2. https://docs.google.com/viewer.

Course Home Page:

INTELLEGENT SYSTEM DESIGN

V Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS516	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Able to prepare data in a way required by data mining algorithms.
II. Knows how to apply rough set (fuzzy set, Petri net) methods for solving basic problems coming from intelligent system domain and data analysis architecture.
III. Different ways of knowledge representation, basic algorithms from rough sets, fuzzy sets and Petri nets.

UNIT-I	**INTRODUCTION**	**Classes: 08**

Fuzzy sets: Basic types, basic concepts, representation, extension principle, types of operation-union, intersection, complement.

UNIT-II	**FUZZY ARITHMETIC**	**Classes:09**

Fuzzy numbers, Linguistic variables, arithmetic operations on intervals, arithmetic operations on fuzzy numbers, lattice of fuzzy numbers, fuzzy equations.

UNIT-III	**FUZZY RELATIONS**	**Classes: 10**

Projections and cylindrical extensions, binary fuzzy relations, binary relations on single set, fuzzy equivalence relations.

Fuzzy compatibility relations, fuzzy ordering relations, fuzzy morphisms.

UNIT-IV	**FUZZY SYSTEMS**	**Classes: 08**

General discussion, fuzzy controllers: Overview, example, fuzzy systems and neural networks, fuzzy automata, fuzzy dynamic systems.

UNIT-V	**PATTERN RECOGNITION**	**Classes: 10**

Introduction, fuzzy clustering, fuzzy pattern recognition, fuzzy image processing.

Text Books:

1. George J, K Lir, Bo Yuan, " Fuzzy sets and Fuzzy Logic", Prentice Hall, Illustrated, 1995.
2. K J Cios, W Pedrycz, R W Swiniarski, "Data Mining Methods For Knowledge Discovery", Kluwer Academic Publishers, Boston, 1st Edition, 1998.

Reference Books:

1. Elaine Rich, Kevin Knight, "Artificial Intelligence", McGraw-Hill Edition, 2 Illustrated, 1991.
2. T. Munakata, "Fundamentals of The New Artificial Intelligence Paradigms", Springer, Berlin, 1998.

Web References:

1. http://www.cs.uni.edu/~schafer/4620/syllabus.htm/.
2. https://coursebook.utdallas.edu/hcs6349.5h1.16s/.
3. www.hshl.de/en-intelligent-systems-design
4. http://www.mathworld.wolfram.com/

E-Text Books:

1. http://www.e-booksdirectory.com/details.php?ebook=2346g
2. http://www.e-booksdirectory.com/details.php?ebook=6780re

Course Home Page:

NATURAL LANGUAGE PROCESSING

V Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS517	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Knowledge of various levels of analysis involved in NLP.
II. Understand the concepts of word level and syntactic analysis.
III. Able to gain knowledge in automated natural language generation and machine translation.
IV. Study on design features of information retrieval systems and lexical resources.

UNIT-I	**OVERVIEW AND LANGUAGE MODELING OVERVIEW**	**Classes: 08**

Origins and challenges of NLP-language and grammar processing Indian languages NLP applications information retrieval; Language modeling: Introduction, various grammar based language models, statistical language model.

UNIT-II	**WORD LEVEL AND SYNTACTIC ANALYSIS**	**Classes: 09**

Word level analysis: introduction regular expressions, finite state automata morphological parsing, spelling error detection, correction words, word classes part-of speech tagging; Syntactic analysis: Introduction context free grammar constituency, parsing probabilistic parsing.

UNIT-III	**SEMANTIC ANALYSIS AND DISCOURSE PROCESSING**	**Classes: 10**

Semantic analysis: Introduction meaning, representation lexical semantics, ambiguity, word sense disambiguation.

Discourse processing: Introduction, cohesion, reference, resolution, discourse, coherence, structure.

UNIT-IV	**NATURAL LANGUAGE GENERATION AND MACHINE TRANSLATION**	**Classes: 09**

Natural language generation: Introduction, architecture of NLG systems generation tasks and representations, application of NLG; Machine translation: Introduction, problems in machine translation, characteristics of Indian languages, machine translation, approaches, translation involving Indian languages.

UNIT-V	**INFORMATION RETRIEVAL AND LEXICAL RESOURCES**	**Classes: 09**

Information retrieval: Introduction, design features of information retrieval systems, classical, non-classical, alternative models of information Retrieval evaluation; Lexical resources: Introduction, word net frame, net stemmers, POS tagger, research corpora.

Text Books:

Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 1st Edition, 2008.

Reference Books:

1. Daniel Jurafsky, James H Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", Prentice Hall, 2nd Edition, 2008.
2. James Allen, "Natural Language Understandings", Benjamin-Cummings Publishing and Co., 2nd Edition, 1995.

Web References:

1. http://www.textrazor.com
2. http://www.coursera.org/course/nlp
3. http://www.nlp.stanford.edu/
4. http://www.nltk.org/

E-Text Books:

1. http://www.e-booksdirectory.com/details.php?ebook=10166
2. http://www.e-booksdirectory.com/details.php?ebook=7400re

Course Home Page:

CLOUD INFRASTRUCTURE AND SERVICES

VI Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS518	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the fundamentals and essentials of cloud computing services.
II. Introduce the broad perceptive of cloud architecture model and virtualization.
III. Explore important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other Business Cloud Applications.
IV. Study the grid computing and able to start adopting Aneka cloud platform as a service.

UNIT-I	DISTRIBUTED SYSTEM MODELS AND VIRTUALIZATION	Classes: 08

Distributed system models and enabling technologies, parallel/distributed programming models, performance; Security and energy: Efficiency, performance metrics and scalability analysis, fault-tolerance and system availability, network threats and data integrity, energy-efficiency in distributed computing; Virtual machines and virtualization of clusters and data centers.

UNIT-II	INTRODUCTION TO CLOUD COMPUTING	Classes: 10

Introduction into cloud computing, migration into cloud enriching the integration as a service paradigm for the cloud era, cloud computing service models, architecture design of compute and storage clouds, public cloud platforms.

UNIT-III	CLOUD INFRASTRUCTURE AND PROGRAMMING MODELS	Classes: 08

Infrastructure as a service (IAAS) and platform and software as a service (PAAS/SAAS), secure distributed data storage in cloud computing.

Aneka comet cloud: T-systems work flow engine for clouds; Cloud programming and software environments: Parallel and distributed programming paradigms.

UNIT-IV	MONITIRING, MANAGEMENT AND APPLICATIONS	Classes: 10

Architecture for federated cloud computing, SLA management in cloud computing, performance prediction for hpc on clouds, architecting cloud applications in the AWS cloud, building content delivery networks using clouds, resources cloud mashups.

UNIT-V	SECURITY IN THE CLOUD	Classes: 09

Security overview: Cloud security challenges and risks, software as a service security, security governance, risk management, security monitoring, security architecture design, data security, application security, virtual machine security, identity management and access control, autonomic security.

Text Books:

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing: Foundations and Applications Programming", Morgan Kaufmann, 1st Edition, 2011.
2. Kai Hwang, Jack Dongarra, Geoffrey Fox, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", M K Publishers, 1st Edition, 2011.

Reference Books:

1. Prabhu, "Grid and Cluster Compting", Prentice-Hall of India, 1st Edition, 2007.
2. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, "Cloud Computing A Practical Approach", McGraw Hill, 1st Edition, 2010.
3. Thomas Erl, Zaigham Mahmood, Ricardo Puttini, "Cloud Computing Concepts Technology and Architecture", Pearson Education, 1st Edition, 2013.
4. Pankaj Arora, Raj Biyani, Salil Dave, "To the Cloud – Cloud Powering an Enterprise", Tata McGraw-Hill, 1st Edition, 2012.
5. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, "Cloud Computing – A Practical Approach", Tata McGraw-Hill, 1st Edition, 2009.

Web References:

1. https://en.wikipedia.org/wiki/Cloud_computing
2. http://www.mit.edu/~caoj/pub/doc/jcao_j_gds.pdf
3. http://www.manjrasoft.com/products.html

E-Text Books:

1. https://books.google.co.in/books?id=evcgB7Qlix4C&pg=RA1-PT60&lpg=RA1 PT60&dq=1
2. https://books.google.co.in/books?id=VSDZAgAAQBAJ&pg=PR14

Course Home Page:

WIRELESS AND MOBILE COMPUTING

VI Group: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS519	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the concept of wireless transmission Protocols.
II. Learn the typical mobile networking infrastructure through a popular GSM protocol Architecture.
III. Illustrate the various layers of mobile networks for location management.
IV. Estimate the database issues in mobile environments and data delivery models.
V. Learn the platforms and protocols used in mobile environment.

UNIT-I	**WIRELESS FUNDAMENTALS AND PROTOCOLS**	**Classes: 08**

Fundamentals of wireless transmission: Frequencies for radio transmission, signals, antennas and multiplexing; Wireless application protocol: Architecture, wireless datagram protocol, wireless transport layer security, wireless transaction protocol, wireless session protocol and wireless markup language.

UNIT-II	**INTRODUCTION TO MOBILE COMPUTING AND SERVICES**	**Classes: 10**

Mobile computing: Paradigm, promises/novel applications and impediments and architecture, limitations of mobile and handheld devices; GSM: Services, system architecture, radio interfaces, protocols, localization, calling, handover, security, GPRS, DECT.

UNIT-III	**MEDIA ACCESS LAYER AND MOBILE NETWORK LAYER**	**Classes: 08**

Motivation for a specialized MAC (Hidden and exposed terminals. Near and far terminals), SDMA, FDMA, TDMA, CDMA, wireless LAN (IEEE802.11) system and protocol architecture.

Mobile network layer: Packet delivery and handover management, location management, registration, tunneling and encapsulation, route optimization, DHCP.

UNIT-IV	**MOBILE TRANSPORT LAYER**	**Classes: 10**

Conventional TCP/IP protocols, indirect TCP, snooping TCP, mobile TCP, other transport layers protocols for mobile networks; Database issues: Database hoarding & caching techniques, C-S computing and adaptation, transactional models, query processing, data recovery process and QoS issues.

UNIT-V	**MOBILE ADHOC NETWORKS(MANET'S)**	**Classes: 09**

Introduction, applications and challenges of a MANET, routing, classification of routing algorithms, algorithms such as DSR, AODV, DSDV; Protocols and platforms for mobile computing: Bluetooth, J2ME, Java card, PalmOS, windows CE, symbian OS, Linux for mobile devices, android.

Text Books:

1. Jochen Schiller, "Mobile Communications", Pearson Education, 2nd Edition, 2008.
2. Raj Kamal, "Mobile Computing", Oxford University Press, Illustrated, 2nd Edition, 2012.

Reference Books:

1. Adelstein, Frank, Gupta, Sandeep KS, Richard III, Golden, Schwiebert, Loren, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill Professional, 2005.
2. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, 2nd Edition, 2003.
3. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley DreamTech, 1st Edition, 2003.

Web References:

1. https://en.wikipedia.org/wiki/Mobile_computing
2. https://www.tutorialspoint.com/mobile_computing/mobile_computing_quick_guide.h
3. https://media.techtarget.com/searchMobileComputing/downloads/Mobile_and_pervasive_computing_Ch06pdf

E-Text Books:

1. https://books.google.co.in/books?id=HoFdSmH77wsC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&false
2. https://books.google.co.in/books?id=LSqPLwEACAAJ&source=gbs_book_other_versions

Course Home Page:

HIGH PERFORMANCE COMPUTING

VI Group : CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS520	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the fundamental principles in design and programming of parallel algorithms.
II. Study the approaches to achieve high performance models in real time applications.
III. Explore on parallel computing development tools and technologies.
IV. Illustrate on add on tools to address the performance issues, analysis, data transformation and visualization.

UNIT-I	DESIGN OF PARALLEL ALGORITHMS	Classes: 08

Parallel computers and computation, a parallel machine model, a parallel programming model , parallel algorithm examples, partitioning, communication, agglomeration, mapping, load balancing algorithms, task, scheduling algorithms, case studies, random numbers generation, hypercube algorithms, vector reduction, matrix transposition, merge sort.

UNIT-II	APPROACHES TO PERFORMANCE MODELING	Classes: 10

A quantitative basis for design, defining performance, approaches to performance modeling, developing models, performance parameters, time, scalability, overheads, bandwidth, efficiency, speed, interconnection networks, input/output; Case study: Shortest path algorithms, floyd's algorithm, dijkstra's algorithm , modular design review, modularity and parallel computing performance analysis; Case study: Convolution, tuple space and matrix multiplication.

UNIT-III	PARALLEL COMPUTING DEVELOPMENT TOOLS	Classes: 08

C++ review, C, C++ introduction, concurrency, locality, processor objects, global pointers thread placement, communication, remote operations.

Synchronization, mutual exclusion, data transfer functions, asynchronous communication, determinism, mapping, modularity performance issues.

UNIT-IV	PARALLEL COMPUTING DEVELOPMENT TOOLS	Classes: 10

Fortran M, concurrency, communication, unstructured communication, asynchronous communication, determinism, argument passing, mapping, modularity, high performance Fortran, data parallelism, concurrency, data distribution, dummy arguments and modularity other HPF features, performance issues.

UNIT-V	ADD ON TOOLS FOR DEVELOPMENT	Classes: 09

Message passing libraries: The MPI programming model, MPI basics, C and Fortran language bindings with MPI functions, global operations, asynchronous communication, modularity, other MPI features, performance issues, performance tools, performance analysis, data collection, data transformation and visualization tools, paragraph, upshot—pablo, gauge, paraide, IBM's parallel environment, AIMS, custom tools.

Text Books:

Ion Foster, "Designing and Building Parallel Programs", Addison Wesley, 1st Edition, 2003.

Reference Books:

1. Arjen Markus, "Modern Fortran in Practice", Cambridge University Press, 1st Edition, 2012.
2. Charles H. Koelbe, "High Performance Fortran Handbook", MIT Press, 1st Edition, 1993.
3. Michael J. Quinn, "Parallel Programming in C with MPI and Open MPI", Tata McGraw-Hill Publishing Company Ltd, 1st Edition, 2003.

Web References:

1. http://www.drdobbs.com/parallel/designing-parallel-algorithms-part-1/223100878.
2. http://searchcloudapplications.techtarget.com/tip/How-to-use-application-performance-modeling-techniques.
3. https://computing.llnl.gov/tutorials/parallel_comp/.

E-Text Books:

1. https://www.free-ebooks.net/ebook/High-Performance-Computing.
2. https://archive.org/details/HighPerformanceComputing.

Course Home Page:

E-COMMERCE

VI Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT514	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Describe e-commerce framework.
II. Explain electronic system for payment.
III. Describe the use of e-commerce advertising and marketing.
IV. Understand business documents and digital library.
V. Understand the usage of multimedia systems for e-commerce.

UNIT-I	INTRODUCTION TO ELECTRONIC COMMERCE	Classes: 10

Electronic Commerce: Frame work, media coverage; anatomy of e-commerce applications: E-commerce consumer applications, E-ecommerce organization applications.

UNIT-II	ELECTRONIC PAYMENT SYSTEMS	Classes: 10

Types of electronic payment systems; Digital token based electronic payment system: E-cash, properties of e-cash, electronic cash in action, business issues and electronic cash, operational risk and electronic cash, electronic checks; smart cards and electronic payment system; Credit card based electronic payment system; Risk and electronic payment system; Designing electronic payment system.

UNIT-III	INTER AND INTRA ORGANIZATIONAL COMMERCE	Classes: 09

Inter organizational commerce: Electronic data interchange, electronic data interchange implementation, and value added networks; Intra organizational commerce: Work flow, automation customization and internal commerce, supply chain management.

Corporate digital library: Document library, digital document types, corporate data warehouses; Advertising and marketing: Information based marketing, advertising on internet, on-line marketing process, market research.

UNIT-IV	CONSUMER SEARCH AND RESOURCE DISCOVERY	Classes: 08

Search and resource discovery paradigms, information search and retrieval, commerce catalogues, information filtering.

UNIT-V	MULTIMEDIA	Classes: 08

Multimedia: Key multimedia concepts, digital video and electronic commerce, desktop video processing, desktop video conferencing.

Text Books:

1. Ravi Kalakata, Whinston Andrew B, "Frontiers of Electronic Commerce", Pearson, 1st Edition, 1996.

Reference Books:

1. David Whitley, "E-Commerce-Strategy, Technologies and Applications", Tata McGraw-Hill, 2nd Edition, 2000.
2. Kamlesh K. Bajaj, "E-Commerce- The Cutting Edge of Business", Tata McGraw-Hill, 1st Edition, 2005.
3. J. Christopher Westland, Theodore H. K Clark, "Global Electronic Commerce- Theory and Case Studies", University Press, 1st Edition, 1999.

