INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043, Telangana

OUTCOME BASED EDUCATION
WITH
CHOICE BASED CREDIT SYSTEM

BACHELOR OF TECHNOLOGY
CIVIL 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

CONTENTS

"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 updating 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 to gain hands-on experience 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.

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 viva voce / seminars / assignments / 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 curriculum section 28.0 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 'Environmental Science', 'Audit course', 'Advanced Programming Lab' and 'Value Added Course'

4.2 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'.

4.3 Each main semester shall be of 23 weeks (Table 1) duration and this period includes time for registration of courses, course work, examination preparation, conduct of examinations, assessment and declaration of final results.

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

4.5 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.

4.6 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.

4.7 The institute may use **supplementary semester** to arrange add-on courses for regular students and / or for deputing them for practical training / FSI.

4.8 The academic calendar shown in Table 1 is declared at the start of the 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. A student can register for a maximum number of 15 credits during a supplementary semester.

6.0 UNIQUE COURSE IDENTIFICATION CODE

Every course of the B Tech programme will be placed in one of the nine groups of courses with minimum credits as listed in the Table 2.

Table 2: Group of Courses

S. No	Branch	Code
1	Civil Engineering	01
2	Electrical and Electronics Engineering	02
3	Mechanical Engineering	03
4	Electronics and Communication Engineering	04
5	Computer Science & Engineering	05
6	Information Technology	06
7	Aeronautical Engineering	07
8	Humanities and Basic Sciences	08

7.0 CURRICULUM AND COURSE STRUCTURE

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

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 Work:** 1 credit

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)	4	4
2	Elective Courses	3	3
3	MOOC Courses	-	2
4	Laboratory Courses	2 / 3	1 / 2
5	Audit Course	-	0
6	Comprehensive Viva Voce	-	1
7	Mini Project	-	1
8	Summer Internship	-	0
9	Full Semester Internship (FSI) Project Work	-	16
10	Project Work	-	10

7.2 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.

7.3 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 (2 Core + 3 Foundation)	3	25
IV Semester	5 + Audit course (3 Core + 2 Foundation)	3	25
Summer Internship (Audit course)			00
V Semester	6 (5 Core + 1 Professional Elective)	2 + Mini Project	29
VI Semester	6 (3 Core + 1 Professional Elective + 1 Open Elective + 1 Foundation)	3 + Comprehensive Viva Voce	28
VII Semester	**Full Semester Internship (FSI) Project Work**		16
VIII Semester	4 (3 Core + 1 Professional Elective)	3	21
Total	**36 + Audit course (16 Foundation + 16 Core + 3 Professional Electives + 1 Open Electives)**	**22 + Comprehensive Viva voce + Mini Project + Project work**	**192**

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

Semester	No. of Theory Courses	No. of Lab Courses	Total Credits
III Semester	5 (2 Core + 3 Foundation)	3	25
IV Semester	5 + Audit course (3 Core + 2 Foundation)	3	25
Summer Internship (Audit course)			00
V Semester	6 (5 Core + 1 Professional Elective)	3 + Mini Project	29
VI Semester	6 (3 Core + 1 Professional Elective + 1 Open Elective + 1 Foundation)	3 + Comprehensive Viva Voce	28
VII Semester	**Full Semester Internship (FSI)**		16
VIII Semester	4 (3 Core + 1 Professional Elective)	3	21
Total	**26 + Audit course (6 Foundation + 16 Core + 3 Professional Electives + 1 Open Electives)**	**14 + Comprehensive Viva Voce + Mini Project + Project work**	**144**

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 (2 Core + 3 Foundation)	3	25
IV Semester	5 + Audit course (3 Core + 2 Foundation)	3	25
Summer Internship (Audit course)			00
V Semester	5 (4 Core + 1 Professional Elective)	3 + Mini Project	25
VI Semester	5 (3 Core + 1 Professional Elective + 1 Open Elective)	3 + Comprehensive Viva Voce	25
VII Semester	5 (3 Core + 1 Professional Elective + 1 Open Elective)	3	24
VIII Semester	3 (1 Core + 1 Skill + 1 Professional Elective)	Project Work	20
Total	**38 + Audit course (15 Foundation + 01 skill + 16 Core + 4 Professional Electives + 2 Open Electives)**	**23 + Comprehensive Viva Voce + Mini Project + Project work**	**192**

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

Semester	No. of Theory Courses	No. of Lab Courses	Total Credits
III Semester	5 (2 Core + 3 Foundation)	3	25
IV Semester	5 + Audit Course (3 Core + 2 Foundation)	3	25
Summer Internship (Audit course)			00
V Semester	5 (4 Core + 1 Professional Elective)	3 + Mini Project	25
VI Semester	5 (3 Core + 1 Professional Elective + 1 Open Elective)	3 + Comprehensive Viva Voce	25
VII Semester	5 (3 Core + 1 Professional Elective + 1 Open Elective)	3	24
VIII Semester	3 (1 Core + 1 Skill + 1 Professional Elective)	Project Work	20
Total	**38 + Audit course (16 Foundation + 15 Core + 4 Professional Electives + 2 Open Electives + 1 Skill)**	**15 + Comprehensive Viva Voce + Mini Project + Project work**	**144**

7.7 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 Electives (01)	16 @ 4 credits + 11 @ 4 credits + 05 @ 3 credits + 03 @ 3 credits + 01 @ 3 credit	135
Total Laboratory Courses (16 + 07)	16 @ 2 credits + 07 @ 1 credit	39
Comprehensive Viva Voce	1 @ 1 credit	01
Mini Project	1 @ 1 credit	01
Full Semester Internship (FSI)	1 @ 16 credits	16
TOTAL CREDITS		**192**

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

Total Theory Courses (38) Core Courses (15) + Foundation Courses (12+ 4) + Professional Electives (04) + Open Electives (02) + Skill (01)	15 @ 4 credits + 12 @ 4 credits + 04 @ 3 credits + 04 @ 3 credits + 02 @ 3 credits + 01 @ 3 credits	141
Total Laboratory Courses (16 + 07)	16 @ 2 credits + 07 @ 1 credit	39
Comprehensive Viva Voce	1 @ 1 credits	01
Mini Project	1 @ 1 credits	01
Project work	1 @ 10 credits	10
TOTAL CREDITS		**192**

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

Total Theory Courses (26) Core Courses (16) + Foundation Courses (5+1) + Professional Electives (03) + Open Electives (01)	16 @ 4 credits + 05 @ 4 credits + 01 @ 3 credits + 03 @ 3 credits + 01 @ 3 credit	99
Total Laboratory Courses (12 + 03)	12 @ 2 credits + 03 @ 1 credit	27
Comprehensive Viva Voce	1 @ 1 credits	01
Mini Project	1 @ 1 credits	01
Full Semester Internship	1 @ 16 credits	16
TOTAL CREDITS		**144**

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

Total Theory Courses (28) Core Courses (15) + Foundation Courses (6) + Professional Electives (04) + Open Electives (02) + Skill (01)	15 @ 4 credits + 06 @ 4 credits + 04 @ 3 credits + 02 @ 3 credits + 01@ 3 credits	105
Total Laboratory Courses (12 + 03)	12 @ 2 credits + 03 @ 1 credit	27
Comprehensive Viva Voce	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-3. 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-3: 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 lab 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 10 marks for the day to day performance and 20 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 lab courses. The distribution shall be 30 marks for internal evaluation (10 marks for day–to–day work, and 20 marks for internal tests) and 70 marks for semester end lab examination. There shall be ONE internal test for 20 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 Sessional Examination (Quiz exam for 30 marks) after 8 weeks of the commencement of the course and semester end evaluation (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:

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

Audit Course #1:

a) List of the courses under audit course#1 will be notified at the beginning of the IV semester for all students and the student has to choose one audit course for self-study mode at the beginning of IV semester. By the end of VI semester, all the students (regular and lateral entry students) shall complete the audit course, preferably Gender Sensitivity with acceptable performance.

b) The students will have four chances in total to clear the audit course beginning from fourth semester. 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 marks memo. Its result shall be declared with "Satisfactory" or "Not Satisfactory" performance.