Web References:

1. www.engr.sjsu.edu/gaojerry/course/cmpe296u/296z/introduction.pdf
2. https://www.tutorialspoint.com/e_commerce/e_commerce_payment_systems.htm
3. www.csnotes.upm.edu.my/kelasmaya/web.nsf/.../$FILE/chapt%2001.ppt

E-Text Books:

1. http://www.ebooks-for-all.com/bookmarks/detail/Introduction-To-E-Commerce/onecat/Electronic-books+Economics-and-Business+E-Business/5/all_items.html
2. https://www.tutorialspoint.com/e_commerce/e_commerce_pdf_version.htm
3. https://www.bdc.ca/en/articles-tools/entrepreneur-toolkit/ebooks/pages/e-commerce-guide.aspx

MOOC Course:

1. https://www.edx.org/course/digital-marketing-social-media-e-wharton-digitalmarketing1-1x-0
2. http://www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s096-effective-programming-in-c-and-c-january-iap-2014/index.htm
3. https://www.class-central.com/mooc/2294/coursera-foundations-of-e-commerce
4. https://www.class-central.com/mooc/1966/canvas-network-basics-of-e-commerce

Course Home Page:

WEB SERVICES

VI Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT515	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the evolution of web services and their challenges in distributed computing.
II. Describe the concepts of core distributing technologies and soa.
III. Understand the basics of web services technologies that are related to enable the web services.
IV. Demonstrate the core fundamentals of soap and their message exchange models related to security.
V. Describe the concepts of web services life cycle and their anatomy of wsdl, uddi.

UNIT-I	EVOLUTION AND EMERGENCE OF WEB SERVICES	Classes: 10

Evolution and emergence of web services: Evolution of distributed computing, core distributed computing technologies, client/server, CORBA, Java RMI, Microsoft DCOM, MOM, challenges in distributed computing, role of J2EE and XML in distributed computing, emergence of web services and Service Oriented Architecture (SOA); Introduction to web services: The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.

UNIT-II	WEB SERVICES ARCHITECTURE	Classes: 6

Web services architecture, web services architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, basic steps of implementing web services, developing web services enabled applications.

UNIT-III	CORE FUNDAMENTALS OF SOAP	Classes: 13

Core fundamentals of Simple Object Access Protocol (SOAP): SOAP message structure, SOAP encoding, SOAP message exchange models, SOAP communication and messaging, SOAP security; Developing web services using SOAP: Building SOAP web services, developing SOAP web services using Java.

Limitations of SOAP, describing seb services: WSDL, WSDL in the world of web services, web services life cycle, anatomy of WSDL definition document, WSDL bindings, WSDL tools, limitations of WSDL.

UNIT-IV	DISCOVERING WEB SERVICES	Classes: 08

Discovering web services: Service discovery, role of service discovery in a SOA, service discovery mechanisms; Universal description, Discovery and Integration *(*UDDI): UDDI Registries, uses of UDDI Registry, Programming with UDDI, UDDI data structures, support for categorization in UDDI registries, publishing API, publishing information to a UDDI registry, searching information in a UDDI registry, deleting information in a UDDI registry, limitations of UDDI.

UNIT-V	WEB SERVICES INTEROPERABILITY	Classes: 08

Web services interoperability: Means of ensuring interoperability, overview of .NET and J2EE; Web services Security: XML security frame work, XML encryption, XML digital signature, XKMS structure, guidelines for signing XML documents.

Text Books:

1. R. Nagappan, R. Skoczylas, R.P. Sriganesh, "Developing Java Web Services", Wiley India, Reprint, 2008.
2. S. Chatterjee, J. Webber, "Developing Enterprise Web Services", Pearson Education, 1st Edition, 2008.
3. F.P. Coyle, "XML, Web Services, and the Data Revolution", Pearson Education, 5th Impression 2007.

Reference Books:

1. S. Graham, "Building Web Services with Java: Making Sense of XML,SOAP,WSDL and UDDI", Pearson Education, 2nd Edition, 2008.
2. D.A. Chappell, T. Jewell, "Java Web Services", O'Reilly, SPD,1st Edition, 2002.
3. James Mc Govern, Sameer Tyagi, Michael E.Stevens, Sunil Mathew, "Java Web Services Architecture", Morgan Kaufmann Publishers, Illustrated, 2003.
4. Richard Monson-Haefel, "J2EE Web Services", Pearson Education, 1st Edition, 2004.
5. Mario Bravetti, Manuel Nunez, Gianluigi Zavattaro, "Web Services and Formal Methods", Springer Science and Business Media, Illustrated 2006.

Web References:

1. http://www.tutorialspoint.com/webservices/
2. http://www.w3schools.com/xml/xml_services.asp
3. http://www.service-architecture.com/articles/web-services/web_services_explained.html
4. http://www.webservicex.net/new/Home/Index

E-Text Books:

1. https://www.crummy.com/writing/RESTful-Web-Services/RESTful_Web_Services.pdf
2. http://freecomputerbooks.com/specialWebServicesBooks.html
3. http://www.e-booksdirectory.com/listing.php?category=61

MOOC Course:

1. https://www.learningtree.com/courses/577/building-rest-and-soap-web-services-with-java/
2. https://www.intertech.com/training/java/java-ee/web-services
3. http://www.slideshare.net/raaviraja/webservices-online-training-course-content

Course Home Page:

GREEN COMPUTING

VI Group: CSE/IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AIT516	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand green computing practices to minimize negative impacts on the environment.
II. Illustrate energy saving practices in their use of hardware.
III. Examine various technology tools that can reduce paper waste and carbon foot print by user.
IV. Analyze and understand how to minimize equipment disposal requirements.

UNIT-I	**INTRODUCTION**	**Classes: 10**

Green IT fundamentals: Business, IT, and the environment; Green computing: Carbon foot print, scoop on power; Green IT Strategies: Drivers, dimensions, and goals; Environmentally responsible business: Policies, practices, and metrics.

UNIT-II	**GREEN ASSETS AND MODELING**	**Classes: 10**

Green assets: Buildings, data centers, networks, and devices; Green business process management: Modeling, optimization, and collaboration; Green enterprise architecture: Environmental intelligence, green supply chains; Green information systems: Design and development models.

UNIT-III	**GRID FRAMEWORK**	**Classes: 09**

Virtualizing of IT systems: Role of electric utilities, telecommuting, teleconferencing and teleporting.

Materials recycling, best ways for Green PC, Green data center, Green Grid framework.

UNIT-IV	**GREEN COMPLIANCE**	**Classes: 08**

Sociocultural aspects of Green IT: Green enterprise transformation roadmap; Green compliance: Protocols, standards, and audits; Emergent carbon issues: Technologies and future.

UNIT-V	**CASE STUDIES**	**Classes: 08**

The Environmentally Responsible Business Strategies (ERBS) : Case study scenarios for trial runs; Case studies: Applying Green IT strategies and applications to a home, hospital, packaging industry and telecom Sector.

Text Books:

1. Bhuvan Unhelkar, "Green IT Strategies and Applications-Using Environmental Intelligence", CRC Press, 2011.
2. Woody Leonhard, Katherrine Murray, "Green Home Computing for Dummies", 1st Edition, 2009.

Reference Books:

1. Alin Gales, Michael Schaefer, Mike Ebbers, "Green Data Center: Steps for the Journey", Shoff/IBM Rebook, IBM Press, 2011.
2. John Lamb, "The Greening of IT: How Companies Can Make A Difference for the Environment", Pearson Education, IBM Press, 2009.
3. Jason Harris, "Green Computing and Green IT- Best Practices on Regulations and Industry Initiatives, Virtualization Power Management, Materials Recycling and Telecommuting", Emero, 1st Edition, 2008.
4. Carl H. Speshock, "Empowering Green Initiatives with IT: A Strategy and Implementation Guide", John Wiley & Sons, Illustrated, 2010.
5. Wu Chun Feng, "The Green Computing Book: Tackling Energy Efficiency at Large Scale", CRC Press, Illustrated, 2014.

Web References:

1. http://searchdatacenter.techtarget.com/definition/green-computing
2. https://www.ncomputing.com/en/company/green-computing
3. https://www.bu.edu/energy/research/technologies-engineered-systems/green-computing/
4. http://explainingcomputers.com/green.html

E-Text Books:

1. https://drive.google.com/file/d/0B9bX852JMJ__NDN1d1RKX3lCRFE/view?pli=1
2. https://www.oecd.org/sti/ieconomy/44379113.pdf

MOOC Course

1. http://www.athabascau.ca/syllabi/comp/comp635.php
2. http://blog.highereducationwhisperer.com/2013/07/green-itis-education-and-training.html
3. https://cs.anu.edu.au/courses/comp7310

Course Home Page:

ELEMENTS OF MECHANICAL ENGINEERING

VI Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AME551	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Familiarize with fundamentals of mechanical systems.
II. Understand and appreciate the significance of mechanical engineering in different fields of engineering.
III. Understanding of application and usage of various engineering materials.

UNIT-I	INTRODUCTION TO ENERGY SYSTEMS	Classes: 09

Introduction: Prime movers and its types, concept of force, pressure, energy, work, power, system, heat, temperature, specific heat capacity, change of state, path, process, cycle, internal energy, enthalpy, statement of zeroth law and first law; Energy: Introduction and application, of energy sources like fossil fuels, nuclear fuels, hydels, solar, wind, and bio-fuels, environment issues like global warming and ozone depletion; Properties of gases: Gas laws, Boyle's law, Charle's law, gas constant, relation between C_p and C_v, various non flow processes like constant volume processes, constant pressure process, isothermal process, adiabatic process, poly-tropic process.

UNIT-II	STEAM TURBINES, HYDRAULIC MACHINES	Classes: 09

Properties of steam: Steam formation, types of steam enthalpy, specific volume, internal volume, internal energy and dryness fraction of steam, use of steam tables, calorimeters; Heat engine: Heat engine cycle and heat engine, working substances, classification of heat engines, description and thermal efficiency of carnot, Rankine, otto cycle, diesel cycles; Steam boilers: Introduction, cochran, lancashire, babcock, and Wilcox boiler, functioning of different mountings and accessories.

UNIT-III	INTERNAL COMBSUTION ENGINES, REFRIGERATION AND AIR-CONDITIONING	Classes: 09

Internal combustion engines: Introduction, classification, engine details, four stroke, two stroke cycle, petrol engine, diesel engine, indicated power, brake power, efficiencies; Pumps: Types, operation of reciprocating. rotary, centrifugal pumps, priming.

Air compressors: Types, operation of reciprocating, rotary air compressors, significance of multi-staging; Refrigeration and air-conditioning: Refrigerant, vapor compression refrigeration system, vapor absorption refrigeration system, domestic refrigerator, window and split air conditioners.

UNIT-IV	MACHINE TOOLS AND AUTOMATION	Classes: 09

Machine tools and automation machine tools operation: Turning, facing , knurling, thread cutting, taper turning by swiveling the compound rest, drilling, boring, reaming, tapping, counter sinking, counter boring, plane milling, end milling, slot milling; Robotic and automation: Introduction, classification based on robot configuration, polar, cylindrical, cartesian, coordinate and spherical, application, advantages and advantages; Automation: Definition, types, fixed, programmable and flexible automation, NC/CNC machines, basic elements with simple block diagrams, advantages and disadvantages.

UNIT-V	ENGINEERING MATERIALS, JOINING PROCESS	Classes: 09

Engineering materials and joining processes: Types, applications of ferrous metals, non-ferrous metals, alloys; Composites: Introduction, definition, classification and application (Automobile and Air Craft).

Text Books:

1. V. K. Manglik, "Elements of Mechanical Engineering", Prentice Hall, 1st Edition, 2013.
2. Mikell P. Groover, "Automation, Production Systems and CIM", Prentice Hall, 4th Edition, 2015.

Reference Books:

1. S. Trymbaka Murthy, "A Text Book of Elements of Mechanical Engineering", University Press, 4th Edition, 2006.
2. K. P. Roy, S. K. Hajra Choudary, Nirjhar Roy, " Element of Mechanical Engineering", Media Promoters & Publishers, 7th Edition, 2012.
3. Pravin Kumar, "Basic Mechanical Engineering", Pearson, 1st Edition, 2013.

Web References:

1. http://www.nptel.ac.in/courses/112107144/
2. *http://www*.nptel.ac.in/courses/112101098/download/lecture-37.pdf

E-Text Books:

1. www.wiley-vch.de/vch/journals/2081/books/2081_rel_title_varadan.pdfM
2. www.ebooks.cawok.pro/Artech.House.Publishers.An.Introduction.to.Microelectrical.pdf

Course Home Page:

DISASTER MANAGEMENT

VI Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACE551	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Identify the major disaster types and develop an understanding of modern disaster management.
II. Recognize and develop awareness of the chronological phases of natural disaster response and refugee relief operations.
III. Understand the key concepts of disaster management related to development and the relationship of different disaster management activities.
IV. Categorize the organizations that are involved in natural disaster assistance and relief system.

UNIT-I	ENVIRONMENTAL HAZARDS AND DISASTERS	Classes: 09

Environmental hazards and disasters: meaning of environmental hazards, environmental disasters and environmental stress; concept of environmental hazards, environmental stress and environmental disasters, different approaches and relation with human ecology, landscape approach, ecosystem approach, perception approach, human ecology and its application in geographical researches.

UNIT-II	TYPES OF ENVIRONMENTAL HAZARDS AND DISASTERS	Classes: 09

Types of environmental hazards and disasters: Natural hazards and disasters, man induced hazards and disasters, natural hazards, planetary hazards/ disasters, extra planetary hazards/ disasters, planetary hazards, endogenous hazards, exogenous hazards.

UNIT-III	ENDOGENOUS HAZARDS	Classes: 09

Endogenous hazards, volcanic eruption, earthquakes, landslides, volcanic hazards/ disasters, causes and distribution of volcanoes, hazardous effects of volcanic eruptions, environmental impacts of volcanic eruptions.

Earthquake hazards/ disasters, causes of earthquakes, distribution of earthquakes, hazardous effects of, earthquakes, earthquake hazards in India, human adjustment, perception and mitigation of earthquake.

UNIT-IV	EXOGENOUS HAZARDS	Classes: 09

Exogenous hazards/ disasters, infrequent events, cumulative atmospheric hazards/ disasters; Infrequent events: Cyclones , lightning , hailstorms; Cyclones: Tropical cyclones and local storms, destruction by tropical cyclones and local storms (causes, distribution human adjustment, perception and mitigation); Cumulative atmospheric hazards/ disasters: Floods, droughts, cold waves, heat waves floods; Causes of floods, flood hazards India, flood control measures (human adjustment, perception and mitigation); Droughts: Impacts of droughts, drought hazards in India, drought control measures, extra planetary hazards/ disasters, man induced hazards /disasters, physical hazards/ disasters, soil erosion, Soil erosion: Mechanics and forms of soil erosion, factors and causes of soil erosion, conservation measures of soil erosion; Chemical hazards/ disasters: Release of toxic chemicals, nuclear explosion, sedimentation processes; Sedimentation processes: Global sedimentation problems regional sedimentation problems, sedimentation and environmental problems, corrective measures of erosion and sedimentation, biological hazards/ disasters, population explosion.

UNIT-V	EMERGING APPROACHES IN DISASTER MANAGEMENT	Classes: 09

Emerging approaches in Disaster Management, Three Stages

1. Pre, disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage, Rehabilitation.

Text Books:

1. Pardeep Sahni, "Disaster Mitigation: Experiences and Reflections", PHI Learning Pvt. Ltd., 1st Edition, 2001.
2. J. Glynn, Gary W. Hein Ke, "Environmental Science and Engineering", Prentice Hall Publishers, 2nd Edition, 1996.

Reference Books:

1. R.B.Singh (Ed), "Environmental Geography", 2nd Edition, 1990.
2. R.B. Singh (Ed), "Disaster Management", 2nd Edition, 2006.

Web References:

1. https://www.google.co.in/?gfe_rd=cr&ei=,iAwWLiDIazv8we8_5LADA#q=disater+mangement
2. http://ndma.gov.in/images/policyplan/dmplan/National%20Disaster%20Management%20Plan%20May%202016.pdf
3. http://www.eib.europa.eu/attachments/pipeline/20080021_eia_en.pdf
4. http://www.ndmindia.nic.in/

E-Text Books:

1. https://www.google.co.in/?gfe_rd=cr&ei=,iAwWLiDIazv8we8_5LADA#q=disaster+management+e+textbooks
2. http://cbse.nic.in/natural%20hazards%20&%20disaster%20management.pdf\
3. http://www.digitalbookindex.org/_search/search010emergencydisastera.asp
4. http://www.icbse.com/books/cbse,ebooks,download

Course Home Page:

GEOSPATIAL TECHNIQUES

VI SEMESTER: Common for all branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACE552	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Apply the technical skills to use geo-referenced data for the purpose of economic, educational, and social development.
II. Apply descriptive and analytical knowledge about map reading, statistics, and geospatial technologies.
III. Integrate the domains of geography and apply their knowledge to issues concerning people, places, and environments.
IV. Describe**,** analyze, and explain the patterns, processes, and interactions of human and physical phenomena on Earth's surface.

UNIT-I	INTRODUCTION TO GEOSPATIAL DATA	Classes: 09

Introduction geospatial data, why to study geospatial data, importance of geospatial technology, spatial data infrastructure, three important geospatial technologies, spatial elements, coordinates and coordinate systems, basic electromagnetic radiation.

UNIT-II	PHOTOGRAMMETRY AND REMOTE SENSING	Classes: 09

Definition and scope, history of photogrammetry and remote sensing, principle, remote sensing data acquisition, remote sensing data analysis methods, advantages and limitations, hardware and software required; Map vs mosaic, ground control points; Energy interactions with atmosphere and earth surface features.

UNIT-III	MAPPING AND CARTOGRAPHY	Classes: 09

What is map and its importance, map scale and types, elements of map and indexing, map coordinate systems, visual interpretation of satellite images, interpretation of terrain evaluation.

Introduction to digital data analysis, cartographic symbolization, classification of symbols, colours in cartography, scale and purpose of a map, cartographic design, thematic cartography, digital cartography.

UNIT-IV	GEOGRAPHIC INFORMATION SYSTEM	Classes: 09

Introduction to GIS, definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, a theoretical framework for GIS, GIS data structures, data collection and input overview, processing of spatial data, data input or output, vector data model, raster data model, geometric representation of spatial feature and data structure; Spatial data and modeling, tin, DTM, overlay, spatial measurement etc.

UNIT-V	GEOSPATIAL TECHNOLOGIES APPLICATIONS	Classes: 09

Visual image analysis for land use/land cover mapping, land use and land cover in water resources, surface water mapping and inventory, geological and soil mapping, agriculture applications for forestry applications, water resources applications, urban and regional planning, environmental assessment, principles of land form identification and evaluation: sedimentary, igneous and metamorphic rock terrain.

Text Books:

1. John D. Bossler, Taylor, Francis, "Manual of Geospatial Science and Technology", CRC Press, 2010.
2. M. Anji Reddy, "Textbook of Remote Sensing and Geographical Information Systems", BSPublication, 2001.

Reference Books:

1. C. P. Lo Albert, K.W. Yonng, "Concepts and Techniques of GIS", 2nd Edition, 2007.
2. Otto Huisman and Rolf A. de "Principles of GeograficInformation Systems", 4th Edition, 2009

Web References:

1. https://www.aaas.org/content/what-are-geospatial-technologies
2. http://www.istl.org/10-spring/internet2.htmls
3. https://geography.columbian.gwu.edu/applied-geospatial-techniques
4. http://kiran.nic.in/pdf/publications/Geospatial_Techniques.pdf

E-Text Books:

1. http://link.springer.com/book/10.1007%2F978-94-007-1858-6
2. http://www.springer.com/us/book/9789400718579
3. http://cbseacademic.in/web_material/doc/2014/7_Geospatial%20Technology%20Text%20Book%20(Class-XII).pdf
4. http://freegeographytools.com/2009/two-free-textbooks-on-geospatialgeostatistical-analysis.

Course Home Page:

OPERATING SYSTEMS

VI Semester: Common for all Braches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS007	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the functionalities of main components in operating systems.
II. Analyze the algorithms used in memory and process management.
III. Understand the clock synchronization protocols.
IV. Interpret the concepts of input and output storage for file management.

UNIT-I	INTRODUCTION	Classes: 10

Operating systems objectives and functions: Computer system architecture, operating systems structure, operating systems operations; Evolution of operating systems: Simple batch, multi programmed, time shared, personal computer, parallel distributed systems, real time systems, special purpose systems, operating system services, user operating systems interface; Systems calls: Types of systems calls, system programs, protection and security, operating system design and implementation, operating systems structure, virtual machines.

UNIT-II	PROCESS AND CPU SCHEDULING, PROCESS COORDINATION	Classes: 10

Process concepts: The process, process state, process control block, threads; process scheduling: Scheduling queues, schedulers, context switch, preemptive scheduling, dispatcher, scheduling criteria, scheduling algorithms, multiple processor scheduling; Real time scheduling; Thread scheduling; Case studies Linux windows; Process synchronization, the critical section problem; Peterson's solution, synchronization hardware, semaphores and classic problems of synchronization, monitors.

UNIT-III	MEMORY MANAGEMENT AND VIRTUAL MEMORY	Classes: 08

Logical and physical address space: Swapping, contiguous memory allocation, paging, structure of page table.

Segmentation: Segmentation with paging, virtual memory, demand paging; Performance of demand paging: Page replacement, page replacement algorithms, allocation of frames, thrashing.

UNIT-IV	FILE SYSTEM INTERFACE, MASS-STORAGE STRUCTURE	Classes: 09

The concept of a file, access methods, directory structure, file system mounting, file sharing, protection, file system structure, file system implementation, allocation methods, free space management, directory implementation, efficiency and performance; Overview of mass storage structure: Disk structure, disk attachment, disk scheduling, disk management, swap space management; Dynamic memory allocation**:** Basic concepts; Library functions.

UNIT-V	DEADLOCKS, PROTECTION	Classes: 08

System model: Deadlock characterization, methods of handling deadlocks, deadlock prevention, dead lock avoidance, dead lock detection and recovery form deadlock system protection, goals of protection, principles of protection, domain of protection, access matrix, implementation of access matrix, access control, revocation of access rights, capability based systems, language based protection.

Text Books:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, "Operating System Principles", Wiley Student Edition, 8th Edition, 2010.
2. William Stallings, "Operating System- Internals and Design Principles", Pearson Education, 6th Edition, 2002.

Reference Books:

1. Andrew S Tanenbaum, "Modern Operating Systems", PHI, 3rd Edition, 2007.
2. D. M. Dhamdhere, "Operating Systems a Concept based Approach", Tata Mc Graw Hill, 2nd Edition, 2006.

Web References:

1. https://www.smartzworld.com/notes/operatingsystems
2. https://www.scoopworld.in
3. https://www.sxecw.edu.in
4. https://www.technofest2u.blogspot.com

E-Text Books:

1. https://it325blog.files.wordpress.com/2012/09/operating-system-concepts-7-th-edition.pdf
2. http://mpathinveco.blog.com/2014/11/25/operating-systems-william-stalling-6th-edition/
3. http://www.e-booksdirectory.com/details.php?ebook=10050
4. http://www.e-booksdirectory.com/details.php?ebook=9907
5. http://www.e-booksdirectory.com/details.php?ebook=9460

Course Home Page:

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

VI Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS003	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand fundamentals of object-oriented terminology and programming concepts in java.
II. Acquire basics of how to translate solution problem into object oriented form..
III. Develop programs in java for solving simple applications.
IV. Design and implement simple program that use exceptions and multithreads.

UNIT-I	OOP CONCEPTS AND JAVA PROGRAMMING	Classes: 08

OOP concepts: Classes and objects, data abstraction, encapsulation, inheritance, benefits of inheritance, polymorphism, procedural and object oriented programming paradigm; Java programming: History of java, comments data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow statements, jump statements, simple java stand alone programs, arrays, console input and output, formatting output, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, exploring string class.

UNIT-II	INHERITANCE, INTERFACES AND PACKAGES	Classes: 10

Inheritance: Inheritance hierarchies, super and subclasses, member access rules, super keyword, preventing inheritance: final classes and methods, the object class and its methods; Polymorphism**:** Dynamic binding, method overriding, abstract classes and methods; Interface: Interfaces vs Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface; Packages: Defining, creating and accessing a package, understanding CLASSPATH, importing packages.

UNIT-III	EXCEPTION HANDLING AND MULTI THREADING	Classes: 08

Exception Handling: Benefits of exception handling, the classification of exceptions, exception hierarchy, checked and unchecked exceptions, usage of try, catch, throw, throws and finally, re-throwing exceptions, exception specification, built in exceptions, creating own exception sub classes.

Multithreading: Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, inter thread communication.

UNIT-IV	FILES, AND CONNECTING TO DATABASE	Classes: 10

Files: streams – byte streams, character stream, text input/output, binary input/output, random access file operations, file management using file class; Connecting to Database: Connecting to a database, querying a database and processing the results, updating data with JDBC.

UNIT-V	GUI PROGRAMMING AND APPLETS	Classes: 09

GUI Programming with Java: The AWT class hierarchy, introduction to swing, swing Vs AWT, hierarchy for swing components, containers- JFrame, JApplet, JDialog, JPanel; Overview of some swing components: JButton, JLabel, JTextField, JTextArea, simple applications; Layout management: Layout manager types: Border, grid and flow; Applets: Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet, passing parameters to applets.

Text Books:

1. Herbert Schildt, Dale Skrien, "Java Fundamentals – A Comprehensive Introduction", McGraw-Hill, 1st Edition, 2013.
2. Herbert Schildt, "Java the Complete Reference", McGraw Hill, Osborne, 8thEditon, 2011.
3. T. Budd, "Understanding Object-Oriented Programming with Java", Pearson Education, Updated Edition (New Java 2 Coverage), 1999.

Reference Books:

1. P. J. Deitel, H. M. Deitel, "Java: How to Program", Prentice Hall, 6th Edition, 2005.
2. P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, CRC Press, 2007.
3. Bruce Eckel, "Thinking in Java", Prentice Hall, 4th Edition, 2006.
4. Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 2nd Edition, 2014.

Web References:

1. http://www.javatpoint.com/java-tutorial
2. http://www.javatutorialpoint.com/introduction-to-java/

E-Text Books:

1.http://bookboon.com/en/java-programming-language-ebooks
2.https://en.wikibooks.org/wiki/Java_Programming

Course Home Page:

EMBEDDED SYSTEMS

VI Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEC016	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Imbibe knowledge about the basic functions, structure, concepts and applications of embedded Systems.
II. Understand real time operating system concepts.
III. Analyze different tools for development of embedded software.
IV. Be acquainted the architecture of advanced processors.

UNIT-I	EMBEDDED COMPUTING	Classes: 08

Definition of embedded system, embedded systems vs. general computing systems, history of embedded systems, complex systems and microprocessor, classification, major application areas, the embedded system design process, characteristics and quality attributes of embedded systems, formalisms for system design, design examples.

UNIT-II	INTRODUCTION TO EMBEDDED C AND APPLICATIONS	Classes: 09

C looping structures, register allocation, function calls, pointer aliasing, structure arrangement, bit fields, unaligned data and endianness, inline functions and inline assembly, portability issues; Embedded systems programming in C, binding and running embedded C program in Keil IDE, dissecting the program, building the hardware; Basic techniques for reading and writing from I/O port pins, switch bounce; Applications: Switch bounce, LED interfacing, interfacing with keyboards, displays, D/A and A/D conversions, multiple interrupts, serial data communication using embedded C interfacing.

UNIT-III	RTOS FUNDAMENTALS AND PROGRAMMING	Classes: 09

Operating system basics, types of operating systems, tasks and task states, process and threads, multiprocessing and multitasking, how to choose an RTOS ,task scheduling, semaphores and queues, hard real-time scheduling considerations, saving memory and power.

Task communication: Shared memory, message passing, remote procedure call and sockets; Task synchronization: Task communication synchronization issues, task synchronization techniques, device drivers.

UNIT-IV	EMBEDDED SOFTWARE DEVELOPMENT TOOLS	Classes: 09

Host and target machines, linker/locators for embedded software, getting embedded software into the target system; Debugging techniques: Testing on host machine, using laboratory tools, an example system.

UNIT-V	INTRODUCTION TO ADVANCED PROCESSORS	Classes: 10

Introduction to advanced architectures: ARM and SHARC, processor and memory organization and instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-En analyzed systems, design example: Elevator controller.

Text Books:

1. Shibu K.V, "Introduction to Embedded Systems", Tata McGraw Hill Education Private Limited, 2nd Edition, 2009.
2. Raj Kamal, "Embedded Systems: Architecture, Programming and Design", Tata McGraw-Hill Education, 2nd Edition, 2011.
3. Andrew Sloss, Dominic Symes,Wright, "ARM System Developer's Guide Designing and Optimizing System Software", Elsevier,1st Edition, 2004.

Reference Books:

1. Wayne Wolf, "Computers as Components, Principles of Embedded Computing Systems Design", Elsevier, 2nd Edition, 2009.
2. Dr. K. V. K. K. Prasad, "Embedded / Real-Time Systems: Concepts, Design & Programming", Dreamtech Publishers, 1st Edition, 2003.
3. Frank Vahid, Tony Givargis, "Embedded System Design", John Wiley & Sons, 3rd Edition, 2006.
4. Lyla B Das, "Embedded Systems" , Pearson Education, 1st Edition, 2012.
5. David E. Simon, "An Embedded Software Primer", Addison-Wesley, 1st Edition, 1999.
6. Michael J. Pont, "Embedded C", Pearson Education, 2nd Edition, 2008.

Web References:

1. https://www.smartzworld.com/notes/embedded-systems-es/
2. http://notes.specworld.in/embedded-systems-es/
3. http://education.uandistar.net/jntu-study-materials
4. http://www.nptelvideos.in/2012/11/embedded-systems.html

E-Text Books:

1. https://www.scribd.com/doc/233633895/Intro-to-Embedded-Systems-by-Shibu-Kv
2. http://www.ee.eng.cmu.ac.th/~demo/think/_DXJSq9r3TvL.pdf
3. https://www.scribd.com/doc/55232437/Embedded-Systems-Raj-Kamal
4. https://docs.google.com/file/d/0B6Cytl4eS_ahUS1LTkVXb1hxa00/edit
5. http://www.ecpe.nu.ac.th/ponpisut/22323006-Embedded-c-Tutorial-8051.pdf

Course Home Page:

SIGNAL ANALYSIS AND TRANSFORM TECHNIQUES

VI Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEC551	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Provide background and fundamentals vectors for the analysis and processing of signals.
II. Evaluate the Fourier series of periodic signals and its properties.
III. Determine the Fourier Transform of signals and its properties.
IV. Convert a continuous time signal to the discrete time domain and reconstruct using the sampling theorem.

UNIT-I	INTERPOLATION AND CURVE FITTING	Classes: 08

Interpolation: Introduction, errors in polynomial interpolation, finite differences, forward differences, backward differences, central differences, symbolic relations and separation of symbols, difference equations, differences of a polynomial, Newton's formulae for interpolation, central difference interpolation formulae, gauss central difference formulae, interpolation with unevenly spaced points, Lagrange's interpolation formula; Spline interpolation, cubic spline; Curve fitting: Fitting a straight line, second degree curve-exponential, curve-power curve by method of least squares.

UNIT-II	NUMERICAL TECHNIQUES	Classes: 10

Solution of algebraic and transcendental equations and linear system of equations: Introduction, graphical interpretation of solution of equations; bisection method, method of False Position, iteration method, Newton-Raphson method; solving system of non-homogeneous equations by L-U decomposition method (Crout's method)Jacobi's and Gauss Seidel iteration method numerical differentiation, integration, and numerical solutions of first order differential equations: Trapezoidal rule, Simpson's 1/3rd and 3/8 rule, generalized quadrature; numerical solution of ordinary differential equations: Solution by Taylor's series method, Picard's method of successive approximation, single step methods, Euler's method, Euler's modified method, Runge-Kutta methods, predictor, corrector methods(Milne's method and Adams-Bashforth methods only).

UNIT-III	FOURIER SERIES AND FOURIER TRANSFORMS	Classes: 08

Definition of periodic function, Fourier expansion of periodic functions in a given interval of length determination of Fourier coefficients, Fourier series of even and odd functions, fourier series in an arbitrary interval, even and odd periodic continuation, half-range Fourier sine and cosine expansions.

Fourier integral theorem: Fourier sine and cosine integrals; Fourier transforms: Fourier sine and cosine transforms, properties, inverse transforms, finite fourier transforms.

UNIT-IV	PARTIAL DIFFERENTIAL EQUATIONS	Classes: 10

Introduction and formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and non-linear equations (Charpit'smethod), Method of separation of variables for second order equations, applications of partial differential equations, two dimensional wave equation, heat equation.

UNIT-V	VECTOR CALCULUS	Classes: 09

Scalar point function and vector point function, gradient, divergence, curl and their related properties, laplacian operator, line integral work done, surface integrals, volume integral, green's theorem, Stoke's theorem and Gauss's Divergence Theorems (Statement & their Verification); Solenoidal and irrotational vectors, Finding Potential function.

Text Books:

1. Kreyszig, "Advanced Engineering Mathematics" John Wiley & Sons, 9th Edition, 2006.
2. Dr. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 43rd Edition, 2014.

Reference Books:

1. Dean G. Duffy, "Advanced Engineering Mathematics with MATLAB", CRC Press Taylor & Francis Group, 3rd Edition, 2013.
2. Alan Jeffrey, "Mathematics for Engineers and Scientists", Chapman & Hall/ CRC Press, 6th Edition, 2013.
3. Michael Greenberg, "Advanced Engineering Mathematics", Pearson Education, 2nd Edition, 2002.