Audit Course #2:

Internship:

All the students shall undergo the summer internship during summer break after IV semester. The minimum internship period is four weeks and the students have an option of choosing their own industry/area of interest, which may be related to their respective branch or any other service oriented task. A self study report for the internship shall be submitted and evaluated during the fifth semester and evaluation shall be conducted by two examiners, one of them being internship supervisor as internal examiner and a senior faculty nominated by the Principal from the panel of experts recommended by HOD. Its result shall be declared with "Satisfactory" or "Not Satisfactory" performance.

8.5 Comprehensive Viva Voce

The comprehensive examination is aimed at assessing the student's understanding of various Foundation, skill and Core courses studied by the end of VI semester and is intended to test the student's grasp of the chosen field of study. The comprehensive examination is an online test evaluated for 100 marks.

8.6 Mini Project

The Mini Project shall be carried out either during V 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.

8.7 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 four 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 course review is conducted by Project Review Committee (PRC) (on the progress) for 10 marks.

In VIII semester, a second mid-course review 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.

8.8 Full Semester Internship (FSI)

FSI is a full semester internship programme that 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 (> 8.0) 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 80% 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 15% may be condoned by the College Academic Committee on the recommendation of Head of the Department if their attendance is between 80% 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 programme.

10.3 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 viva voce / Mini Project / Project, if s/he secures

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

ii. A minimum of 40% marks for each Lab / Comprehensive viva voce / 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-4.

Table-4: Grade Points Scale (Absolute Grading)

Range of Marks	Grade Point	Letter Grade
90 – 100	10	S (Outstanding)
80 – 89	9	A+ (Excellent)
70 – 79	8	A (Very Good)
60 – 69	7	B+ (Good)
50 – 59	6	B (Above Average)
45 – 49	5	C (Average)
40 – 44	4	P (Pass)
Below 40	0	F (Fail)
Absent	0	Ab (Absent)
Authorized Break of Study	0	ABS

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

13.3 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.

13.4 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	O	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 for promotion / completion of regular B.Tech programme of study.

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

i. A student shall be promoted from IV semester to V semester of programme of study only if he fulfills the academic requirement of securing 50% of credits from the examinations held up to end of III semester including supplementary examinations.

ii. A student shall be promoted from VI semester to VII semester of programme of study only if he fulfills the academic requirements of securing 50% of credits out of which all 48 credits from I and II semesters shall be completed, from the examinations held up to V semester including supplementary examinations.

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

A student shall be promoted from VI semester to VII semester only if he fulfills the academic requirements of securing 50% credits from the examinations held up to V semester including supplementary examinations.

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	:	First Class with Distinction
CGPA ≥ 6.5 and < 7.5	:	First Class
CGPA ≥ 5.0 and < 6.5	:	Second Class
CGPA ≥ 4.0 and < 5.0	:	Pass Class
CGPA < 4.0	:	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 the 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 courses 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 marks memo.

All the candidates who register for the semester end examination will be issued memorandum of marks by the institute. Apart from the semester wise marks memos, the institute will issue the provisional certificate 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 programme in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the programme 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 programme. 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 programme 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 programme 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 Programme 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

27.1 A student who has been detained in any semester of previous regulations for not satisfying the attendance requirements shall be permitted to join in the corresponding semester of this regulation.

27.2 Semester End Examination in each course under the regulations that precede immediately these regulations shall be conducted three times after the conduct of last regular examination under those regulations. Thereafter, the failed students, if any, shall take examination in the equivalent papers of these regulations as suggested by the Chairman, BOS concerned.

28.0 REVISION OF REGULATIONS AND CURRICULUM

The Institute may from time to time 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)

Civil Engineering

B. TECH - CURRICULUM

I Semester

Course Code	Course Name	Category	Periods per week			Credits	Scheme of Examination Max. Marks		
			L	T	P		CIA	SEE	Total
THEORY									
A1801	English for Communication	Foundation	3	-	-	3	30	70	100
A1802	Linear Algebra and Ordinary Differential Equations	Foundation	3	1	-	4	30	70	100
A1805	Engineering Chemistry	Foundation	3	-	-	3	30	70	100
A1301	Engineering Mechanics-Statics	Foundation	3	1	-	4	30	70	100
A1302	Engineering Drawing	Foundation	2	-	3	4	30	70	100
PRACTICAL									
A1806	Communication Skills Laboratory	Foundation	-	-	2	1	30	70	100
A1808	Engineering Chemistry Laboratory	Foundation	-	-	2	1	30	70	100
A1503	Engineering Practices Laboratory	Foundation	-	-	3	2	30	70	100
A1305	Workshop	Foundation	-	-	3	2	30	70	100
TOTAL			**14**	**02**	**13**	**24**	**270**	**630**	**900**

II Semester

Course Code	Course Name	Category	Periods per week			Credits	Scheme of Examination Max. Marks		
			L	T	P		CIA	SEE	Total
THEORY									
A2301	Engineering Mechanics-Dynamics	Foundation	3	1	-	4	30	70	100
A2802	Computational Mathematics and Integral Calculus	Foundation	3	1	-	4	30	70	100
A2806	Applied Physics	Foundation	3	-	-	3	30	70	100
A2807	Environmental Science and Engineering	Foundation	3	-	-	3	30	70	100
A2501	Computer Programming	Foundation	3	1	-	4	30	70	100
PRACTICAL									
A2810	Computational Mathematics Laboratory	Foundation	-	-	2	1	30	70	100
A2809	Applied Physics Laboratory	Foundation	-	-	2	1	30	70	100
A2502	Computer Programming Laboratory	Foundation	-	-	3	2	30	70	100
A2302	Computer Aided Engineering Drawing Practice	Foundation	-	-	3	2	30	70	100
TOTAL			**15**	**03**	**10**	**24**	**270**	**630**	**900**

III Semester

Course Code	Course Name	Category	Periods per week			Credits	Scheme of Examination Max. Marks		
			L	T	P		CIA	SEE	TOTAL
THEORY									
A3101	Strength of Materials	Core	3	1	-	4	30	70	100
A3102	Surveying	Core	3	1	-	4	30	70	100
A3103	Engineering Geology	Foundation	3	1	-	4	30	70	100
A3204	Fundamentals of Electrical and Electronics Engineering	Foundation	3	1	-	4	30	70	100
A3805	Probability and Partial Differential Equations	Foundation	3	1	-	4	30	70	100
PRACTICAL									
A3104	Surveying Laboratory	Core	-	-	3	2	30	70	100
A3105	Computer Aided Drafting of Buildings	Core	-	-	3	2	30	70	100
A3106	Engineering Geology Laboratory	Foundation	-	-	2	1	30	70	100
TOTAL			**15**	**05**	**08**	**25**	**240**	**560**	**800**

IV Semester

Course Code	Course Name	Category	Periods per week			Credits	Scheme of Examination Max. Marks		
			L	T	P		CIA	SEE	TOTAL
THEORY									
A4101	Mechanics of Materials and Structures	Core	3	1	-	4	30	70	100
A4102	Fluid Mechanics	Foundation	3	1	-	4	30	70	100
A4103	Concrete Technology	Core	3		-	3	30	70	100
A4104	Structural Analysis	Core	3	1	-	4	30	70	100
A4105	Building Materials, Construction and Planning	Foundation	3	1	-	4	30	70	100
	Audit Course	Perspective	-	-	-	-	-	-	-
PRACTICAL									
A4106	Strength of Materials Laboratory	Foundation	-	-	3	2	30	70	100
A4107	Concrete Technology Laboratory	Core	-	-	3	2	30	70	100
A4108	Advanced Surveying Laboratory	Core	-	-	3	2	30	70	100
TOTAL			**15**	**04**	**09**	**25**	**240**	**560**	**800**