Web References:

1. http://nptel.ac.in/courses/117102060/
2. http://nptel.ac.in/downloads/122101003/

E-Text Books:

1. http://nptel.ac.in/courses/115101005/downloads/lectures-doc/Lecture-3.pdf
2. http://nptel.ac.in/courses/115101005/downloads/lectures-doc/Lecture-1.pdf
3. http://www-elec.inaoep.mx/~jmram/Kreyzig-ECS-DIF1.pdf

Course Home Page:

INTRODUCTION TO AUTOMOBILE ENGINEERING

VI Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AME552	Elective	3	-	-	3	30	70	100
Contact Classes:45	Tutorial Classes: Nil	Practical Classes: Nil				`Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the function of various parts of automobile, features of fuel supply systems for S.I and C.I engines.
II. Distinguish the features of various types of cooling, ignition and electrical systems.
III. Identify the merits and demerits of the various transmission and suspension systems.
IV. Recognize the working of various braking and steering systems.
V. Summarize the ways and means of reducing the emissions from automobiles.

UNIT-I	INTRODUCTION	Classes: 09

Introduction to automobile engineering, chassis and automobile components, automobile engines, otto cycle, diesel cycle, dual cycle, engine lubrication, lubricating oil, lubrication oil filter, engine servicing; Fuel supply system; Fuel tank, strainer, feed pump, fuel filter, injection pump, injector, filters, electronic controlled fuel injection, common rail direct injection systems.

UNIT-II	COOLING SYSTEM	Classes: 09

Cooling requirements, air cooling, liquid cooling, water forced circulation system, radiators, cooling fan, water pump, thermostat, pressure sealed cooling, antifreeze solutions, intelligent cooling; Ignition system: Function of an ignition system, battery ignition system, storage battery, condenser and spark plug, magneto coil ignition system, electronic ignition system, electronic ignition, spark advance mechanisms; Electrical system: Charging circuit, generator, current-voltage regulator, starting system, bendix drive mechanism solenoid switch, lighting systems, automatic high beam control, horn, wiper, fuel gauge, oil pressure gauge, engine temperature indicator.

UNIT-III	TRANSMISSION AND SUSPENSIONS SYSTEMS	Classes: 09

Transmission system: Clutches, principle, types, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel.

Gear boxes, types, constant mesh, synchro mesh gear boxes, epicyclic gear box, auto transmission, continuous variable transmission, propeller shaft, Hotch-Kiss drive, Torque tube drive, universal joint, differential, rear axles types, wheels and tyres; Suspension system: Objects of suspension systems, rigid axle suspension system, torsion bar, shock absorber, independent suspension system.

UNIT-IV	BRAKING AND STEERING SYSTEMS	Classes: 09

Braking system: Mechanical brake system, Hydraulic brakes system, Master cylinder, wheel cylinder, Requirements of brake fluid, pneumatic and vacuum brake, ABS; Steering system: Steering geometry, camber, castor, king pin, rake, combined angle toe-in, toe-out, types of steering mechanism, Ackerman steering mechanism, Davis steering mechanism, steering gears types, steering linkages.

UNIT-V	EMISSIONS FROM AUTOMOBILES	Classes: 09

Emissions from automobiles, pollution standards national and international, pollution control techniques, petrol injection, common rail diesel injection, variable valve timing; Energy alternatives, solar, photo-voltaic, hydrogen, biomass, alcohols, LPG, CNG, liquid fuels and gaseous fuels, hydrogen as a fuel for internal combustion engines, their merits and demerits.

Text Books:

1. Willam H crouse, Donald L. Anglin, "Automobile Engineering", McGraw Hill, 10th Edition, 2006.
2. Manzoor, Nawazish Mehdi, Yosuf Ali, "A Text Book Automobile Engineering", Frontline Publications, 1st Edition, 2011.

Reference Books:

1. R. K. Rajput, "A Text Book of Automobile Engineering", Laxmi Publications, 1st Edition, 2015.
2. Joseph Heinter, "Automotive Mechanics", CBS, 2nd Edition, 2006.
3. K. Netwon, W. Steeds, T. K.Garrett, "Automotive Engineering", Butterworth-Heinamann, 13th Edition, 2016.
4. S. Srinivasan, "Automotive Engines", Tata McGraw-Hill, 2nd Edition, 2003.
5. Khalil. U. Siddiqui, "A Text Book of Automobile Engineering", New Age International, 1st Edition, 2012.

Web References:

1. http://www.nptel.kmeacollege.ac.in/syllabus/125106002/
2. http://www.nptel.ac.in/courses/125106002/

E-Text Books:

1. http:// www.engineeringstudymaterial.net/tag/automotive-engineering-books
2. https://www.studynama.com/.../299-Automobile-engineering-lecture-notes-ebook-pdf

Course Home Page:

INTRODUCTION TO ROBOTICS

VI Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AME553	Elective	3	-	-	3	30	70	100
Contact Classes:45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Familiarize with the automation and brief history of robot and applications.
II. Understand the kinematics of robots and knowledge about robot end effectors and their design.
III. Apply robot actuators and feedback components to automation.

UNIT-I	**INTRODUCTION TO ROBOTICS**	**Classes: 09**

Introduction: Automation and robotic, an over view of robotics, classification by coordinate system and control systems; Components of the industrial robotics: Degrees of freedom, end effectors: Mechanical gripper, magnetic, vacuum cup and other types of grippers, general consideration on gripper selection and design.

UNIT-II	**MOTION ANALYSIS AND KINEMATICS**	**Classes: 09**

Motion analysis: Basic rotation matrices, composite rotation matrices, Euler angles, equivalent angle and axis, homogeneous transformation, problems; Manipulator kinematics: D-H notations, joint coordinates and world coordinates, forward and inverse kinematics, problems.

UNIT-III	**KINEMATICS AND DYNAMICS**	**Classes: 09**

Differential kinematics: Differential kinematics of planar and spherical manipulators, Jacobians, problems.

Robot dynamics: Lagrange, Euler formulations, Newton-Euler formulations, problems on planar two link manipulators.

UNIT-IV	**TRAJECTORY PLANNING AND ACTUATORS**	**Classes: 09**

Trajectory planning: Joint space scheme, cubic polynomial fit, avoidance of obstacles, types of motion**:** Slew motion, joint interpolated motion, straight line motion, problems; Robot actuators and feedback components; Actuators: pneumatic and hydraulic actuators.

UNIT-V	**ELECTRIC ACTUATORS AND ROBOTIC APPLICATIONS**	**Classes: 09**

Electric actuators: DC servo motors, stepper motors, feedback components: position sensors, potentiometers, resolvers and encoders, velocity sensors, tactile sensors; Robot application in manufacturing: Material handling, assembly and inspection.

Text Books:

1. Groover M. P, "Industrial Robotics", Tata McGraw-Hill, 1st Edition, 2013.
2. J. J Craig," Introduction to Robotic Mechanics and Control", Pearson, 3rd Edition, 2013.

Reference Books:

1. Richard D. Klafter, "Robotic Engineering", Prentice Hall, 1st Edition, 2013.
2. Fu K S, "Robotics", McGraw-Hill, 1st Edition, 2013.

Web References:

1. https://www.doc.ic.ac.uk/~ajd/Robotics/RoboticsResources/lecture1.pdf
2. http://opencourses.emu.edu.tr/course/view.php?id=32
3. https://www.researchgate.net/publication/277712686_Introduction_to_Robotics_class_notes_UG_level

E-Text Books:

1. http://*www.robot.bmstu.ru/*
2. http://www.robotee.com/index.php/download-free-robotic-e-books/

Course Home Page:

AEROSPACE PROPULSION AND COMBUSTION

VI Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AAE551	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Demonstrate with an overview of various aerospace propulsion systems and a sound foundation in the fundamentals of thermodynamics.
II. Distinguish the elementary principles of thermodynamic cycles as applied to propulsion analysis.
III. Prioritize an introduction to combustion& gas kinetic theory.
IV. Discover a working knowledge of and the tools to measure various flight propulsion systems such as turbojets, turbofans, ramjets, rockets, air turbo-rockets and nuclear/electric propulsion systems.

UNIT-I	ELEMENTS OF AIRCRAFT PROPULSION	Classes: 10

Classification of power plants, methods of aircraft propulsion, propulsive efficiency, specific fuel consumption, thrust and power, factors affecting thrust and power, illustration of working of gas turbine engine, characteristics of turboprop, turbofan and turbojet, ram jet, scram jet, methods of thrust augmentation, atmospheric properties, turbojet, turbofan, turboprop, turbo-shaft engine construction and nomenclature, theory and performance, introduction to compressors, turbines, combustors and after burners for aircraft engines.

UNIT-II	PROPELLER THEORY	Classes: 08

Momentum theory, Blade element theory, combined blade element and momentum theory, propeller power losses, propeller performance parameters, prediction of static thrust and in flight, negative thrust, prop fans, ducted propellers, propeller noise, propeller selection, propeller charts.

UNIT-III	INLETS, NOZZLES AND COMBUSTION CHAMBERS	Classes: 10

Subsonic and supersonic inlets, relation between minimum area ratio and external deceleration ratio, starting problem in supersonic inlets, modes of inlet operation, jet nozzle, efficiencies, over expanded, under and optimum expansion in nozzles, thrust reversal.

Classification of combustion chambers, combustion chamber performance flame tube cooling, flame stabilization.

UNIT-IV	THERMODYNAMICS OF REACTING SYSTEMS	Classes: 09

Chemical kinetics: equilibrium, analysis of simple reactions, steady, state and partial equilibrium approximations, explosion theories; Transport phenomena: Molecular and convective transports; Conservation equations of multicomponent, reacting systems.

UNIT-V	PREMIXED FLAMES	Classes: 08

Rankine hugoniot relations, theories of laminar premixed flame propagation, quenching and flammability limits; Diffusion flames: Burke-Schumann theory, laminar jet diffusion flame, droplet combustion, turbulent combustion, closure problem, premixed and non-premixed turbulent combustion, introduction to DNS and LES.

Text Books:

1. Stephen R. Turns, "An Introduction to Combustion", McGraw-Hill, 3rd Edition, 2012.
2. Thomas A. Ward, "Aerospace Propulsion Systems", John Wiley and Sons, 1st Edition, 2010.

Reference Books:

1. M. H. Sadd, "Elasticity: Theory, Applications, and Numerics", Academic Press, 2nd Edition, 2009.
2. R. G. Budynas, "Advanced Strength and Applied Stress Analysis", McGraw-Hill, 2nd Edition, 1999.
3. A. P. Boresi, R.J. Schmidt, "Advanced Mechanics of Materials", John Willey & Sons, 5th Edition, 2003.

Web References:

1. https://www.nptel.ac.in/courses/101101002/
2. https://www.en.wikipedia.org/wiki/Airbreathing_jet_engine
3. https://www.en.wikipedia.org/wiki/Combustor
4. https://www.aero.iisc.ernet.in/page/propulsion

E-Text Books:

1. https://www.as.wiley.com/WileyCDA/WileyTitle/productCd-1118307984.html
2. https://www.sciencedirect.com/science/book/9781856179126
3. https://www.books.google.co.in/books?id=iUuPAQAAQBAJ&source=gbs_similarbooks

Course Home Page:

DIGITAL IMAGE PROCESSING

VII Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEC508	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the image fundamentals and mathematical transforms necessary for image processing.
II. Describe the image enhancement techniques.
III. Evaluate the image restoration procedures.
IV. Analyze the image compression procedures.
V. Design the image segmentation and representation techniques.

UNIT-I	**INTRODUCTION**	**Classes: 10**

Digital image fundamentals and image transforms digital image fundamentals, sampling and quantization, relationship between pixels; Image transforms: 2-D FFT, properties, Walsh transform, Hadamard transform, discrete cosine transform, Haar transform, Slant transform, hoteling transform.

UNIT-II	**IMAGE ENHANCEMENT**	**Classes: 09**

Introduction, image enhancement in spatial domain, enhancement through point processing, types of point processing, histogram manipulation, linear and non-linear gray level transformation, local or neighbourhood operation, median filter processing; Spatial domain high pass filtering, filtering in frequency domain, obtaining frequency domain filters from spatial filters, generating filters directly in the frequency domain, low pass (smoothing) and high pass (sharpening) filters in frequency domain.

UNIT-III	**IMAGE RESTORATION**	**Classes: 08**

Image restoration degradation model, algebraic approach to restoration, inverse filtering.

Least mean square filters, constrained least square restoration, interactive restoration.

UNIT-IV	**IMAGE SEGMENTATION**	**Classes: 08**

Image segmentation detection of discontinuities, edge linking and boundary detection, threshold, region oriented segmentation morphological image processing dilation and erosion, structuring element decomposition, the strel function, erosion; Combining dilation and erosion: Opening and closing the hit and miss transformation.

UNIT-V	**IMAGE COMPRESSION**	**Classes: 10**

Image compression: Redundancies and their removal methods, fidelity criteria, image compression models, source encoder and decoder, error free compression, lossy compression, JPEG 2000 standard.

Text Books:

1. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Pearson, 3rd Edition, 2008.
2. S. Jayaraman, S. Esakkirajan, T. Veerakumar, "Digital Image Processing", TMH, 3rd Edition, 2010.

Reference Books:

1. Rafael, C. Gonzalez, Richard E Woods, Stens L Eddings, "Digital Image Processing using MAT LAB", Tata McGraw-Hill, 2nd Edition, 2010.
2. A.K. Jain, "Fundamentals of Digital Image Processing", PHI, 1st Edition, 1989.
3. Somka, Hlavac, Boyle, "Digital Image Processing and Computer Vision", Cengage Learning, 1st Edition, 2008.
4. Adrain Low, "Introductory Computer vision Imaging Techniques and Solutions", Tata McGraw-Hill, 2nd Edition, 2008.
5. John C. Russ, J. Christian Russ, "Introduction to Image Processing & Analysis", CRC Press, 1st Edition, 2010.

Web References:

1. https://imagingbook.com/
2. https://en.wikipedia.org/wiki/Digital_image_processing
3. http://www.tutorialspoint.com/dip/
4. http://www.imageprocessingplace.com/
5. http://web.stanford.edu/class/ee368/
6. https://sisu.ut.ee/dev/imageprocessing/book/1
7. https://in.mathworks.com/discovery/digital-image-processing.html?requestedDomain=www.mathworks.com

E-Text Books:

1. http://www.sci.utah.edu/~gerig/CS6640-F2010/dip3e_chapter_02.pdf
2. http://www.faadooengineers.com/threads/350-Digital-Image-Processing
3. http://newwayofengineering.blogspot.in/2013/08/anil-k-jain-fundamentals-of-digital.html
4. http://bookboon.com/en/digital-image-processing-part-one-ebook

Course Home Page:

OPTIMIZATION TECHNIQUES

VII Semester: **Common for all Branches**

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS012	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Learn fundamentals of linear programming through optimization.
II. Understand and apply optimization techniques to industrial applications.
III. Apply the dynamic programming and quadratic approximation to electrical and electronic problems and applications.

UNIT-I	**LINEAR PROGRAMMING**	**Classes: 09**

Definition, characteristics and phases, types of models, operations research models, applications, linear programming problem formulation, graphical solution, simplex method; Artificial variables techniques: Two-phase method, Big-M method.

UNIT-II	**TRANSPORTATION AND ASSIGNMENT PROBLEMS**	**Classes: 09**

Transportation problem, formulation, optimal solution, unbalanced transportation problem, degeneracy, assignment problem, formulation, optimal solution, variants of assignment problem, traveling salesman problem.

UNIT-III	**SEQUENCING AND THEORY OF GAMES**	**Classes: 09**

Sequencing: Introduction, flow-shop sequencing, n jobs through two machines, n jobs through three machines, job shop sequencing, two jobs through m machines.

Theory of games: Introduction, terminology, solution of games with saddle points and without saddle points, 2 x 2 games, dominance principle, m x 2 and 2 x n games, graphical method.

UNIT-IV	**DYNAMIC PROGRAMMING**	**Classes: 09**

Introduction: Terminology, Bellman's principle of optimality, applications of dynamic programming shortest path problem, linear programming problem.

UNIT-V	**QUADRATIC APPROXIMATION**	**Classes: 09**

Quadratic approximation methods for constrained problems: Direct quadratic approximation, quadratic approximation of the legrangian function, variable metric methods for constrained optimization.

Text Books:

1. A Ravindran, "Engineering Optimization", John Wiley & Sons Publications, 4th Edition, 2009.
2. Hillier, Liberman, "Introduction to Operation Research", Tata McGraw Hill, 2nd Edition, 2000.

Reference Books:

1. Dr. J K Sharma, "Operation Research", Mac Milan Publications, 5th Edition, 2013.
2. Ronald L. Rardin, "Optimization in Operation Research", Pearson Education Pvt. Limited, 2005.
3. N V S Raju, "Operation Research", S M S Education, 3rd Revised Edition.