V Semester

Course Code	Course Name	Category	Periods per week			Credits	Scheme of Examination Max. Marks		
			L	T	P		CIA	SEE	Total
THEORY									
A5101	Hydraulics and Hydraulic Machinery	Core	3	1	-	4	30	70	100
A5102	Reinforced Concrete Structures Design and Drawing	Core	3	1	-	4	30	70	100
A5103	Geotechnical Engineering	Core	3	1	-	4	30	70	100
A5104	Water Resources Engineering	Core	3	1	-	4	30	70	100
	Professional Elective - I Available and Selected MOOCs courses	Elective	3	-	-	3	30	70	100
PRACTICAL									
A5105	Fluid Mechanics and Hydraulic Machinery Laboratory	Core	-	-	3	2	30	70	100
A5106	Geotechnical Engineering Laboratory	Core	-	-	3	2	30	70	100
A5807	Technical Writing and Content Development Laboratory	Foundation	-	-	2	1	30	70	100
A5108	Mini Project	Core	-	-	2	1	30	70	100
TOTAL			**15**	**04**	**10**	**25**	**270**	**630**	**900**

VI Semester

Course Code	Course Name	Category	Periods per week			Credits	Scheme of Examination Max. Marks		
			L	T	P		CIA	SEE	Total
THEORY									
A6101	Design of Steel Structures and Drawing	Core	3	1	-	4	30	70	100
A6102	Environmental Engineering	Core	3	1	-	4	30	70	100
A6103	Transportation Engineering -I	Core	3	1	-	4	30	70	100
	Professional Elective - II Available and Selected MOOCs courses	Elective	3	-	-	3	30	70	100
	Open Elective – I Available and Selected MOOCs courses	Elective	3	-	-	3	30	70	100
PRACTICAL									
A6104	Environmental Engineering Laboratory	Core	-	-	3	2	30	70	100
A6105	Transportation Materials Laboratory	Core	-	-	3	2	30	70	100
A6106	Non Destructive Testing Laboratory	Core	-	-	3	2	30	70	100
A6107	Comprehensive Viva Voce	Core	-	-	-	1	-	100	100
TOTAL			**15**	**03**	**11**	**25**	**240**	**660**	**900**

VII Semester

Course Code	Course Name	Category	Periods per week			Credits	Scheme of Examination Max. Marks		
			L	T	P		CIA	SEE	Total
THEORY									
A7101	Transportation Engineering -II	Core	3	1	-	4	30	70	100
A7102	Foundation Engineering	Core	3	1	-	4	30	70	100
A7103	Estimation and Costing	Core	3	1	-	4	30	70	100
	Professional Elective - III Available and Selected MOOCs courses	Elective	3	-	-	3	30	70	100
	Open Elective – II Available and Selected MOOCs courses	Elective	3	-	-	3	30	70	100
PRACTICAL									
A7104	Advanced Analysis and Design Laboratory	Core	-	-	3	2	30	70	100
A7105	Advanced Material Testing Laboratory	Core	-	-	3	2	30	70	100
A7106	Project Planning and Development Laboratory	Core	-	-	3	2	30	70	100
AP101	Project Work (Phase- I)	Internship	-	-	3	-	-	-	-
TOTAL			**15**	**03**	**12**	**24**	**240**	**560**	**800**

VIII Semester

Course Code	Course Name	Category	Periods per week			Credits	Scheme of Examination Max. Marks		
			L	T	P		CIA	SEE	Total
THEORY									
A8101	Rehabilitation and Retrofitting of Structures	Core	3	1	-	4	30	70	100
A8102	Construction Management	Core	3	1	-	3	30	70	100
	Professional Elective - IV Available and Selected MOOCs courses	Elective	3	-	-	3	30	70	100
PRACTICAL									
AP101	Project Work (Phase- II)	Internship	-	-	20	10	30	70	100
TOTAL			**09**	**01**	**20**	**20**	**120**	**280**	**400**

PROFESSIONAL ELECTIVES

GROUP- I: STRUCTURAL ENGINEERING

Course Code	Course Title
A9101	Advanced Structural Analysis
A9102	Finite Element Methods
A9103	Elements of Structural Dynamics
A9104	Elements of Earthquake Engineering
A9105	Design of Pre stressed Concrete Structures
A9106	Advanced Structural Design
A9107	Advanced Concrete Technology
A9108	Design of Bridge Structures

GROUP- II: GEOTECHNICAL ENGINEERING

Course Code	Course Title
A9109	Advanced Soil Mechanics
A9110	Rock Mechanics
A9111	Ground Improvement Techniques
A9112	Earth and Rock-fill Dams
A9113	Geosynthetics and Reinforced Soil Structures
A9114	Geotechnical Earthquake Engineering
A9115	Geo-Environmental Engineering
A9116	Theories in Soil Structure Interaction

GROUP- III: FLUID MECHANICS AND WATER RESOURCESENGINEERING

Course Code	Course Title
A9117	Computational Fluid Dynamics
A9118	Advanced Water Resources Engineering
A9119	Design and Drawing of Irrigation Structures
A9120	Water Resources Planning and Management
A9121	Advanced Ground Water Hydrology
A9122	Soft Computing in Water Resources
A9123	Stochastic and Simulation Hydrology
A9124	Impact of Climate Change in Water Resources Systems

GROUP- IV: TRANSPORTATION ENGINEERING

Course Code	Course Title
A9125	Principles of Traffic Engineering
A9126	Pavement Design
A9127	Urban Transportation and Planning
A9128	Pavement Materials
A9129	Highway Project Management
A9130	Highway Construction Methods
A9131	Airways, Railways and Waterways
A9132	Intelligent Transportation Systems

GROUP- V: ENVIRONMENTAL ENGINEERING

Course Code	Course Title
A9133	Environmental Impact Assessment and Management
A9134	Industrial Waste Water Treatment
A9135	Air Pollution and Control
A9136	Green Buildings and Energy Conservations
A9137	Solid Waste Management
A9138	Construction Demolition Waste Management and Recycling
A9139	Biomedical and Hazardous Waste Management
A9140	Renewable Energy Technologies

GROUP- VI: REMOTE SENSING AND GIS

Course Code	Course Title
A9141	Geographical Information Systems
A9142	Introduction to Geospatial Technologies
A9143	Disaster Management and Mitigation
A9144	Geodesy
A9145	Application of Remote Sensing in GIS
A9146	Cartography
A9147	Introduction to Photogrammetry
A9148	Land use and Land Cover Mapping

OPEN ELECTIVES-I

Course Code	Course Title
AE401	Micro Electro -Mechanical Systems
AE101	Disaster Management*
AE102	Geo Spatial Techniques*
AE501	Operating System
AE502	Object Oriented Programming through JAVA
AE402	Embedded Systems
AE403	Signal Analysis and Transform Techniques
AE301	Reliability Engineering
AE503	Robotics
AE701	Aerospace Propulsion and Combustion
Note: * indicates that subject is not offered to the students of Civil Engineering Department	

OPEN ELECTIVES- II

Course Code	Course Title
AE404	Image Processing
AE801	Optimization Techniques
AE504	Data Base Management System
AE505	Information Security
AE802	Modeling and Simulation
AE201	Renewable Energy Sources
AE303	Finite Element Analysis
AE803	Research Methodologies
AE304	Composite Materials
AE702	Launch Vehicles and Controls

AUDIT COURSES

Course Code	Course Title
A4801	Intellectual Property Rights
A4802	Total Quality Management
A4803	Professional Ethics and Human Values
A4804	Legal Sciences
A4805	Gender Sensitivity
A4806	Clinical Psychology
A4807	English for Special Purposes
A4808	Entrepreneurship
A4809	Any Foreign Language
A4810	Design History

ADVANCED COMPUTING LABORATORY

Course Code	Course Title
AA101	MATLAB Programming for Numerical Computations
AA102	Structural Designs Using Excel VBA Programming
AA103	Static and Dynamic Structural Analysis with ANSYS
AA104	Geotechnical Software Laboratory (GEOSTUDIO, SAFE)
AA105	Transportation Software Laboratory
AA106	Arc – GIS Laboratory

VALUE ADDED COURSES

Course Code	Course Title
AV101	Bridge Course to Construction – Trikona Conskills Certified
AV102	Certification Course in Construction Project Management
AV103	ITEDI Certification Course in Structural Design
AV104	ISMB Advance Certificate in Civil Engineering
AV105	MXRoads – Vissim – Plaxis Certification Course
AV106	SAFE – GEOSTUDIO Certification Course
AV107	PIFCE Certification Courses for Primavera, SAP, Revit.