Web References:

1. http://www2.informs.org/Resources
2. http://www.mit.edu/~orc/
3. http://www.ieor.columbia.edu/
4. http://www.universalteacherpublications.com/univ/ebooks/or/Ch1/origin.htm
5. http://www.wolfram.com/solutions/OperationsResearch/

E-Text Books:

1. http://engineeringstudymaterial.net/ebook/new-optimization-techniques-in-engineering-godfrey/
2. http://www.freetechbooks.com/urban-operations-research-logistical-and-transportation-planning-methods-t486.html

Course Home Page:

DATABASE MANAGEMENT SYSTEMS

VII Semester: **Common for all Branches**

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS005	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES:

The course should enable the students to:

I. Understand the role of database management system in an organization and learn the database concepts.
II. Design databases using data modeling and data normalization techniques.
III. Construct database queries using relational algebra and calculus.
IV. Understand the concept of a database transaction and related database facilities.
V. Learn how to evaluate set of queries in query processing.

UNIT-I	CONCEPTUAL MODELING	Classes: 10

Introduction to file and database systems: Database system structure, data models, introduction to network and hierarchical models, ERmodel, relational model.

UNIT-II	RELATIONAL APPROACH	Classes: 08

Relational algebra and calculus: Relational algebra, selection and projection, set operations, renaming, joins, division, examples of algebra queries, relational calculus, tuple relational calculus, domain relational calculus, expressive power of algebra and calculus.

UNIT-III	BASIC SQL QUERY	Classes: 10

SQL data definition; Queries in SQL: updates, views, integrity and security, relational database design.

Functional dependencies and normalization for relational databases upto five normal forms.

UNIT-IV	TRANSACTION MANAGEMENT	Classes: 09

Transaction processing: Introduction, need for concurrency control, desirable properties of transaction, schedule and recoverability, serializability and schedules, concurrency control; Types of locks: Two phases locking, deadlock, timestamp based concurrency control, recovery techniques, concepts, immediate update, deferred update, shadow paging.

UNIT-V	DATA STORAGE AND QUERY PROCESSING	Classes: 08

Record storage and primary file organization, secondary storage devices, operations on files, heap File, sorted files, hashing techniques, and index structures forfiles; Different types of indexes, B tree, B+ tree, query processing.

Text Books:

Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw-Hill, 4th Edition, 2002.

Reference Books:

1. Ramez Elmasri, Shamkant B. Navathe, "Fundamental Database Systems", Pearson Education, 3rdEdition, 2003.
2. Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 3rd Edition, 2003.
3. Hector Garcia Molina, Jeffrey D. Ullman, Jennifer Widom, "Database System Implementation", Pearson Education, United States, 1st Edition, 2000.
4. Peter Rob, Corlos Coronel, "Database System, Design, Implementation and Management", Thompson Learning Course Technology, 5th Edition, 2003.

Web References:

1. https://www.youtube.com/results?search_query=DBMS+onluine+classes
2. http://www.w3schools.in/dbms/
3. http://beginnersbook.com/2015/04/dbms-tutorial/

E-Text Books:

1. http://www.e-booksdirectory.com/details.php?ebook=10166
2. http://www.e-booksdirectory.com/details.php?ebook=7400re

Course Home Page:

INFORMATION SECURITY

VII Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
ACS013	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Learn the basic categories of threats to computers and networks.
II. Understand various cryptographic algorithms and be familiar with public-key cryptography.
III. Apply authentication functions for providing effective security.
IV. Analyze the application protocols to provide web security.
V. Discuss the place of ethics in the Information Security Area.

UNIT-I	ATTACKS ON COMPUTERS AND COMPUTER SECURITY	Classes: 08

Attacks on computers and computer security: Introduction, the need for security, security approaches, principles of security, types of security attacks, security services, security mechanism, a model for network security; Cryptography concepts and techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT-II	SYMMETRIC KEY CIPHERS	Classes: 10

Symmetric key ciphers: Block cipher principles and algorithms (DES, AES, Blowfish), differential and linear cryptanalysis, block cipher modes of operation, stream ciphers, RC4 location, and placement of encryption function, key distribution; Asymmetric key ciphers: Principles of public key cryptosystems, algorithms (RSA Diffie - Helman, ECC) key distribution.

UNIT-III	MESSAGE AUTHENTICATION ALGORITHM AND HASH FUNCTIONS	Classes: 08

Message authentication algorithm and hash functions: Authentication requirements, functions, message, authentication codes, hash functions, secure hash algorithm, whirlpool, HMAC, CMAC, digital signatures, knapsack algorithm.

Authentication application: Kerberos, X.509 authentication service, public – key infrastructure, biometric authentication.

UNIT-IV	E-MAIL SECURITY	Classes: 10

E-mail security: Pretty good privacy; S/MIMI IP Security: IP security overview, IP security architecture, authentication header, encapsulating security payload, combining security associations, key management.

UNIT-V	WEB SECURITY	Classes: 09

Web security: Web security considerations, secure socket layer and transport layer security, secure electronic transaction intruders; Virus and firewalls: Intruders, intrusion detection password management, virus and related threats, countermeasures, firewall design principles; Types of firewalls case studies on cryptography and security: Secure inter-branch payment transactions, cross site scripting vulnerability, virtual electronics.

Text Books:

1. William Stallings, "Cryptography and Network Security", Pearson Education, 4th Edition, 2005.
2. AtulKahate, "Cryptography and Network Security", McGraw-Hill, 2nd Edition, 2009.

Reference Books:

1. C K Shymala, N Harini, Dr. T R Padmanabhan, "Cryptography and Network Security", Wiley India, 1st Edition, 2016.
2. Behrouz A. Forouzan, Debdeep Mukhopadhyay , "Cryptography and Network Security", McGraw-Hill, 2nd Edition, 2010.

Web References:

1. http://bookboon.com/en/search?q=INFORMATION+SECURITY
2. https://books.google.co.in/books/about/Cryptography_Network_Security_Sie_2E.html?id=Kokjwdf0E7QC
3. https://books.google.co.in/books/about/Information_Security.html?id=Bh45pU0_E_4C

E-Text Books:

1. https://books.google.co.in/books/about/Information_Security.html
2. http://www.amazon.in/Cryptography-Network-Security-Behrouz-Forouzan/dp/007070208X

Course Home Page:

MODELING AND SIMULATION

VII Semester: Common to All Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS551	Elective	3	-	-	3	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		

OBJECTIVES:

The course should enable the students to:

I. Understand the basic system concept and definitions of system.
II. Study the techniques to model and to simulate various systems.
III. Analyze a system and to make use of the information to improve the performance.

UNIT-I	**INTRODUCTION**	**Classes: 08**

When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of models; Discrete event system simulation; Steps in a simulation study; The basics of spreadsheet simulation; Simulation example: Simulation of queuing systems in a spreadsheet.

UNIT-II	**GENERAL PRINCIPLES SIMULATION SOFTWARE**	**Classes: 10**

Concepts in discrete-event simulation: The event-scheduling / time-advance algorithm, world views, manual simulation using event scheduling; List processing, simulation in java; Simulation in GPSS review of terminology and concepts; Useful statistical models; Discrete distributions; Continuous distributions; Poisson process; Empirical distributions.

UNIT-III	**QUEUING MODELS AND RANDOM NUMBERS**	**Classes: 08**

Characteristics of queuing systems; Queuing notation; Long-run measures of performance of queuing systems; Steady-state behavior of M/G/1 queue; Networks of queues; Rough-cut modeling: An illustration.

Properties of random numbers: Generation of pseudo random numbers; Techniques for generating random numbers; Tests for random numbers random-variate generation: Inverse transforms technique; Acceptance-rejection technique; Special properties.

UNIT-IV	**INPUT MODELING**	**Classes: 10**

Data collection; Identifying the distribution with data; Parameter estimation; Goodness of fit tests; Fitting a non-stationary poisson process; Selecting input models without data; Multivariate and time-series input models.

UNIT-V	**ESTIMATION OF ABSOLUTE PERFORMANCE**	**Classes: 09**

Types of simulations with respect to output analysis; Stochastic nature of output data; Absolute measures of performance and their estimation; Output analysis for terminating simulations; Output analysis for steady-state simulations; Model building, verification and validation; Verification of simulation models; Calibration and validation of models, optimization via simulation.

Text Books:

Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol, "Discrete-Event System Simulation", Pearson Education, 5th Edition, 2010.

Reference Books:

1. Lawrence M. Leemis, Stephen K. Park, "Discrete – Event Simulation: A First Course", Pearson Education, 1st Edition, 2006.
2. Averill M., "Law: Simulation Modeling and Analysis", Tata McGraw-Hill, 4th Edition, 2007.

Web References:

1. https://storage.googleapis.com/northwestern14-edu/Vtu-Notes-For-System-Modeling-And Simulation.pd.
2. http://www.slideshare.net/qwerty626/system-simulation-modeling-notessjbit.

E-Text Books:

1. http://www.e-booksdirectory.com/listing.php?category=100
2. https://www.google.co.in/?gfe_rd=cr&ei=YGRCWOWMKuPx8AfQqaaoCg#q=simulation+and+modeling+e+books&start=30

Course Home Page:

ENERGY FROM WASTE

VII Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEE551	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			

OBJECTIVES:

The course should enable the students to:

I. Understand the principles associated with effective energy management and to apply these principles in the day to day life.
II. Develop insight into the collection, transfer and transport of municipal solid waste.
III. Explain the design and operation of a municipal solid waste landfill.
IV. Device key processes involved in recovering energy from wastes, systematically evaluate the main operational challenges in operating thermal and biochemical energy from waste facilities.

UNIT - I	INTRODUCTION TO WASTE AND WASTE PROCESSING	Classes: 08

Solid waste sources solid waste sources, types, composition, properties, global warming; Municipal solid waste: Physical, chemical and biological properties, waste collection and, transfer stations, waste minimization and recycling of municipal waste, segregation of waste, size reduction, managing waste, status of technologies for generation of energy from waste treatment and disposal aerobic composting, incineration, furnace type and design, medical waste / pharmaceutical waste treatment technologies, incineration, environmental impacts, measures to mitigate environmental effects due to incineration .

UNIT - II	WASTE TREATMENT AND DISPOSAL	Classes: 10

Land fill method of solid waste disposal land fill classification, types, methods and sitting consideration; Layout and preliminary design of landfills: Composition, characteristics, generation, movement and control of landfill leach ate and gases, environmental monitoring system for land fill gases.

UNIT - III	BIO-CHEMICAL CONVERSION	Classes: 09

Energy generation from waste bio-chemical conversion: Sources of energy generation, anaerobic digestion of sewage and municipal waste, direct combustion of MSW-refuse derived solid fuel.

Industrial waste, agro residues and anaerobic digestion.

UNIT - IV	THERMO-CHEMICAL CONVERSION	Classes: 10

Biogas production, land fill gas generation and utilization, thermo-chemical conversion: Sources of energy generation, gasification of waste using gasifies briquetting, utilization and advantages of briquetting, environmental benefits of bio-chemical and thermo- chemical conversion.

UNIT - V	E-WASTE MANAGEMENT	Classes: 08

E-waste: E-waste in the global context: Growth of electrical and electronics industry in India, environmental concerns and health hazards; Recycling e-waste: A thriving economy of the unorganized sector, global trade in hazardous waste, impact of hazardous e-waste in India; Management of e-waste: E-waste legislation, government regulations on e-waste management, international experience, need for stringent health safeguards and environmental protection laws of India.

Text Books:

1. Nicholas P Cheremisinoff, "Handbook of Solid Waste Management and Waste Minimization Technologies", An Imprint of Elsevier, New Delhi, 2003.
2. P Aarne Vesilind, William A Worrell and Debra R Reinhart, "Solid Waste Engineering", 2nd edition 2002.
3. M Dutta , B P Parida, B K Guha and T R Surkrishnan, "Industrial Solid Waste Management and Landfilling practice", Reprint Edition New Delhi, 1999.
4. Rajya Sabha Secretariat, "E-waste in India: Research unit", Reprint Edition, June, 2011.
5. Amalendu Bagchi Design, "Construction and Monitoring of Landfills", John Wiley and Sons, New York, 1994.
6. M. L. Davis and D. A. Cornwell, "Introduction to environmental engineering", International Edition, 2008.
7. C. S. Rao, "Environmental Pollution Control Engineering", Wiley Eastern Ltd. New Delhi, 1995.
8. S. K. Agarwal, "Industrial Environment Assessment and Strategy", APH Publishing Corporation, New Delhi, 1996.
9. Sofer, Samir S. (ed.), Zaborsky, R. (ed.), "Biomass Conversion Processes for Energy and Fuels", New York, Plenum Press, 1981.
10. Hagerty, D.Joseph; Pavoni, Joseph L; Heer, John E., "Solid Waste Management", New York, Van Nostrand, 1973.
11. George Tchobanoglous, Hilary Theisen and Samuel Vigil Prsl: Tchobanoglous, George Theisen, Hillary Vigil, Samuel, "Integrated Solid Waste management: Engineering Principles and Management issues", New York, McGraw Hill, 1993.

Reference Books:

1. C Parker and T Roberts (Ed), "Energy from Waste", An Evaluation of Conversion Technologies, Elsevier Applied Science, London, 1985.
2. KL Shah, "Basics of Solid and Hazardous Waste Management Technology", Prentice Hall, Reprint Edition, 2000.
3. M Datta, "Waste Disposal in Engineered Landfills", Narosa Publishing House, 1997.
4. G Rich et.al, Hazardous, "Waste Management Technology", Podvan Publishers, 1987.
5. AD Bhide, BB Sundaresan, "Solid Waste Management in Developing Countries", INSDOC, New Delhi, 1983.

Web References:

1. https://www.e-waste Management: From waste to Resource Klaus Hieronymi, Ramzy Kahnat, Eric williams Tech. & Engg.-2013 (Publisher: Earthscan 2013
2. https://www.What is the impact of E-waste: Tamara Thompson
3. https://www. E-waste poses a Health Hazard: Sairudeen Pattazhy

E-Text Books:

1. https://www.unep.org
2. https://www.outledge.com
3. https://www.bookdepository.com
4. https://www.ecoactiv.com

Course Home Page:

FINITE ELEMENT ANALYSIS

VII Semester: Common for all branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AAE552	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Possess a good understanding of the theoretical basis of the weighted residual finite element method.
II. Use the commercial finite element package ANSYS to build finite element models and solve a selected range of engineering problems.
III. Communicate effectively in writing to report (both textually and graphically) the method used, the implementation and the numerical results obtained.

UNIT-I	INTRODUCTION	Classes: 10

Review of various approximate method, variational approach and weighted residual approach application to structural mechanics problems; Finite difference methods- governing equation and convergence criteria of finite element method.

UNIT-II	DISCRETE ELEMENTS	Classes: 10

Bar elements, uniform section, mechanical and thermal loading, varying section, 2D and 3D truss element. Beam element, problems for various loadings and boundary conditions 2D and 3D Frame elements, longitudinal and lateral vibration; Use of local and natural coordinates.

UNIT-III	CONTINUUM ELEMENTS	Classes: 09

Plane stress, plane strain and axi-symmetric problem; Derivation of element matrices for constant.

Linear strain triangular elements and axi-symmetric element.

UNIT-IV	ISOPARAMETRIC ELEMENTS	Classes: 08

Definitions, Shape function for 4, 8 and 9 nodal quadrilateral elements, stiffness matrix and consistent load vector, evaluation of element matrices using numerical integration.

UNIT-V	FIELD PROBLEM AND METHODS OF SOLUTIONS	Classes: 08

Heat transfer problems, steady state fin problems, derivation of element matrices for two dimensional problems, torsion problems. Bandwidth, elimination method and method of factorization for solving simultaneous algebraic equations, features of software packages, sources of error.

Text Books:

1. Tirupathi. R. Chandrapatha, Ashok D. Belegundu, "Introduction to Finite Elements in Engineering", Printice Hall India, 3rd Edition, 2003.
2. Rao. S.S., "Finite Element Methods in Engineering", Butterworth and Heinemann, 5th Edition 2010.
3. Reddy J.N., "An Introduction to Finite Element Method", McGraw-Hill, 3rd Edition, 2005.

Reference Books:

1. Krishnamoorthy C.S, "Finite Element Analysis", Tata McGraw-Hill, 2nd Edition 2001.
2. K. J. Bathe, E. L. Wilson, "Numerical Methods in Finite Elements Analysis", Prentice Hall of India, 1985.
3. Robert D Cook, David S Malkus, Michael E Plesha, "Concepts and Applications of Finite Element Analysis", John Wiley and Sons, Inc., 4th Edition, 2003.
4. Larry J Segerlind, "Applied Finite Element Analysis", John Wiley and Sons, Inc, 2nd Edition, 1984.

Web References:

1. http://home.iitk.ac.in/~sbasu/me623_2006/fem_notes_me623.pdf
2. http://nptel.ac.in/courses/112104116/
3. http://www.me.berkeley.edu/~lwlin/me128/FEMNotes.pdf

E-Text Books:

1. http://www.civilenggforall.com/2015/09/finite-element-analysis-by-ss-bhavikatti-free-download-pdf-civilenggforall.com.html
2. https://books.google.co.in/books/about/Finite_Element_Analysis_For_Engineering.html?id=3XJoK4x5fZwC

Course Home Page:

RESEARCH METHODOLOGIES

VII Semester: Common for All Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS552	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Orient the student to make an informed choice from the large number of alternative methods and experimental designs available.
II. Empower the student with the knowledge and skills they need to undertake a research project, to present a conference paper and to write a scientific article.
III. Develop a thorough understanding of the fundamental theoretical ideas and logic of research.
IV. Identify various sources of information for literature review and data collection.

UNIT-I	**INTRODUCION TO RESEARCH AND PHILOSOPHIES**	**Classes: 07**

Introduction to research: The role of research, research process overview; Philosophies and the language of research theory building: Science and its functions, what is theory, the meaning of methodology.

UNIT-II	**A RESEARCHER PROBLEMS AND HYPOTHESES**	**Classes: 10**

Thinking like a researcher: Understanding concepts, constructs, variables, and definitions; Problems and hypotheses: Defining the research problem, formulation of the research hypotheses, the importance of problems and hypotheses.

UNIT-III	**RESEARCH DESIGN AND DATA COLLECTION**	**Classes: 09**

Research design: Experimental and no experimental research design, field research, and survey research.

Methods of data collection: Secondary data collection methods, qualitative methods of data collection, and survey methods of data collection.

UNIT-IV	**ATTITUDE MEASUREMENT , SCALING AND SAMPLING TECHNIQUES**	**Classes: 09**

Attitude measurement and scaling: Types of measurement scales; Questionnaire designing, reliability and validity; Sampling techniques: The nature of sampling, probability sampling design, non probability sampling design, and determination of sample size.

UNIT-V	**PROCESSING AND ANALYSIS OF DATA,ETHICAL ISSUES**	**Classes: 10**

Processing and analysis of data ; Ethical issues in conducting research; Report generation, report writing, and APA format; Title page, abstract, introduction, methodology, results, discussion, references, and appendices.

Text Books:

1. Bryman, Alan, Bell, Emma, "Business Research Methods", Oxford University Press, 3rd Edition, 2011.
2. Kerlinger, F.N., Lee, H.B.,"Foundations of Behavioral Research", Harcourt Inc., 4th Edition, 2000.
3. Rubin, Allen, Babbie, Earl, "Essential Research Methods for Social Work", Cengage Learning Inc., USA, 2009.

Reference Books:

1. Anantasi A., Urbina S., "Psychological Testing", Pearson Education, 2004.
2. Chawla, Deepak, Sondhi, Neena, "Research Methodology: Concepts and Cases", Vikas Publishing House Pvt. Ltd. Delhi, 2011.
3. Pawar B. S., "Theory Building For Hypothesis Specification In Organizational Studies", Response Books, New Delhi, 2009.
4. NeumanW.L., "Social Research Methods: Qualitative and Quantitative Approaches", Pearson Education, 2008.

Web References:

1. https://en.wikipedia.org/wiki/Online_research_methods
2. https://www.prescott.edu/library/resources/research-bibliography.php

E-Text Books:

1. https://www.hcmuaf.edu.vn/.../Research%20Methodology%20-%20Methods%20and%20T...
2. https://www.federaljack.com/ebooks/My%20collection%20of%20medical%20books,%2020...

Course Home Page:

BASIC REFRIGERATION AND AIR-CONDITIONING

VI Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AME554	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Analyze and understand various concepts and laws of thermodynamics.
II. Understand the concepts of refrigeration and air refrigeration.
III. Understand vapour compression refrigeration system and also vapour absorption refrigeration system.
IV. Identify various psychometric properties and processes.

UNIT-I	RECAPITULATION OF THERMODYNAMICS	Classes : 09

Recapitulation of thermodynamics: Thermodynamic systems, laws of thermodynamics, phase, state, process, cycle, concepts of enthalpy, entropy, specific heat, sensible heat, latent heat, dryness fraction, correlations involving enthalpy, entropy and dryness fraction, types of various processes and their representation on T-s, P-V and P-h diagrams, carnot cycle, reversed carnot cycle.

UNIT-II	INTRODUCTION AND AIR REFRIGERATION	Classes : 09

Introduction to Refrigeration: Basic concepts, unit of refrigeration; C.O.P: Refrigerators, heat pump, Carnot refrigerators and applications of refrigerator; Air refrigeration cycle: Bell Coleman cycle, open and dense air system – ideal and actual refrigeration, applications, aircraft refrigeration cycles; Refrigerants: Desirable properties, nomenclature and selection of refrigerants, effects of refrigerants on ozone depletion and global warming, alternate refrigerants.

UNIT-III	VAPOUR COMPRESSION REFRIGERATION	Classes: 09

Vapor compression refrigeration, ideal cycle, effect of variation in evaporator pressure, condenser pressure, super heating of vapor, sub cooling of liquid.

Evaporator and condenser temperatures, deviations of practical (actual cycle) from ideal cycle, construction and use of p-h chart problems.

UNIT-IV	VAPOUR ABSORPTION REFRIGERATION	Classes: 09

Vapor absorption refrigeration: description, working of NH3-Water, Li Br–water system, calculation of HCOP, principle and operation of three fluid vapor absorption refrigeration systems, steam jet refrigeration system, working principle, basic operation, principle and operation of thermo electric and vortex tube or hilsch tube refrigeration systems.

UNIT-V	INTRODUCTION TO AIR CONDITIONING	Classes : 09

Psychometric properties and processes, sensible and latent heat loads, characterization, need for ventilation, consideration of infiltration, load concepts of RSHF, ASHF, ESHF and ADP; Concept of human comfort and effective temperature, comfort air conditioning, industrial air conditioning and requirements, air conditioning load calculations.

Text Books:

1. S. C. Arora, Domkundwar, "A Course in Refrigeration and Air-conditioning", Dhanpatrai Publications, 2nd Edition, 2014.
2. C. P. Arora, "Refrigeration and Air Conditioning", Tata McGraw-Hill, 17th Edition, 2006.

Reference Books:

1. Manohar Prasad, "Refrigeration and Air Conditioning", New Age International, 3rd Edition, 2015.
2. P. N Ananthanarayanan, "Basic Refrigeration and Air Conditioning", Tata McGraw-Hill, 2015.

Web References:

1. http://www.engineeringstudymaterial.net/tag/air-conditioning-and-refrigeration-books/
2. https://www.en.wikipedia.org/wiki/Air_conditioning

E-Text Book:

1. http://www.mechanicalgeek.com/refrigeration-and-air-conditioning-by-rs-khurmi-pdf/
2. http://www.engineeringstudymaterial.net/tag/air-conditioning-and-refrigeration-books/

Course Home Page:

LAUNCH VEHICLES AND CONTROLS

VII Semester: **Common to all branches**

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AAE553	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The course should enable the students to:

I. Understand the various configurations of launch vehicles and application of controls.
II. Identify different tracking systems for launch vehicles.
III. Distinguish between different errors associated with navigation system and compensation errors.
IV. Compare the guidance systems for short medium and long range missile.

UNIT-I	INTRODUCTION	Classes: 10

Types of rockets and missiles, various configurations, components forces on the vehicle during atmospheric flight, nose cone design and drag estimation; Concepts of navigation ADF, VOR/DME, Doppler, LORAN and OMEGA, guidance and control; Introduction to basic principles; Air data information; Guidance trajectories; Radar systems; Principle of working of radar; Radar equations and applications; MTI and pulse Doppler radar; moving target detector; limitation of MTI performance.

UNIT-II	TRACKING WITH RADAR	Classes: 10

Mono pulse tracking: Conical scan and sequential lobbing; Automatic tracking with surveillance radar (ADT); CW radar; Applications; Other guidance systems; Gyros and stabilized platforms; Inertial guidance and laser based guidance; Components of inertial navigation system; imaging infrared guidance; Satellite navigation; GPS; Accelerometers.

UNIT-III	INERTIAL NAVIGATION SYSTEM	Classes: 09

INS transfer function and errors; Different coordinate system, compensation errors, schuler loops; Cross coupling; Missile control system; Guided missile concept; Augmented systems.

Control of aerodynamic missile; Missile parameters for dynamic analysis; Missile autopilot schematics; Longitudinal and Lateral autopilots.

UNIT-IV	MISSILE GUIDANCE	Classes: 08

Missile guidance laws, short and medium range missiles; Proportional navigation guidance; Command guidance; Comparison of guidance system performance; Bank to turn missile guidance; Terminal guidance; Weapon control missile guidance.

UNIT-V	INTEGRATED FLIGHT/FIRE CONTROL SYSTEM	Classes: 08

Director fire control system; Fire control modes; Tracking control laws; Longitudinal flight control system; Lateral flight control system; Rate of change of Euler angle, auto pilot; Integrated flight and fire control (IFFC) flight testing.

Text Books:

1. Merrilh I. Skolnik, " Introduction to Radar Systems", Tata McGraw-Hill, 3rd Edition, 2001.
2. John H Blakelock, "Automatic control of Aircraft and Missiles", Wile–Inter Science Publication, 2nd Edition, May 1990.

Reference Books:

1. R.B. Underdown, Tony Palmer, "Navigation", Black Well Publishing, 6th Edition, 2001.
2. R P G Collinson, "Introduction to Avionics Systems", Kulwar Academic Publishers, 3rd Edition, 2003.

Web References:

1. http://home.iitk.ac.in/~sbasu/me623_2006/fem_notes_me623.pdf
2. http://nptel.ac.in/courses/112104116/
3. http://www.me.berkeley.edu/~lwlin/me128/FEMNotes.pdf

E-Text Books:

1. http://www.civilenggforall.com/2015/09/finite-element-analysis-by-ss-bhavikatti-free-download-pdf-civilenggforall.com.html
2. https://books.google.co.in/books/about/Finite_Element_Analysis_For_Engineering.html?id=3XJoK4x5fZwC

Course Home Page:

INTELLECTUAL PROPERTY RIGHTS

IV Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS601	Perspective	-	-	-	-	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: Nil		

OBJECTIVES:

The course should enable the students to:

I. Explore the knowledge in determination of trade secrets status.
II. Adequate knowledge in New Developments in trade law.
III. Understand the complexities involved in the process of attributing intellectual property rights to people.
IV. Learn the legalities of intellectual property to avoid plagiarism and other IPR relates crimes like copyright, infringements, etc.
V. Learn the fundamental principles and the application of those principles to factual, real-world disputes.

UNIT-I **INTRODUCTION TO INTELLECTUAL PROPERTY**

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II **TRADE MARKS**

Purpose and function of trademarks, acquisition of trademarks rights, protectable matter, selecting and evaluating trademark, trademark registration processes.

UNIT-III **LAW OF COPYRIGHTS AND LAW OF PATENTS**

Fundamentals of copyrights law, originality of material, rights to reproduction, rights to perform the work publicly, copyright ownership issues.

Copyright registration, notice of copyright, international copyright law, foundation of patent law, patent searching process, ownership rights and transfer.

UNIT-IV **TRADE SECRETS AND UNFAIR COMPETITION:**

Trade secrets law, determination of trade secrets status, liability for misappropriations of trade secrets, protection for submission, trade secrets litigation, misappropriation of right of publicity and false advertising.

UNIT-V **NEW DEVELOPMENTS OF INTELLECTUAL PROPERTY**

New developments in trade law, copyright law, patent law, intellectual property audits international overview of intellectual property, international-trademark law, copyright law, international patent law, international development in trade secrets law.

Text Books:

1. Deborah. E. Bouchoux, "Intellectual Property Right", Cengage Learning, 4th Edition, 2013.
2. Prabuddha Ganguli, "Intellectual Property Right: Unleashing the Knowledge Economy", Tata McGraw Hill Publishing Company Ltd., 3rd Edition, 2005.

Reference Books:
1. Catherine J. Holland, "Intellectual Property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press, CDR Edition, 2007. 2. Stephen Elias, "Patent, Copyright & Trademark: A Desk Reference to Intellectual Property Law", Lisa Goldoftas Publishers, Nolo Press, 1996.
Web References:
1. https://en.wikipedia.org/wiki/Intellectual_property 2. http://sokogskriv.no/en/sources-and-references/why-cite-sources/intellectual-property-rights/
E-Text Books:
1. http://www.e-booksdirectory.com/listing.php?category=269 2. http://www.lexisnexis.com/store/catalog/catalog.jsp?id=80
Course Home Page:

TOTAL QUALITY MANAGEMENT

IV Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS602	Perspective	-	-	-	-	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: Nil		

OBJECTIVES:

The course should enable the students to:

I. Understand the philosophy and core values of Total Quality Management (TQM).
II. Determine the voice of the customer and the impact of quality on economic performance and long-term business success of an organization.
III. Apply and evaluate best practices for the attainment of total quality.
IV. Utilize Statistical Process Control (SPC) techniques as a means to diagnose, reduce and eliminate causes of variation.
V. Describe and apply the development and nature of quality control charts.

UNIT-I **PRINCIPLES AND PRACTICES-1**

Introduction, gurus of TQM, historic review, benefits of TQM leadership, characteristics of quality leaders, the deming philosophy, quality councils, strategic planning, customer satisfaction, customer perception of quality service quality, customer retention, employee involvement, employee survey-empowerment, gain sharing, performance appraisal.

UNIT-II **PRINCIPLES AND PRACTICES-2**

Continuous process improvement, the jurantrilogy, the PDCA cycle-kaizen, reengineering; Supplier partnership, partnering, sourcing, supplier selection, supplier rating, performance measures, basic concept, strategy quality cost bench marking, reasons for bench marking, process understanding current performance, pitfalls and criticism of benchmarking.

UNIT-III **TOOLS AND TECHNIQUES-1**

Information technology, computers and the quality functions, information quality issues, quality management system, benefits of ISO registration, ISO 9000 series standards, internal audits.

Environmental management system, ISO 14000series, benefits of EMS, relation to healthy and safety quality function deployment, the voice of the customer, building a house of quality, QFD process.

UNIT-IV **TOOLS AND TECHNIQUES-2**

Quality by design benefits, communication model, failure mode and effective analysis, failure rate, FMEA documentation, the process of FMEA documentation, product liability, proof and expert witness; Total productive maintenance, promoting the philosophy and training-improvements and needs, autonomous work groups.

UNIT-V **MANAGEMENT TOOLS**

Management tools introduction-forced field analysis, tree diagram, process decision program chart statistical process control, cause and effect diagram-histogram, state of control, process capability, experimental design, hypothesis, orthogonal design two factors and full factors-quality strategy for Indian industries, quality management in India.

Text Books:

Joel E Ross, "Total Quality Management", CRC Press, 3rd Edition, 2015.

Reference Books:

1. Dale H.Besterfeild, CarlonBesterfeild, "Total Quality Management", Pearson Education, 1st Edition, 2015.
2. Sridhara Bhat, "Total Quality Management Texts and Cases", Himalaya, 1st Edition, 2015.
3. Poornima M Charantimath,"Total Quality Management", Pearson Education, 1stEdition, 2015.

Web References;

1. http://managementhelp.org/quality/total-quality-management.htm
2. http://www.tandfonline.com/toc/ctqm20/current

E-Text Books:

1. https://www.scribd.com/doc/19378602/Quality-Management-eBook
2. http://bookboon.com/en/quality-management-ebook

Course Home Page:

PROFESSIONAL ETHICS AND HUMAN VALUES

IV Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS603	Perspective	-	-	-	-	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: Nil		

OBJECTIVES:

The course should enable the students to:

I. Understand the fundamental theoretical and historic graphical topics of professional ethics and human values.
II. Study independence and self-evaluation professional ethics and human values, so that they can grasp the core values as independent thinkers.
III. Develop their analytical and pragmatic abilities & situational reasoning aligned towards right and wrong.

UNIT-I INTRODUCTION TO PROFESSIONAL ETHICS

Basics of profession: Engineering and professionalism, two models of professionalism, three types of ethics or morality, the negative face of engineering ethics, the positive face of engineering ethics, responsibility in engineering, engineering standards, the standard care,blame responsibility and causation.

UNIT-II PROFESSIONAL ETHICS IN ENGINEERING

Engineering ethics , variety of moral issues, types of inquiry moral dilemmas, moral autonomy, the problems of many hands, Kohlburg's theory, Gilligan's theory impediments to responsible action, engineering as social experimentation, framing the problem, determining the facts, codes of ethics, clarifying concepts application issues, common ground, general principles, utilitarian thinking respect for persons.

UNIT-III ETHICS AND HUMAN VALUES

Human values, morals, values, and ethics, integrity, work ethic, service learning, civic virtue, respect for others, living peacefully.

Caring, sharing, honesty, courage, valuing time, co-operation, commitment, empathy, self-confidence, spirituality, character.

UNIT-IV MORAL RESPONSIBILITIES & RIGHTS

Ethics consensus, controversy, models of professional roles, theories about right action, self, interest, customs and religion, uses of ethical theories, responsibility for rights, respect for authority, conflicts of interest, occupational crime, professional rights and employee rights, communicating risk and public policy, collective bargaining.

UNIT-V GLOBAL ETHICS & VALUES

Global issues, multinational corporations, environmental ethics, engineers as managers, advisors, and experts witnesses, moral leadership sample codes of ethics problem of bribery, extortion and grease payments, problem of nepotism, excessive gifts, paternalism, different business practices, negotiating tax, global trends.