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

CIVIL ENGINEERING

SYLLABUS

ENGLISH FOR COMMUNICATION
(Common for AE / CE / ME)

Semester: I

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A1801	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. Endow the communication in an intelligible English accent and pronunciation.
II. Promulgate the use of the four language skills i.e., Listening, Speaking, Reading and Writing.
III. Widen the art of writing simple English with correct spelling, grammar and punctuation.

UNIT-I	LISTENING SKILL	Hours: 08

Significance, essentials, barriers and effectiveness of listening; Listening to dialogues, conversation, discussions, monologues, soliloquies; Listening to prose and poetry reading; 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.

UNIT-II	SPEAKING SKILL	Hours: 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; Interviews: Preparing HR questions with possible answers; 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.

UNIT-III	READING SKILL	Hours: 10

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

Vocabulary enrichment and grammar exercises based on selective readings: Anecdotes, short stories, poems, prose 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	Hours: 09

Significance, essentials and effectiveness of writing; Writing emails, agendas, brochures, instructions, recommendations, functional checklists, minutes of a meeting; Writing paragraphs: Comparing, contrasting, presentations with an introduction, body and conclusion; Writing formal and informal letters: Letter of invitation, accepting, declining, requesting, cover letter enclosing a CV or Resume; Report writing.

UNIT-V	VOCABULARY AND GRAMMAR	Hours: 08

Punctuation, parts of speech, articles, concords, tenses, verbs; Forms of verbs: Regular and irregular, direct and indirect speech, change of voice; Synonyms, antonyms, one word substitutes, idioms and phrases, prefixes, suffixes, technical vocabulary.

Text Books :

1. Devaki Reddy, Shreesh Chaudhary,"Technical English", Macmillan, 1st Edition, 2009.
2. Rutherford, Andrea J, "Basic Communication Skills for Technology", Pearson Education, 2nd Edition, 2010.

Reference Books:

1. Norman Whitby, "Business Benchmark: Pre-Intermediate to Intermediate – BEC Preliminary", Cambridge University Press, 2nd Edition, 2008.
2. Meenakshi Raman, Sangeetha Sharma, "Technical Communication Principles Practices", Oxford University Press, New Delhi, 3rd Edition ,2015.
3. V Sasikumar, PV Dhamija, "Spoken English", Tata McGraw Hill, New Delhi, 2nd Edition, 2007.

Web References:

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

E-Text Books:

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

LINEAR ALGEBRA AND ORDINARY DIFFERENTIAL EQUATIONS
(Common for all Branches)

Semester: I

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A1802	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. Determine the maxima and minima of functions of several variables by using partial differential coefficients.
III. Apply differential equations on real time applications.

UNIT-I	THEORY OF MATRICES	Hours: 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	Hours: 10

Cayley-Hamilton theorem: Statement, verification, finding inverse and powers of a matrix; Linear dependence and independence of vectors; Linear transformation; Orthogonal 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	FUNCTIONS OF SINGLE AND SEVERAL VARIABLES	Hours: 08

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;

UNIT-IV	DIFFERENTIAL EQUATIONS OF FIRST ORDER AND THEIR APPLICATIONS	Hours: 10

Formation of a differential equation; Differential equations of first order and first degree: 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-V	HIGHER ORDER LINEAR DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS	Hours: 09

Linear differential equations of second and higher order with constant coefficients, nonhomogeneous 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

Text Books:

1. E. Kreyszig, "Advanced Engineering Mathematics", JohnWiley&SonsPublishers,9th Edition, 2014.
2. B.S.Grewal, "Higher Engineering Mathematics",KhannaPublishers, 42ndEdition, 2012.

Reference Books:

1. B. V. Ramana, "Engineering Mathematics-1", Tata Mc Graw Hill Education, 4th Edition, 2009.
2. Ravish R Singh, Mukul Bhatt, "Engineering Mathematics-1", Tata Mc Graw Hill Education, 1st Edition, 2009.
3. Tom Apostal, "Calculus-Vol-I & II", Wiley Student Edition, 2011.

Web References:

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

ENGINEERING CHEMISTRY
(Common for all Branches)

Semester: I

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A1805	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	Hours: 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	Hours: 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	Hours: 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.

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

UNIT-IV	MATERIALS CHEMISTRY	Hours: 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 Polyvinylchloride, Teflon, Bakelite and Nylon-6, 6; Rubbers: Natural rubber its process and vulcanization; Elastomers: Buna-s and Thiokol rubber; Fibers: 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	Hours: 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(HCV) and net calorific value(LCV), calculation of air 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 McGraw 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, 5thEdition, 2013.
4. R.P.Mani, K.N.Mishra, "Chemistry of Engineering Materials", Cengage Learning, 3rd Edition, 2015.

Web References:

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

E-Text Books:

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

ENGINEERING MECHANICS–STATICS
(Common for AE / CE / ME)

Semester: I

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A1301	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 the ability to work with basic engineering mechanics concepts required for analyzing static structures.
II. Understand the laws of friction and its application in simple machines
III. Apply the centroid and center of gravity in solving various engineering problems.
IV. Understand moment of Inertia using integration methods and method of moments.
V. Understand the application and analysis of beams and truss.

UNIT-I	EQUILIBRIUM OF SYSTEMS OF FORCES	Hours: 09

Introduction to engineering mechanics: Basic concepts, systems of forces; Coplanar concurrent forces, components in space, resultant, moment of force and its application, couples and resultant of force system, equilibrium of system of forces; Free body diagrams, equation of coplanar systems, spatial systems for concurrent forces, Lami's theorem, graphical method for equilibrium of coplanar force, converse of the law of triangle of forces, converse of the law of polygon of forces condition of equilibrium.

UNIT-II	FRICTION	Hours: 09

Friction: Types of friction, limiting friction, laws of friction, angle of repose, equilibrium of body laying on rough inclined plane, ladder friction, wedge friction, screw friction, screw jack, differential screw jack.

UNIT-III	CENTROID AND CENTER OF GRAVITY	Hours: 09

Centroid and center of gravity: Centroid of lines, centroid of area, centroids of composite figures.

Theorems of Pappus, centre of gravity of bodies, centroids of volumes, centre of gravity of composite bodies.

UNIT-IV	AREA AND MASS MOMENT OF INERTIA	Hours: 09

Area moment of inertia: Introduction, moment of inertia, polar moment of inertia, radius of gyration, transfer theorems for moment of inertia, moment of inertia by integration, moment of inertia of composite figures, product of inertia, transfer formula for product of inertia: Mass moment of inertia: Introduction, moment of inertia of masses, radius of gyration, transfer formula for mass moment of inertia, mass moment of inertia by integration, mass moment of inertia of composite bodies.

UNIT-V	BEAMS AND TRUSSES	Hours: 09

Trusses: Analysis of perfect frames (analytical method), types of frames, assumptions for forces in members of a perfect frame, method of joints, method of sections, force table, cantilever trusses, structures with one end hinged and the other freely supported on rollers carrying horizontal or inclined loads.

Text Books:

1. R. C. Hibbler, "Engineering Mechanics", Prentice Hall, 12th Edition, 2009.
2. Timoshenko,D. H. Young, "EngineeringMechanics",Tata Mc Graw Hill, 5thEdition, 2013.

Reference Books:

1. S. S. Bhavikatti, "A Text Book of Engineering Mechanics", New Age International, 1stEdition, 2012.
2. A.K.Tayal, "Engineering Mechanics", Uma Publications, 14thEdition, 2013.
3. R. K. Bansal "Engineering Mechanics", Laxmi Publication, 8th Edition, 2013.
4. Basudeb Bhattacharya, "EngineeringMechanics", Oxford UniversityPress, 2ndEdition, 2014.
5. K. Vijay Kumar Reddy, J. Suresh Kumar, "Singer's Engineering Mechanics Statics and Dynamics", BS Publishers, 1st Edition, 2013.