Text Books:

1. PSR Murthy, "Indian Culture Values and Professional Ethics", BS Publications, 1st Edition, 2013.
2. Mike Martin, Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, 3rd Edition, 2003.
3. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, 4th Edition, 2012.
4. George Reynolds, "Ethics in Information Technology", Cengage Learning, 5th Edition, 2012.

Reference Books:

1. Mike Martin, Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, 4th Edition, 2004.
2. Charles E Harris, Micheal J Rabins, "Engineering Ethics", Cengage Learning, 5th Edition, 2014.
3. Edmund G Seebauer, Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 1st Edition, 2000.

Web References:

1. http://www.imd.inder.cu/adjuntos/article/524/Professional%20Ethics%20and%20Human%20Values.pdfhttp://bit.ly/29SyL7i
2. https://books.google.com/books/about/Textbook_on_Professional_Ethics_and_Huma.html?id=-dPiHmlV_

E-Text Books:

1. https://www.amazon.com/Professional-Ethics-Human-Values-Govindarajan-ebook/dp/B00K6GSSUW
2. http://bookboon.com/en/business-ethics-ebook

Course Home Page:

LEGAL SCIENCES

IV Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS604	Perspective	-	-	-	-	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: Nil		

OBJECTIVES:

The course should enable the students to:

I. Acquaint the student with the scientific method of social science research.
II. Provide the knowledge of the technique of selection, collection and interpretation of primary and secondary data in socio legal research.
III. Emphasis would be laid on practical training in conducting research.

UNIT-I **CONCEPT OF LEGAL SCIENCE**

Fundamentals of legal science, law systems in India, comparative public law, law and justice in a globalizing world. Impact of the human rights instruments on domestic law.

UNIT-II **TECHNOLOGY & LEGAL SYSTEMS**

Principles of corporate law conjunction, temporal, subordinate clauses complex sentences, intellectual property rights, contract law, cyber law.

UNIT-III **CONSTITUTION AND ADMINISTRATIVE LAW**

Minorities law, human rights, international and national sphere, media law.

Health law, globalization vis-à-vis human rights, significance of human rights.

UNIT-IV **HUMAN RIGHTS INTERNATIONAL AND NATIONAL SPHERE**

Human rights with special reference to right to development, rights of disadvantaged and vulnerable groups, critical analysis, cultural relativism and human rights, human rights in the Indian sphere, an over view, constitution and the analysis of preamble, social action litigation and the role of Indian judiciary, critical examination of the human rights council and human rights commission, treaty mechanism with respect to covenants ICESCR and ICCPR, convention on the elimination of discrimination against women and child rights convention.

UNIT-V **SCIENTIFIC METHODOLOGY IN LEGAL SYSTEMS**

The science of research and scientific methodology ,analysis of law with scientific methods, scientific approach to socio legal problems, interrelation between speculation, fact and theory building fallacies of scientific methodology with reference to socio legal research ,inter-disciplinary research and legal research models, arm chair research vis-a-vis empirical research, legal research-common law and civil law legal systems.

Text Books:

1. Robert Watt, "Concise book on Legal Research", Abe Books Publishers, 1st Edition, 2015.
2. Ram Ahuja, "Research Method", News Way Publishers, 1st Edition, 2012.
3. Goode, Hatt, "Research Methodology", Eastern Limited Publication, 1st Edition reprinted, 2006.

Reference Books:

1. Somekh, C. Lewin, "Research Methods", Vistaar Publications, 1st Edition, 2005.
2. Bhandarkar, "Research Methods, Research Styles and Research Strategies", Wilkinson Publishers, 1st Edition, 2009.

Web References:

1. http://humansecurityconf.polsci.chula.ac.th/Documents/Presentations/Shanawez.pdf
2. http://www.lexisnexis.com/documents/pdf/20080806034945_large.pdf
3. http://www.theglobaljusticenetwork.org/journal
4. http://humansecurityconf.polsci.chula.ac.th/Documents/Presentations/Shanawez.pdf
5. http://as.nyu.edu/docs/IO/1172/globaljustice.pdf

E-Text Books:

www.bookboon.com/en/natural-sciences-eBooks

Course Home Page:

CLINICAL PSYCHOLOGY

IV Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS605	Perspective	-	-	-	-	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: Nil		

OBJECTIVES:

The course should enable the students to:

I. Develop the knowledge pertinent to the organism, developmental, social and situational factors those are relevant to the initiation and maintenance of human behavior.
II. Understand the present and implement effective strategies to deal with these issues during work with patients.
III. Study the professional identity and practice as clinical psychologists through fundamental knowledge of psychology, commitment to professional ethics.
IV. Understand the multiculturalism, diversity and participation in life-long learning.

UNIT-I BASIC PSYCHOLOGY

Introduction: Psychology, definition, psychology as a science, early schools of psychology, modern perspectives, methods of psychology, experimental method, systematic observation, case study method, survey method, fields of psychology.

UNIT-II BIOLOGY OF BEHAVIOR AND SENSORY PROCESS

Neurons and synapses: Nervous system , peripheral and central nervous system: brain and sleep: importance of fore brain, association cortex, left and right hemisphere functions; Some general properties of senses, subliminal stimuli, the visual sense, auditory sense, the other senses; Consciousness, meaning, functions, divided consciousness, stages of sleep, dreams, meditation, hypnosis.

UNIT-III ATTENTION AND PERCEPTION

Selective attention; physiological correlates of attention, internal influences on perception, learning set, motivation and emotion, cognitive styles.

External influences on perception, figure ground, movement, illusions, perceptual organization, constancy, depth perception, binocular and monocular cues.

UNIT-IV MOTIVATION AND EMOTION MOTIVES

Definitions, motivation cycle, theories of motivation, biological motivation, social motives, frustration and conflicts of motives, defense mechanism, emotion, expression and judgment of emotion, the physiology of emotion, theories of emotion.

UNIT-V CLINICAL PSYCHOLOGY & MENTAL HEALTH

History of clinical psychology and its role in understanding and alleviation of mental illness, promotion of mental health and rehabilitation of the mentally ill, role and functions of clinical psychologists in DMHP, professional code of conduct and ethical issues.

Text Books:

1. M. S. Bhatia, "Clinical Psychology", B J Publishers, 1st Edition, 2008.
2. Paul Bennett, "Abnormal and Clinical Psychology: An Introductory Textbook", Pearson Publishers, 2nd Edition, 2006.

Reference Books:

1. Robert A. Baron, Girishwar Misra, "Psychology: Indian Subcontinent Edition", Pearson Education, 5th Edition, 2009.
2. HillGard, E. R., C.A. Richard, L.A.Rita, "Introduction to Psychology", Oxford and IBH, New Delhi, 6th Edition, 1976.

Web References:

1. https://www.amazon.com/Clinical-Psychology-Counseling-Books/b?ie=UTF8&node=11143
2. https://global.oup.com/academic/content/series/o/oxford-textbooks-in-clinical-psychology-otcp/?cc=in&lang=en&

E-Text Books:

1. https://www.amazon.com/Clinical-Psychology-Counseling-Books/b?ie=UTF8&node=11143
2. https://books.google.co.in/books/about/Clinical_Psychology.html?id=u4aDPdw0Fi4C&redir_esc=y

Course Home Page:

ENGLISH FOR SPECIAL PURPOSES

IV Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS606	Perspective	-	-	-	-	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: Nil		

OBJECTIVES:

The course should enable the students to:

I. Learn the structure and style of effective sentences, paragraphs, and essays.
II. Focus on diction and spelling, punctuation and mechanics, and functional grammar in direct relation to students' own writing.
III. Understand and apply the basic conventions of syntax and mechanics; and proofread competently and prepare acceptable manuscripts.
IV. Emphasize the importance of language in academic and employability
V. Empower the communicative skills which enhance the employability skills with self-confidence.

UNIT-I **PRESENTATION SKILLS**

English presentation, effective presentation, live presentation, web access, language orientation, classifications, method of presentations, declarations ,impact, concepts of presentation, skill oriented presentations, analysis of presentation, types of presentations.

UNIT-II **NON-VERBAL COMMUNICATION**

Overview, this unit includes body language, posture, distance different levels of physical closeness appropriate to different types of relationship, right usage of gestures, open and closed postures, to be aware of facial expressions and their importance in non verbal communication.

UNIT-III **INTERPERSONAL SKILLS**

To build rapport, handling the criticism, giving and receive the feedback, be assertive, influencing and negotiation skills.

Methods of interpersonal skills, problem solving, decision making, verbal communication, peer negotiation, effective participating.

UNIT-IV **LISTENING**

Listen effectively, how to make notes, the difference between active listening and passive listening to understand different dialects. Initiating the contact, the important context in communicating. the reluctant speaker, appendices, problems in listening.

UNIT-V **SPEAKING AND READING**

Actively participate in GDs and debates, deal with JAM topics, answer questions in interviews, vocabulary section, useful information, discussing, socializing the effectiveness; How to read critically, to understand the main idea and tone of the author to understand complex ideas.

Text Books:

1. Susan E. Boyer, "Word Building Activities for Beginners of English" Birrong Book Publishers, 1st Edition, 2009.
2. Clive Oxenden , Christina Latham -Koenig, Paul Seligson, "New English File. Intermediate. Workbook", Oxford Publications, 1st Edition, 2006.
3. P Peter Bullions, "Practical Lessons in English Grammar and Composition", ESL Publications, 1st Edition, 1849.

Reference Books:

1. Wren and Martin, "High school English Grammar and Composition", S Chand Publications, 1st Edition, 2013.
2. Ron Cowan, "The Teacher's Grammar of English", Cambridge University Press, 1st Edition, 2008.

Web References:

1. http://www.cde.ca.gov/be/st/ss/documents/englangdevstnd.pdf
2. http://ell.stanford.edu/sites/default/files/ELP_task_force_report_rev.pdf

E-Text Books:

1. http://www.linguistik-online.org/40_09/dahmardeh.pdf
2. http://bookboon.com/en/english-language-ebooks

Course Home Page:

ENTREPRENEURSHIP

IV Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS607	Perspective	-	-	-	-	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: Nil		

OBJECTIVES:

The course should enable the students to:

I. Identify and apply the elements of entrepreneurship and to entrepreneurial processes;
II. Recognize the importance of entrepreneurship and identify the profile of entrepreneurs and their role in economic growth.
III. Analyze the business environment, opportunity recognition, and the business idea-generation process;
IV. Develop an idea on the legal framework and also understand strategic perspectives in entrepreneurship.

UNIT-I	UNDERSTANDING ENTREPRENEURIAL MINDSET

The revolution impact of entrepreneurship-The evolution of entrepreneurship-Approaches to entrepreneurship-Process approach-Twenty first centaury trend s in entrepreneurship.

UNIT-II	THE INDIVIDUAL ENTREPRENEURIAL MINDSET

The individual entrepreneurial mind set and personality, the entrepreneurial journey, stress and the entrepreneur, the entrepreneurial ego, entrepreneurial motivation, corporate entrepreneurial mindset the nature of corporate entrepreneur, conceptualization of corporate entrepreneurship strategy sustaining corporate entrepreneurship

UNIT-III	LAUNCHING ENTREPRENEURIAL VENTURES

Opportunities identification, entrepreneurial imagination and creativity, the nature of the creativity process, innovation and entrepreneurship, methods to initiate ventures.

Creating new ventures acquiring an established entrepreneurial venture, franchising-hybrid disadvantage of franchising.

UNIT-IV	LEGAL CHALLENGES OF ENTREPRENEURSHIP

Intellectual property protection, patents, copyrights trademarks and trade secrets-avoiding trademark pitfalls, formulation of the entrepreneurial plan, the challenges of new venture start-ups, poor financial understanding, and critical factors for new venture development-the evaluation process-feasibility criteria approach.

UNIT-V	STRATEGIC PERSPECTIVES IN ENTREPRENEURSHIP

Strategic planning, strategic actions, strategic positioning business stabilization, building the adaptive firms-understanding the growth stage, unique managerial concern of growing ventures.

Text Books:

1. DFKuratko,TVRao, "Entrepreneurship: A South Asian Perspective", Cengage Learning, 1st Edition,2012.
2. Gordon, K.Natarajan, "Entrepreneurship Development", Himalaya, 4th Edition, 2008.
3. Coulter, "Entrepreneurship in Action", PHI, 2nd Edition, 2002.
4. S.S. Khanka, "Entrepreneurial Development", S. Chand & Co. Ltd, 5th Edition, 2007.

Reference Books:

1. Vijay Sathe, "Corporate Entrepreneurship", Cambridge, 1st Edition, 2009.
2. Vasanth Desai, "Dynamics of Entrepreneurial Development and Management", HPH, Millenium Edition, 2007.
3. P. Narayana Reddy, "Entrepreneurship – Text and Cases", Cengage Learning", 1st Edition, 2010.
4. David H. Hott, "Entrepreneurship New Venture Creation", PHI, 1st Edition, 2004.

Web References:

1. http://www.tutorialspoint.com/entrepreneurship_development/entrepreneurship_development_tutorial.pdf
2. http://www.advalue-project.eu/content_files/EN/33/AdValue_Personal_Effectiveness_EN.pdf

E-Text Books:

1. http://www.freebookcentre.net/Business/Entrepreneurship-Books.html
2. http://www.e-booksdirectory.com/listing.php?category=390
3. http://www.bookboon.com/en/entrepreneurship-ebooks

GERMAN LANGUAGE

IV Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS608	Perspective	-	-	-	-	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: Nil		

OBJECTIVES:

The course should enable the students to:

I. Complete reading, writing, speaking, and listening assignments with ever increasing proficiency and accuracy.
II. Increase grammatical accuracy on written assignments.
III. Implement the language skills in listening, speaking, reading and writing in German language.

UNIT-I	GERMAN SOUNDS

Vowels, consonants, diphthongs, umlaut, the nouns, gender distinctions, cases, definite and indefinite articles, conjugation of verbs, verbs with separable and inseparable prefixes, modal verbs, personal pronouns, possessive pronouns, reflexive pronouns, cases nominative, accusative and dative; Structure of sentence and categories of sentences, subordinate clause, causative and conditional sentences; A very interesting slideshow presentation is held to enlighten the students about the culture, people, and lifestyle in Germany.

UNIT-II	SENTENCES FORMATION

Infinite sentences, use of conjunctive and conjunctive ii (contd.) plusquam perfect, modal verb (contd.) Conjunction, temporal, subordinate clauses complex sentences.

UNIT-III	GERMAN BASIC GRAMMAR

Verbs: Different forms, past tense and present perfect tense, adjectives and their declension, degrees of comparison; Prepositions, genitive case, conjunctive.

Different conjunctions (co-ordinating and subordinating), simple, complex and compound sentences, active and passive voice, relative pronouns.

UNIT-IV	PURPOSE OF LANGUAGE STUDY

Pictures and perceptions, conflicts and solutions, change and the future, the purpose of the study of the German language, listening, understanding, reacting, speaking, communicating, use of language, pronunciation and intonation ,reading, reading and understanding, writing, text writing, text forming, use of language, language reflection, building up the language, language comparison, culture reflection, other cultures and cultural identity.

UNIT-V	GERMAN ADVANCED COMMUNICATION LEVEL-1

The significance of language study 1. Speaking and thinking 2. Self – discovery 3. Communication 4. Language Competence 5. Language and culture 6. Language changes 7. Connection with other areas of study 8. The mother—language 9. Other languages.

Text Books:

1. Korbinian, Lorenz Nieder Deutschals Fremdsprache IA. Ausländer, "German Language", Perfect Paperback Publishers, 1st Edition, 1992.
2. Deutsch alsFremdsprache, IB, Erganzungskurs, "German Language", Front Cover. Klett, Glossar Deutsch-Spanisch Publishers, 1st Edition, 1981.

Reference Books:

1. Griesbach, "Moderner Gebrauch der deutschen Sprache", Schulz Publishers, 10th Edition, 2011.
2. Anna Quick , Hermann Glaser U.A, "Intermediate German: A Grammar and workbook", Paperback, 1st Edition, 2006.

Web References:

1. http://www.prsformusicfoundation.com/docs/408/Schenke%20-%20Seago%20-%20Basic%20German.pdf
2. https://upload.wikimedia.org/wikipedia/commons/2/2d/German.pdf

E-Text Books:

1. http://www.staidenshomeschool.com/files/Learning_German_Ebook.pdf
2. https://weblearn.ox.ac.uk/access/content/group/modlang/general/handbooks/09-10/prelims/german_language_guide_0910.pdf

Course Home Page:

DESIGN HISTORY

VII Semester: Common for all Branches

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS609	Perspective	-	-	-	-	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: Nil		

OBJECTIVES:

The course should enable the students to:

I. Understand the fundamental theoretical and historiographical topics of design, from the fifties of the twentieth century to the present day.
II. Use methodological tools and develop their analytical and critical capacities, so that they can grasp the bonds that link works of design with their respective social, economic and cultural backdrop.
III. Identify the influences at work between the various different creative disciplines.
IV. Develop their analytical and critical abilities, focusing on their search for their own expressive design language.