Web References:

1. http://www.iitg.ernet.in/rkbc/me101/Presentation/L01-03.pdf
2. http://www.vssut.ac.in/lecture_notes/lecture1423904717.pdf

E-Text Books:

1. http://www.freeengineeringbooks.com/Civil/Engineering-Mechanics-Books.php
2. http://www.textbooksonline.tn.nic.in/books/11/stdxi-voc-ema-em-2.pdf
3. http://www.faadooengineers.com/threads/17024-Engineering-mechanics-pdf-Free-Download

ENGINEERING DRAWING
(Common for AE / CE / ME)

Semester: I

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A1302	Foundation	2	-	3	4	30	70	100
Contact Classes: 30	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 75		

OBJECTIVES:

The course should enable the students to:

I. Understand the basic principles of engineering drawing and construction of curves used in engineering field.
II. Apply the knowledge of interpretation of projection in different quadrants.
III. Understand the projections of solids, when it is inclined to both planes simultaneously.
IV. Convert the pictorial views into orthographic view and vice versa.
V. Create intricate details of components through sections and develop its surfaces.

UNIT-I	FUNDAMENTALS OF ENGINEERING DRAWING, SCALES AND CURVES	Hours: 09

Introduction to engineering drawing: Drawing instruments and accessories, types of line, lettering practice, and rules of dimensioning, geometrical constructions, basic geometrical shapes; Scales:Types of scales, units of length and their conversion, construction of scales, plain scale, diagonal scale, vernier scale; Curves used in engineering practice and their constructions; Conic sections, construction of ellipse parabola and hyperbola, special curves, construction of cycloid, epicycloid, hypocycloid and involutes.

UNIT-II	ORTHOGRAPHIC PROJECTION, PROJECTION OF PLANES	Hours: 09

Orthographic projection: Principles of orthographic projections, conventions, first and third angle projections, projection of points, projection of lines, lines inclined to single plane, lines inclined to both the planes, true lengths and traces; Projection of planes: Projection of regular planes, planes inclined to one plane, planes inclined to both planes, projection of planes by auxiliary plane projection method.

UNIT-III	PROJECTION OF SOLIDS	Hours: 09

Projection of solids: Projections of regular solid, prisms, cylinders, pyramids, cones.
Solids inclined to one plane, solids inclined to both planes, projection of solid by auxiliary plane projection method.

UNIT-IV	DEVELOPMENT OF SURFACES, ISOMETRIC PROJECTIONS	Hours: 09

Development of surfaces: Development of lateral surface of right regular solids, prisms, cylinders, pyramids and cones.
Isometric projections:Principle of isometric projection, isometric scale, isometric projections and isometric views, isometric projections of planes, prisms, cylinders, pyramids, and cones.

UNIT-V	TRANSFORMATION OF PROJECTIONS	Hours: 09

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 Mc Graw Hill, 2nd EditionIndia, 2013.
Reference Books:
1. K. Venugopal, "EngineeringDrawingandGraphics",NewAgePublications,2nd Edition, 2010. 2. Dhananjay. A. Johle, "Engineering Drawing",TataMcGraw-Hill, 1st Edition, 2008. 3. K. C. John, "Engineering Drawing", PHI Learning Private Limited", 2nd Edition, 2009.
Web References:
1.nptel.ac.in/courses/112103019/ 2.nptel.ac.in/courses/112103019/14
E-Text Book:
1.https://books.google.co.in/books/about/Engineering_Drawing.html?id=_hdOU8kRb2AC

COMMUNICATION SKILLS LABORATORY
(Common for AE / ME / CE)

Semester: I

Course Code	Category	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A1806	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 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 experience sand 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**

Reading for information transfer; Reading newspaper and magazine articles, memos, letters, notices and minutes for critical commentary.

Week-7 **READING SKILL**

Reading brochures, advertisements, pamphlets for improved presentation; Reading comprehension exercises with critical and analytical questions based on context.

Week-8	WRITING SKILL
Writing messages, leaflets, notice; Writing tasks; Flashcard.	
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**
Writing a short story on their own; Writing a review on: Video clippings on inspirationalspeeches, short films, advertisements, recipe and recently watched film.	
Week-11	**THINKING SKILL**
Practice in preparing thinking blocks to decode diagrammatical representations into English words, expressions, idioms, proverbs.	
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. Raman, Meenakshi, Sangeetha Sharma, "Technical Communication", English for Engineers, 2nd Edition, New Delhi, Oxford University Press, 2010.
2. Rhirdion, Daniel, "Technical Communication", New Delhi, Cengage Learning, 1st Edition, 2009.

Web References:

1. http://learnenglish.britishcouncil.org
2. http://www.esl-lab.com/
3. http://www.elllo.org/

ENGINEERING CHEMISTRY LABORATORY
(Common for AE / CE / ME)

Semester: I

Course Code	Category	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A1808	Foundation	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 28			Total Classes: 28			

OBJECTIVES:

The course should enable the students to:

I. Comprehend the experimental results.

II. Analyze, interpret, and draw conclusions from data.

LIST OF EXPERIMENTS

Week-l	**INTRODUCTION TO CHEMISTRY LABORATORY**

Introduction to chemistry laboratory. Do's and Don'ts in chemistry laboratory.

Week-2	**VOLUMETRIC ANALYSIS**

Batch I. Estimation of hardness of water by EDTA method.

Batch II. Estimation of dissolved oxygen in water.

Week-3	**VOLUMETRIC ANALYSIS**

Batch I. Estimation of dissolved oxygen in water

Batch II. Estimation of hardness of water by EDTA method

Week-4	**VOLUMETRIC ANALYSIS**

Batch I. Estimation of Mno_2 in pyrolusite.

Batch II. Determination of copper in brass.

Week-5	**VOLUMETRIC ANALYSIS**

Batch I. Determination of copper in brass

Batch II. Estimation of Mno_2 in pyrolusite

Week-6	**INSTRUMENTATION**

Batch I. Conductometric titration of strong acid vs strong base.

Batch II. Potentiometric titration of strong acid vs strong base

Week-7	**INSTRUMENTATION**

Batch I. Conductometric titration ofstrong acid vs strong base.

Batch II. Potentiometric titration of strong acid vs strong base.

Week-8	**INSTRUMENTATION**

Batch I. Conductometric titration of mixture of acids vs strong base.

Batch II. Potentiometric titration of weak acid vs strong base.

Week-9	**INSTRUMENTATION**

Batch I. Conductometric titration of mixture of acids vs strong base.

Batch II. Potentiometric titration of acid strong vs strong base

Week-10	PHYSICAL PROPERTIES
Batch I. Determination of viscosity of sample oil by Redwood / Oswald's viscometer. Batch II. Determination of surface tension of lubricants	
Week-11	**PHYSICAL PROPERTIES**
Batch I. Determination of surface tension of lubricants. Batch II. Determination of viscosity of sample oil by Redwood / Oswald's viscometer.	
Week-12	**PREPARATION OF ORGANIC COMPOUNDS**
Batch I. Preparation of Aspirin. Batch II. Preparation of Thiokol rubber.	
Week-13	**PREPARATION OF ORGANIC COMPOUNDS**
Batch I. Preparation of Thiokol rubber Batch II. Preparation of Aspirin	
Week-14	**REVISION**
Revision.	
Reference Books:	
1. Vogel's, "Quantitative Chemical Analaysis", Prentice Hall, 6th Edition, 2000. 2. Gary D.Christian, "Analytical Chemistry", Wiley India, 6th Edition, 2007.	
Web References:	
1. http://www.iare.ac.in	

ENGINEERING PRACTICES LABORATORY
(Common for AE / CE / ME)

Semester: I

Course Code	Category	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A1503	Foundation	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 32			Total Classes: 32			

OBJECTIVES:

The course should enable the students to:

I. Practice on operating system installation and configuration settings.
II. Design blogs and view the Skype installation.
III. Prepare productivity tools like word processors, spreadsheets, presentations.
IV. Develop models using fitting, carpentry, foundry, Black-Smithy and Tin-Smithy trades.
V. Demonstrate the process of house wiring for connecting and controlling home appliances.