UNIT-I	INTRODUCTION TO DESIGN HISTORY

Materials and techniques of design, design in the machine age, design body, environmental design.

UNIT-II	DESIGN PRODUCTS

Innovative ideas of design products, intellectual and creative research, commercial and critical perspectives on design products, social, ethical and economic impact of your design.

UNIT-III	GLOBAL INNOVATION IN DESIGN

Styles of global innovation design, the service design basics.

Concepts of vehicle design, techniques of design engineering (IDE).

UNIT-IV	THE DESIGN INTERACTIONS

Interaction design, digital media, fine art, products, graphic and furniture design, architecture, life sciences, biotech, social sciences, and computer science, human consequences of different technological design futures.

UNIT-V	RESEARCH IN DESIGN HISTORY

Research in craftsmanship and artisanal cultures, design, trade and exchange, design exhibitions, curatorial practice, history and theory, design and national, global identities, the design and material culture of the domestic interior, material history and the history of materiality, asian design history.

Text Books:

1. R.S. Khurmi, "A Textbook of Machine Design", Eurasia Publishing House (pvt.) Ltd., 14th Edition, 2005.
2. Nicolas, "Beyond Design Ethnography", Nova Publishers, 2nd Edition, 2014.
3. Mariana Amatullo, "Career Pathways in Design for Social Innovation; Design matters at Art Center College of Design", LEAP Dialogues, 1st Edition, 2016.

Reference Books:
1. Max Bruinsma, "Design for the Good Society", Paperback, 1st Edition, 2015. 2. BeppeFinessi, "How to Break the Rules of Brand Design", Global Publishers, 1st Edition, 2009.
Web References:
1. https://en.wikipedia.org/wiki/Web_design 2. https://en.wikipedia.org/wiki/Responsive_web_design
E-Text Books:
1. http://www.creativebloq.com/design/free-ebooks-designers-7133700 2. https://www.amazon.com/Designing-History-East-Asian-Textbooks/dp/0415855586
Course Home Page:

GENDER SENSITIVITY

III Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AHS017	Perspective	-	-	-	-	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: Nil		

OBJECTIVES:

The course should enable the students to:

I. Understand the basic concepts relating to gender and to provide logical understanding of gender roles.
II. Analyze present various perspective of body and discourse on power relationship.
III. Develop cultural construction of masculinity and femininity.
IV. Study the evolution of gender studies from women's studies

UNIT-I	INTRODUCTION

Sex and gender; types of gender, gender roles and gender division of labour, gender stereotyping and gender discrimination-the other and objectification, male gaze and objectivity.

UNIT-II	GENDER PERSPECTIVES OF BODY

Biological-phenomenological and socio-cultural perspectives of body, body as a site and articulation of power relations- cultural meaning of female body and women's lived experiences -gender and sexual culture.

UNIT-III	SOCIAL CONSTRUCTION OF FEMININITY

Bio-social perspective of gender, gender as attributional fact, essentialism in the construction of femininity, challenging cultural notions of femininity.

Butler, Douglas, Faucault and Haraway, images of women in sports, arts, entertainment and fashion industry, media and feminine identities.

UNIT-IV	SOCIAL CONSTRUCTION OF MASCULINITY

Definition and understanding of masculinities, sociology of masculinity, social organization of masculinity and privileged position of masculinity, politics of masculinity and power, media and masculine identities.

UNIT-V	WOMEN'S STUDIES AND GENDER STUDIES

Evolution and scope of women's studies, from women's studies to gender studies: A paradigm shift, women's studies vs. gender studies, workshop, gender sensitization through gender related.

Text Books

1. Gender, "How Gender Inequality Persists in the Modern World", Oxford University Press, Reprinted Edition, 2011.
2. William M Johnson, "Recent Reference Books in Religion", Duke University Publications, Reprinted Edition, 2014.

Reference Books:

Alolajis. Mustapha, Sara Mils, "Gender Representation In Learning Materials", Pearson Publications, 1st Edition, 2015.

Web References:

1. https://www.google.co.in/search?q=clinical++pscyology+ebooks&ie=utf-8&oe=utf-8&client=firefox-b-ab&gfe_rd=cr&ei=xPmJV6OhFcuL8Qf3qam4Cw#q=gender+sensitivity+web+references
2. https://en.wikipedia.org/wiki/Gender_sensitization

E-Text Books:

1. http://ebooklibrary.org/articles/gender_sensitization
2. http://cbseacademic.in/publication_ebooks.html

VISION AND MISSION OF THE INSTITUTE

VISION

To bring forth professionally competent and socially sensitive engineers, capable of working across cultures meeting the global standards ethically.

MISSION

To provide students with an extensive and exceptional education that prepares them to excel in their profession, guided by dynamic intellectual community and be able to face the technically complex world with creative leadership qualities.

Further, be instrumental in emanating new knowledge through innovative research that emboldens entrepreneurship and economic development for the benefit of wide spread community.

B.TECH - PROGRAM OUTCOMES (POS)

PO-1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems (**Engineering Knowledge**).

PO-2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences **(Problem Analysis).**

PO-3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations **(Design/Development of Solutions).**

PO-4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions **(Conduct Investigations of Complex Problems).**

PO-5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations **(Modern Tool Usage).**

PO-6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice **(The Engineer and Society).**

PO-7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development **(Environment and Sustainability).**

PO-8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice **(Ethics).**

PO-9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings **(Individual and Team Work).**

PO-10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions **(Communication).**

PO-11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change **(Life-long learning).**

OBJECTIVES OF THE DEPARTMENT

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

Programme Educational Objectives (PEO's)

A graduate of the Computer Science and Engineering Program should:

PEO – I: Students will establish themselves as effective professionals by solving real problems through the use of computer science knowledge and with attention to team work, effective communication, critical thinking and problem solving skills.

PEO – II: Students will develop professional skills that prepare them for immediate employment and for life-long learning in advanced areas of computer science and related fields.

PEO – III: Students will demonstrate their ability to adapt to a rapidly changing environment by having learned and applied new skills and new technologies.

PEO – IV: Students will be provided with an educational foundation that prepares them for excellence, leadership roles along diverse career paths with encouragement to professional ethics and active participation needed for a successful career.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO – I: **Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO – II: **Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO – III: **Successful Career and Entrepreneurship:** The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

FREQUENTLY ASKED QUESTIONS AND ANSWERS ABOUT AUTONOMY

1. Who grants Autonomy? UGC, Govt., AICTE or University

In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy but only after concurrence from the respective state Government as well as UGC. The State Government has its own powers to grant autonomy directly to Govt. and Govt. aided Colleges.

2 Shall IARE award its own Degrees?

No. Degree will be awarded by Jawaharlal Nehru Technological University, Hyderabad with a mention of the name IARE on the Degree Certificate.

3 What is the difference between a Deemed University and an Autonomy College?

A Deemed University is fully autonomous to the extent of awarding its own Degree. A Deemed University is usually a Non-Affiliating version of a University and has similar responsibilities like any University. An Autonomous College enjoys Academic Autonomy alone. The University to which an autonomous college is affiliated will have checks on the performance of the autonomous college.

4 How will the Foreign Universities or other stake – holders know that we are an Autonomous College?

Autonomous status, once declared, shall be accepted by all the stake holders. The Govt. of Telangana mentions autonomous status during the First Year admission procedure. Foreign Universities and Indian Industries will know our status through our website.

5 What is the change of Status for Students and Teachers if we become Autonomous?

An autonomous college carries a prestigious image. Autonomy is actually earned out of our continued past efforts on academic performances, our capability of self- governance and the kind of quality education we offer.

6 Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?

There is a built in mechanism in the autonomous working for this purpose. An Internal Committee called Academic Programme Evaluation Committee, which will keep a watch on the academics and keep its reports and recommendations every year. In addition the highest academic council also supervises the academic matters. The standards of our question papers, the regularity of academic calendar, attendance of students, speed and transparency of result declaration and such other parameters are involved in this process.

7 Will the students of IARE as an Autonomous College qualify for University Medals and Prizes for academic excellence?

No. IARE has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural on co-curricular organized by the University the students shall qualify.

8 Can IARE have its own Convocation?

No. Since the University awards the Degree the Convocation will be that of the University, but there will be Graduation Day at IARE.

9 Can IARE give a provisional degree certificate?

Since the examinations are conducted by IARE and the results are also declared by IARE, the college sends a list of successful candidates with their final Grades and Grade Point Averages including

CGPA to the University. Therefore with the prior permission of the University the college will be entitled to give the provisional certificate.

10 Will Academic Autonomy make a positive impact on the Placements or Employability?

Certainly. The number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment. Also the autonomous status is more responsive to the needs of the industry. As a result therefore, there will be a lot of scope for industry oriented skill development built-in into the system. The graduates from an autonomous college will therefore represent better employability.

11 What is the proportion of Internal and External Assessment as an Autonomous College?

Presently, it is 70 % external and 30% internal. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.

12 Is it possible to have complete Internal Assessment for Theory or Practicals?

Yes indeed. We define our own system. We have the freedom to keep the proportion of external and internal assessment component to choose.

13 Why Credit based Grade System?

The credit based grade system is an accepted standard of academic performance the world over in all Universities. The acceptability of our graduates in the world market shall improve.

14 What exactly is a Credit based Grade System?

The credit based grade system defines a much better statistical way of judging the academic performance. One Lecture Hour per week of Teaching Learning process is assigned One Credit. One hour of laboratory work is assigned half credit. Letter Grades like A, B,C,D, etc. are assigned for a Range of Marks. (e.g. 91% and above is A+, 80 to 90 % could be A etc.) in Absolute Grading System while grades are awarded by statistical analysis in relative grading system. We thus dispense with sharp numerical boundaries. Secondly, the grades are associated with defined Grade Points in the scale of 1 to 10. Weighted Average of Grade Points is also defined Grade Points are weighted by Credits and averaged over total credits in a Semester. This process is repeated for all Semesters and a CGPA defines the Final Academic Performance

15 What are the norms for the number of Credits per Semester and total number of Credits for UG/PG programme?

These norms are usually defined by UGC or AICTE. Usually around 25 Credits per semester is the accepted norm.

16 What is a Semester Grade Point Average (SGPA)?

The performance of a student in a semester is indicated by a number called SGPA. The SGPA is the weighted average of the grade points obtained in all the courses registered by the student during the semester.

$$SGPA = \sum_{i=1}^{n} (C_i G_i) / \sum_{i=1}^{n} C_i$$

Where, C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} course and i represent the number of courses in which a student registered in the concerned semester. SGPA is rounded to two decimal places.

17 What is a Cumulative Grade Point Average (CGPA)?

An up-to-date assessment of overall performance of a student from the time of his first registration is

obtained by calculating a number called CGPA, which is weighted average of the grade points obtained in all the courses registered by the students since he entered the Institute.

$$CGPA = \sum_{j=1}^{m} \left(C_j S_j \right) / \sum_{j=1}^{m} C_j$$

Where, S_j is the SGPA of the j^{th} semester and C_j is the total number of credits upto the semester and m represent the number of semesters completed in which a student registered upto the semester. CGPA is rounded to two decimal places.

18 Is there any Software available for calculating Grade point averages and converting the same into Grades?

Yes, The institute has its own MIS software for calculation of SGPA, CGPA, etc.

19 Will the teacher be required to do the job of calculating SGPAs etc. and convert the same into Grades?

No. The teacher has to give marks obtained out of whatever maximum marks as it is. Rest is all done by the computer.

20 Will there be any Revaluation or Re-Examination System?

No. There will double valuation of answer scripts. There will be a make up Examination after a reasonable preparation time after the End Semester Examination for specific cases mentioned in the Rules and Regulations. In addition to this, there shall be a 'summer term' (compressed term) followed by the End Semester Exam, to save the precious time of students.

21 How fast Syllabi can be and should be changed?

Autonomy allows us the freedom to change the syllabi as often as we need.

22 Will the Degree be awarded on the basis of only final year performance?

No. The CGPA will reflect the average performance of all the semester taken together.

23 What are Statutory Academic Bodies?

Governing Body, Academic Council, Examination Committee and Board of Studies are the different statutory bodies. The participation of external members in every body is compulsory. The institute has nominated professors from IIT, NIT, University (the officers of the rank of Pro-vice Chancellor, Deans and Controller of Examinations) and also the reputed industrialist and industry experts on these bodies.

24 Who takes Decisions on Academic matters?

The Governing Body of institute is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like Boards of Studies. Decisions taken at the Boared of Studies level are to be ratified at the Academic Council and Governing Body.

25 What is the role of Examination committee?

The Examinations Committee is responsible for the smooth conduct of internal, End Semester and make up Examinations. All matters involving the conduct of examinations spot valuations, tabulations preparation of Grade Cards etc fall within the duties of the Examination Committee.

26 Is there any mechanism for Grievance Redressal?

The institute has grievance redressal committee, headed by Dean - Student affairs and Dean - IQAC.

27 How many attempts are permitted for obtaining a Degree?

All such matters are defined in Rules & Regulation

28 Who declares the result?

The result declaration process is also defined. After tabulation work wherein the SGPA, CGPA and final Grades are ready, the entire result is reviewed by the Moderation Committee. Any unusual deviations or gross level discrepancies are deliberated and removed. The entire result is discussed in the Examinations and Result Committee for its approval. The result is then declared on the institute notice boards as well put on the web site and Students Corner. It is eventually sent to the University.

29 Who will keep the Student Academic Records, University or IARE?

It is the responsibility of the Dean, Academics of the Autonomous College to keep and preserve all the records.

30 What is our relationship with the JNT University?

We remain an affiliated college of the JNT University. The University has the right to nominate its members on the academic bodies of the college.

31 Shall we require University approval if we want to start any New Courses?

Yes, It is expected that approvals or such other matters from an autonomous college will receive priority.

32 Shall we get autonomy for PG and Doctoral Programmes also?

Yes, presently our PG programmes also enjoying autonomous status.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

S.No	**Nature of Malpractices/Improper conduct**	**Punishment**
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculator, cell phone, pager, palm computer or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the Controller of Examinations.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is

		registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Controller of Examinations /Additional Controller of Examinations/any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the COE or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the COE or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the Institute premises or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject

		and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

UNDERTAKING BY STUDENT / PARENT

"To make the students attend the classes regularly from the first day of starting of classes and be aware of the College regulations, the following Undertaking Form is introduced which should be signed by both student and parent. The same should be submitted to the Dean, Academic".

I, Mr./Ms. ---------- joining I Semester / III Semester for the academic year 2016-2017 / 2017-2018 in Institute of Aeronautical Engineering, Hyderabad, do hereby undertake and abide by the following terms, and I will bring the ACKNOWLEDGEMENT duly signed by me and my parent and submit it to the Dean, Academic.

1. I will attend all the classes as per the timetable from the starting day of the semester specified in the institute Academic Calendar. In case, I do not turn up even after two weeks of starting of classes, I shall be ineligible to continue for the current academic year.
2. I will be regular and punctual to all the classes (theory/practical/drawing) and secure attendance of not less than 75% in every course as stipulated by Institute. I am fully aware that an attendance of less than 65% in more than three theory courses will make me lose one year.
3. I will compulsorily follow the dress code prescribed by the college.
4. I will conduct myself in a highly disciplined and decent manner both inside the classroom and on campus, failing which suitable action may be taken against me as per the rules and regulations of the institute.
5. I will concentrate on my studies without wasting time in the Campus/Hostel/Residence and attend all the tests to secure more than the minimum prescribed Class/Sessional Marks in each course. I will submit the assignments given in time to improve my performance.
6. I will not use Mobile Phone in the institute premises and also, I will not involve in any form of ragging inside or outside the campus. I am fully aware that using mobile phone to the institute premises is not permissible and involving in Ragging is an offence and punishable as per JNTUH/UGC rules and the law.
7. I declare that I shall not indulge in ragging, eve-teasing, smoking, consuming alcohol drug abuse or any other anti-social activity in the college premises, hostel, on educational tours, industrial visits or elsewhere.
8. I will pay tuition fees, examination fees and any other dues within the stipulated time as required by the Institution / authorities, failing which I will not be permitted to attend the classes.
9. I will not cause or involve in any sort of violence or disturbance both within and outside the college campus.
10. If I absent myself continuously for 3 days, my parents will have to meet the HOD concerned/ Principal.
11. I hereby acknowledge that I have received a copy of IARE - R16 Academic Rules and Regulations, Syllabus copy and hence, I shall abide by all the rules specified in it.

ACKNOWLEDGEMENT

I have carefully gone through the terms of the undertaking mentioned above and I understand that following these are for my/his/her own benefit and improvement. I also understand that if I/he/she fail to comply with these terms, shall be liable for suitable action as per Institute/JNTUH/AICTE/UGC rules and the law. I undertake that I/he/she will strictly follow the above terms.

Signature of Student with Date

Signature of Parent with Date
Name & Address with Phone Number