LIST OF EXPERIMENTS

Week-1	**NETWORK CONNECTIONS**
IP configurations, connecting devices in LAN through bridge, hub, switch; Wi-Fi, Li-Fi and Bluetooth settings; Crimping: Crossover, strait over.	
Week-2	**BLOG CREATION**
Creating blogs, import the data into blogs, blog templates, blog design.	
Week-3	**SKYPE INSTALLATION**
Skype installation and usages of Skype.	
Week-4	**CYBER HYGIENE**
Install antivirus software; Configure their personal firewall and windows update on their computer.	
Week-5	**MS WORD**
Prepare the project document - 1.	
Week-6	**MS WORD**
Prepare the resume.	
Week-7	**MS EXCEL**
Spreadsheet basics, modifying worksheets, formatting cells, formulas and functions, sorting and filtering, charts.	
Week-8	**MS POWER POINT**
Power point screen, working with slides, add content, work with text, working with tables, graphics, slide animation, reordering slides, adding sound to a presentation.	
Week-9	**LATEX**
Prepare the project document – 1.	
Week-10	**LATEX**
Prepare the project document – 2.	
Week-11	**LATEX**
Prepare the resume.	
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 Mc Graw 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 McGrawHill Publishing Company Limited, New Delhi, 2nd Edition, 2007.

Web References:

1. www.cl.cam.ac.uk/teaching/1011/CompFunds
2. www.bibcol.com
3. www.tutorialspoint.com/computer_fundamentals
4. www.craftsmanspace.com

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

HARDWARE:
30 numbers of Intel Desktop Computers with 2 GB RAM
Dot Matrix Printers: 02

SOFTWARE:
System Software: Linux / Windows 7.
Application Software's: MS Office and TeXworks 0.6.1on LaTeX 2e (Open Source)

OTHER COMPONENTS REQUIRED:

Name of the component	Range/Specifications
Resistors	100 Ω, 2.2KΩ.
Capacitors	0.1μF.
Mild Steel	50 x 50 x 8 mm.
Bulb	40 Watts.
Wooden Piece	300 x 300 x 30 mm.
Armature winding M/c	0-440V, 20 A.
Coil Winding machine	0-440V, 20 A.
Copper winding wire enameled	35SWG 15 kg.
Core stamping	Made of silicon steel (E&I shape).

WORKSHOP
(Common for AE / CE / ME)

Semester: I

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A1305	Foundation	-	-	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. Identify and use of tools, types of joints in carpentry, fitting, tin smithy and plumbing operations.
II. Understand of electrical wiring and components.
III. Observation of the function of lathe, shaper, drilling, boring, milling, grinding machines.

LIST OF EXPERIMENTS

Week-1	**CARPENTRY**

Batch-I: Preparation of lap joint as per given dimensions.
Batch-II: Preparation of dove tail joint as per given taper angle.

Week-2	**CARPENTRY**

Batch-I: Preparation of dove tail joint as per given taper angle.
Batch-II: Preparation of lap joint as per given dimensions.

Week-3	**FITTING**

Batch-I: Make a square fit for given sizes.
Batch-II: Make a straight fit for given dimensions.

Week-4	**FITTING**

Batch-I: Make a straight fit for given dimensions.
Batch-II: Make a square fit for given sizes.

Week-5	**TIN SMITHY**

Batch-I: Prepare the development of a surface and make a round tin.
Batch-II: Prepare the development of a surface and make a rectangular tray.

Week-6	**TIN SMITHY**

Batch-I: Prepare the development of a surface and make a rectangular tray.
Batch-II: Prepare the development of a surface and make a round tin.

Week-7	**FOUNDRY**

Batch-I: Prepare a wheel flange mould using a given wooden pattern.
Batch-II: Prepare a bearing housing using a aluminum pattern.

Week-8	**FOUNDRY**

Batch-I: Prepare a bearing housing using a aluminum pattern.
Batch-II: Prepare a wheel flange mould using a given wooden pattern.

Week-9	**HOUSE WIRING**

Batch -I: Make an electrical connection to demonstrate domestic voltage and current sharing.
Batch-II: Make an electrical connection to control one bulb with two switches-stair case connection.

Week-10	HOUSE WIRING
Batch-I: Make an electrical connection to control one bulb with two switches-stair case connection. Batch-II: Make an electrical connection to demonstrate domestic voltage and current sharing.	
Week-11	**BLACK SMITHY**
Batch-I: Prepare S-bend for given MS rod using open hearth furnace. Batch-II: Prepare J-bendof given MS rod using open hearth furnace	
Week-12	**BLACK SMITHY**
Batch-I: Prepare J-bend of given MS rod using open hearth furnace. Batch-II: Prepare S-bend for given MS rod using open hearth furnace.	
Week-13	**DEMONSTRATION**
Batch-I: Demonstration of arc welding and gas welding, Batch-II: Preparation of pipe plumbing joints.	
Week-14	**DEMONSTRATION OF MACHINE TOOLS**
Batch -I: Familiarization of central lathe and shaping machine and it's working. Batch-II: Familiarization of central lathe and shaping machine and it's working	
Week-15	**DEMONSTRATION OF MACHINE TOOLS**
Batch -I: Familiarization of drilling, milling and grinding machines and its working. Batch-II: Familiarization of drilling, milling and grinding machines and its working	

Reference Books:

1. K. C. John, "Mechanical Workshop Practice", PHI, 2nd Edition, 2010.
2. H.S. Bawa, "WorkshopPractice", TataMc Graw Hill PublishingCompanyLimited, 2nd Edition 2009.
3. S. K. Hajra Choudhury, A. K. Hajra Choudhury, "Elements of Workshop Technology", Media Promoters, 1st Edition, 2009.

Web References:

http://www.iare.ac.in

ENGINEERING MECHANICS-DYNAMICS
(Common for AE / CE / ME)

Semester : II

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A2301	Foundation	3	1	-	4	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

OBJECTIVES:

This course should enable the students to:

I. Develop the ability to work comfortably with basic engineering mechanics concepts required for analyzing static structures.
II. Identify an appropriate structural system to studying a given problem and isolate it from its environment, model the problem using good free-body diagrams and accurate equilibrium equations.
III. Identify and model various types of loading and support conditions that act on structural systems, apply pertinent mathematical, physical and engineering mechanical principles to the system to solve and analyze the problem.
IV. Solve the problem of equilibrium by using the principle of work and energy, impulse momentum and vibrations.

UNIT-I	KINEMATICS OF PARTICLES- RECTILINEAR MOTION	Hours: 09

Kinematics of particles- Rectilinear motion: Motion of a particle**,** rectilinear motion**,** motion curves, rectangular components of curvilinear motion, kinematics of rigid body, types of rigid body motion, angular motion, fixed axis rotation.

UNIT-II	KINETICS OF PARTICLE	Hours: 09

Kinetics of Particle: Introduction-Definitions of matter, body, particle, mass, weight, inertia, momentum. Newton's law of motion. Relation between force and mass. Motion of a particle in rectangular coordinates. D'Alembert's Principle. Motion of lift. Motion of body on an inclined plane. Motion of connected Bodies.

UNIT-III	IMPULSE AND MOMENTUM, VIRTUAL WORK	Hours: 09

Impulse and Momentum: Introduction- impact, momentum, impulse and impulsive forces, units. Law of conservation of momentum, Newton's law of collision of elastic bodies- coefficient of restitution. Recoil of gun. Impulse momentum equation.
Virtual work: Introduction, principle of virtual work, applications; Beams, Lifting machines, simple framed structures.

UNIT-IV	WORK ENERGY METHOD	Hours: 09

Work Energy Method: law of conservation of Energy, application of work energy method to particle motion and connected system, work energy applied to connected Systems, work energy applied to fixed axis rotation.

UNIT-V	MECHANICAL VIBRATIONS	Hours: 09

Mechanical vibrations: Definitions and concepts**,** simple harmonic motion**,** free vibrations, simple and compound pendulums, torsion pendulum, free vibrations without damping: General cases.

Text Books:

1. K. Vijay Kumar Reddy, J Suresh Kumar, "Singer's Engineering Mechanics – Statics and Dynamics", BS Publishers, 2013.
2. Timoshenko Yung, "Engineering Mechanics", Tata-Mc-Grawhill.

Reference Books:

1. S. S. Bhavikatti, "A Text Book of Engineering Mechanics", New Age International, India.
2. A. K .Tayal, "Engineering Mechanics", Uma Publications.
3. R K Bansal, "Engineering Mechanics", Laxmi Publications, 2005.
4. R.C. Hibbler, "Engineering Mechanics", Prentice hall, 12th Ed., 2013.

Web References:
1. http://www.iitg.ernet.in/rkbc/me101/Presentation/L01-03.pdf. 2. http://www.vssut.ac.in/lecture_notes/lecture1423904717.pdf.
E-Text Books:
1. http://www.freeengineeringbooks.com/Civil/Engineering-Mechanics-Books.php. 2. http://www.textbooksonline.tn.nic.in/books/11/stdxi-voc-ema-em-2.pdf. 3. http://www.faadooengineers.com/threads/17024-Engineering-mechanics-Pdf-Free-Download.

COMPUTATIONAL MATHEMATICS AND INTEGRAL CALCULUS
(Common for AE / CE / ME)

Semester: II

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A2802	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.

UNIT-I	ROOT FINDING TECHNIQUES AND INTERPOLATION	Hours: 09

Root finding techniques: Solving algebraic and transcendental equations by bisection method, method of false position, iteration method and 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, Newton's divided difference interpolation.

UNIT-II	NUMERICAL DIFFERENTIATION AND INTEGRATION	Hours: 08

Numerical Differentiation: Derivatives using Newton's forward formula, Derivatives using Newton's backward formula, central difference by Stirling formula, unequal intervals by Newton's divided difference; Numerical integration: Newton-Cote's formula, trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.

UNIT-III	NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS	Hours: 10

Single step methods: Picard's method of successive approximations, Taylor's series method.

Step by step methods: Euler's, modified Euler's and Runge-Kutta method;Multi step methods: Predictor-corrector methods, Milne's method and Adams-Bashforth method.

UNIT-IV	MULTIPLE INTEGRALS	Hours: 08

Double and triple integrals; Change of order of integration; Change of variables: Polar, cylindrical and spherical; Finding the area of a region using double integration and volume of a region using triple integration.

UNIT-V	VECTOR CALCULUS	Hours: 10

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; Gauss divergence theorem-statements and verification.

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. B. V. Ramana, "Mathematical Methods", Tata McGraw Hill Education, 4th Edition, 2009.
2. S. S. Sastry, "Introduction methods of numerical analysis", Prentice-Hall of India Private Limited, 5th Edition, 2005.

Web References:

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

E-Text Books:

1. http://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

APPLIED PHYSICS
(Common for AE / CE / ME)

Semester: II

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A2806	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. Develop the strong fundamentals of crystal structures and properties.
II. Strengthen the knowledge of theoretical and technological aspects of lasers and optical fibers.
III. Correlate the principles with applications of the dielectric and magnetic materials.
IV. Enrich the knowledge in X-ray diffraction, holography, acoustics and ultrasonics.

UNIT-I	CRYSTALLOGRAPHY AND CRYSTAL STRUCTURES	Hours: 09

Crystallography and crystal structures: Space lattice, unit cell, lattice parameters, crystal systems, Bravais lattices, directions and planes in crystals, Miller indices, interplanar spacing of orthogonal crystal systems, atomic radius, coordination number and packing factor of SC, BCC, FCC, NaCl and diamond structures.

UNIT-II	LASERS AND FIBER OPTICS	Hours: 09

Lasers: Characteristics of lasers, spontaneous and stimulated emission of radiation, metastable state, population inversion, lasing action, ruby laser, semiconductor diode laser and applications of lasers; Fiber optics: Principle and construction of an optical fiber, acceptance angle, numerical aperture, types of optical fibers, losses in optical fibers and applications of optical fibers.

UNIT-III	DIELECTRIC AND MAGNETIC PROPERTIES	Hours: 09

Dielectric properties: Basic definitions, electronic, ionic and orientation polarizations (qualitative), internal fields in solid.
Magnetic properties: Basic definitions, origin of magnetic moment, Bohr magneton, classification of dia, para and ferromagnetic materials on the basis of magnetic moment, domain theory of ferro magnetism on the basis of hysteresis curve.

UNIT-IV	X-RAY DIFFRACTION AND HOLOGRAPHY	Hours: 09

X-ray diffraction: Bragg's law, Laue method, powder method and applications; Holography: Basic principle; Construction and reconstruction of hologram, conditions for holography; Types of holograms: Reflection, transmission, thin and thick holograms; Applications of holography.

UNIT-V	ACOUSTICS AND ULTRASONICS	Hours: 09

Acoustics: Reverberation, reverberation time, Sabine's formula (qualitative), absorption coefficient, measurement of absorption coefficient, factors affecting acoustics of an auditorium and their remedies; Ultrasonics: Introduction; Generation of ultrasonic waves; Magnetostriction method, piezoelectric method, properties, applications.

Text Books:

1. V. Rajendran, "Engineering Physics", Tata McGraw Hill Book Publishers, 1st Edition, 2010.
2. P. K. Palanisamy, "Engineering Physics", Scitech Publishers, 4th Edition, 2014.

Reference Books:

1. R. K. Gaur, S. L. Gupta, "Engineering Physics", Dhanpat Rai Publications, 8th Edition, 2001.
2. A. J. Dekker, "Solid State Physics", Macmillan India ltd, 1st Edition, 2000.
3. Hitendra K Malik, A. K. Singh, "Engineering Physics", Mc Graw Hill Education, 1st Edition, 2009.
4. Dr. K. Vijaya Kumar, Dr. S Chandralingam , " Modern Engineering Physics", S.Chand& Co New Delhi, 1st Edition, 2010.

Web References:

1. http://link.springer.com
2. http://www.intechopen.com
3. https://books.google.co.in
4. https://books.google.co.in

E-Text Books:

1. http://www.peaceone.net/basic/Feynman/
2. http://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

ENVIRONMENTAL SCIENCE AND ENGINEERING
(Common for all Branches)

Semester: II

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A2807	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	Hours: 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	Hours: 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	Hours: 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	Hours: 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: Wastewater 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	Hours: 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 rules, hazardous waste management and handling rules; 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.

Reference Books:

1. G. 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. http://www.elsevier.com
2. libguides.lib.msu.edu
3. http://www.fao.org
4. http://www.nrc.gov
5. http://www.istl.org
6. http://www.ser.org
7. http://www.epd.gov.
8. http:// www.nptel.ac.in

E-Text Books:

1. http://www.ilocis.org
2. img.teebweb.org
3. ec.europa.eu
4. http://www.epa.ie
5. birdi.ctu.edu.vn

COMPUTER PROGRAMMING
(Common for AE / CE / ME)

Semester: II

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A2501	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 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	Hours:10

Introduction to computers: Generation and classification of computers, programming languages, number system, problem solving techniques, algorithms, flowcharts, pseudo code.
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	Hours:12

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	Hours:10

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	Hours:07

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	Hours:06

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. Balagurusamy E, "Computer Programming", Tata McGraw Hill Education, 1st Edition, 2014.

Reference Books:

1. B. A.Forouzan, R. F. Gillberg, "C Programming and Data Structures", Cengage Learning, India, 3rd Edition, 2014.
2. W. Kernighan Brian, Dennis M. Ritchie, "The C Programming Language", PHI Learning, 2nd Edition, 1988.
3. Schildt Herbert, "C: The Complete Reference", Tata McGraw Hill Education, 4th Edition, 2014.
4. R. S. Bichkar, "Programming with C", Universities Press, 2nd Edition, 2012.
5. 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://en.wikibooks.org/wiki/Computer_Programming
4. https://www.khanacademy.org/computing/computer-programming

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://enggnotebook.weebly.com/uploads/2/2/7/1/22718186/ge6151-notes.pdf

MOOC Course

https://alison.com/courses/Introduction-to-Programming-in-c

COMPUTATIONAL MATHEMATICS LABORATORY
(Common for AE / CE / ME)

Semester: II

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A2810	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. Regulafalse method. c. Newton Raphson method.	
Week-10	**NUMERICAL DIFFERENTIATION AND INTEGRATION**
a. Trapezoidal, Simpson's method. b. Euler method. c. RungeKutta 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:

1.http://www.iare.ac.in

APPLIED PHYSICS LABORATORY
(Common for AE / ME / CE)

Semester: II

Course Code	Category	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A2809	Foundation	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 28				Total Classes: 28		

OBJECTIVES:

The course should enable the students to:

I. Enrich the concept of rigidity modulus and frequency.
II. Enlighten the real time application of interference, diffraction and optical fibers.
III. Upgrade practical knowledge in magnetic induction, LED and LASER.

LIST OF EXPERIMENTS

Week- l	**INTRODUCTION TO PHYSICS LABORATORY.**
Introduction to physics laboratory. Do's and Don'ts in physics lab.	
Week- 2	**MEASURING INSTRUMENTS AND TORSIONAL PENDULUM.**
Batch I: Measurement of thickness of a wire and radius of a disc. Batch II: Determination of rigidity modulus of material of string-Torsional pendulum.	
Week-3	**MEASURING INSTRUMENTS AND TORSIONAL PENDULUM.**
Batch I: Determination of rigidity modulus of material of string-Torsional pendulum. Batch II: Measurement of thickness of a wire and radius of a disc.	
Week-4	**STEWART AND GEE'S METHOD AND FREQUENCY OF LONGITUDINAL WAVES.**
Batch I: Magnetic field along the axis of current carrying coil-Stewart and Gee's method. Batch II: Determining frequency of longitudinal waves	
Week-5	**STEWART AND GEE'S METHOD AND FREQUENCY OF LONGITUDINAL WAVES.**
Batch I: Determining frequency of longitudinal waves. Batch II: Magnetic field along the axis of current carrying coil-Stewart and Gee's method.	
Week-6	**FREQUENCY OF TRANSVERSE WAVES ANDLASER DIFFRACTION.**
Batch I: Calculating frequency of transverse waves. Batch II: Wavelength of laser source-diffraction grating.	
Week-7	**FREQUENCY OF TRANSVERSE WAVES ANDLASER DIFFRACTION.**
Batch I: Wavelength of laser source-diffraction grating. Batch II: Calculating frequency of transverse waves.	
Week-8	**SPECTROMETER AND DISPERSIVE POWER.**
Batch I: Adjustments and minimum deviation in spectrometer. Batch II: Dispersive power of material of prism.	
Week 9	**SPECTROMETER AND DISPERSIVE POWER.**
Batch I: Dispersive power of material of prism. Batch II: Adjustments and minimum deviation in spectrometer.	
Week-10	**NEWTON'S RINGS AND OPTICAL FIBER.**
Batch I: Newton's rings-Radius of curvature of planoconvex lens.	

Batch II: Evaluation of numerical aperture of given fiber and Bending losses of fibres.	
Week-11	**NEWTON'S RINGS AND OPTICAL FIBER.**
Batch I: Evaluation of numerical aperture of given fiber and Bending losses of fibres. Batch II: Newton's rings-Radius of curvature of planoconvex lens.	
Week-12	**LED CHARACTERISTICS AND LASER CHARACTERISTICS.**
Batch I : V-I characteristics of LED. Batch II : Study of L-I characteristics of laser diode.	
Week-13	**LED CHARACTERISTICS AND LASER CHARACTERISTICS.**
Batch I : Study of L-I characteristics of laser diode. Batch II : V-I characteristics of LED.	
Week-14	**REVISION**
Revision.	

Reference Books:

1. C. L. Arora, "Practical Physics", S. Chand & Co, New India, 3rd Edition, 2012.
2. Vijay Kumar, Dr. T. Radhakrishna, "Practical Physics for Engineering students", S M enterprises, 2nd Edition, 2014.
3. R. K. Shukla, Anchal Srivatsava, "Practical Physics", New age International, 2nd Edition, 2011.

Web References:

1. http://www.iare.ac.in

COMPUTER PROGRAMMING LABORATORY
(Common for AE / CE / ME)

Semester: I

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A2502	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. https://www.sanfoundry.com/c-programming-examples
2. https://www.geeksforgeeks.org/c
3. https://www.cprogramming.com/tutorial/c
4. https://www.cs.princeton.edu

COMPUTER AIDED ENGINEERING DRAWING PRACTICE
(Common for AE / CE / ME)

Semester: II

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A2302	Foundation	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 75		

OBJECTIVES:

The course should enable the students to:

I. Understand the basic principles of engineering drawing.
II. Understand the intersection of solids in different quadrants.
III. Convert the pictorial views into orthographic view and vice versa.
IV. Create intricate details of components through sections and develop its surfaces.
V. Understand the perspective projection of solids through vanishing and visual ray method.

UNIT-I	AUTOCAD AND DVELOPMENT OF SURFACES WITH SECTIONAL VIEW	Hours: 09

Introduction to AutoCAD: Geometrical construction; Sections and sectional views, sections of right regular solids, prisms, pyramids, cylinders and cones, auxiliary views, development of surfaces, development of surfaces of right regular solids prisms, pyramids, cylinders and cones.

UNIT-II	INTERSECTION OF SOLIDS	Hours: 09

Intersection of solids: Intersection of prism versus prism, cylinder versus prism, cylinder versus cylinder and cylinder versus cone.

UNIT-III	ISOMETRIC PROJECTIONS	Hours: 09

Isometric projections**:** Principles of isometric projections, isometric scale, isometric views, conventions. Isometric views of lines, planes, simple and compound solids, isometric views of objects having spherical parts.

UNIT-IV	TRANSFORMATION OF PROJECTIONS	Hours: 09

Transformation of projections: Conversion of isometric views to orthographic views, conventions for simple objects; Construction of orthographic projections for given isometric projections.

UNIT-V	PERSPECTIVE PROJECTIONS	Hours: 09

Perspective projections: Perspective view of points, lines, plane figures and simple solids, vanishing point method and visual ray method.

Reference Books:

1. N.D. Bhatt, "Engineering Drawing", Charotar Publications, 49th Edition, 2012.
2. C. M. Agrawal, Basant Agrawal, "Engineering Drawing'', Tata Mc Graw Hill, 2nd Edition, 2013.
3. K. Venugopal, "Engineering Drawing and Graphics", New Age Publications, 2nd Edition, 2010.
4. S. Trymbaka Murthy, "Computer Aided Engineering Drawing", I.K. International Publishers, 3rd Edition, 2011.
5. A. K. Sarkar, A. P. Rastogi, "Engineering Graphics with AutoCAD", PHI Learning, 1st Edition, 2010.

Web References:

1. http://nptel.ac.in/courses/112103019/
2. http://freevideolectures.com/Course/3420/Engineering-Drawing

E-Text Book:

1.https://books.google.co.in/books/about/Engineering_Drawing.html?id=_hdOU8kRb2AC

STRENGTH OF MATERIALS
(CE)

Semester : III

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A3101	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. Relate mechanical properties of a material with its behavior under various load types.
II. Classify the types of material according to the modes of failure and stress strain curves.
III. Apply the concepts of mechanics to find the stresses at a point in a material of a structural member.
IV. Analyze a loaded structural member for deflections and failure strength.
V. Evaluate the stresses & strains in materials and deflections in beam members.

UNIT-I	SIMPLE STRESSES AND STRAINS	Hours: 09

Concept of stress and strain, elasticity and plasticity, Hooke's law, stress strain diagram for mild steel, working stress, factor of safety, lateral strain and Poisson's ratio, volumetric strain , elastic modulii and the relationship between them bars of varying section , composite bars , temperature stresses. Introductory concept of strain energy, resilience.

UNIT-II	SHEAR FORCE AND BENDING MOMENT	Hours: 09

Definition of beam, Types of beams, concept of shear force and bending moment, shear force and bending moment diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads, point of contraflexure, relation between Shear force, bending moment and rate of loading at a section of a beam.

UNIT-III	FLEXURAL AND SHEAR STRESSES IN BEAMS	Hours: 09

Flexural Stresses: Theory of simple bending, assumptions, derivation of bending equation: M/I = f/y = E/R - Neutral axis: Determination of bending stresses; Section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections; Design of simple beam sections.

Shear Stresses: Derivation of formula, shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

Unsymmetrical bending and shear Centre: Centroidal principal axes of the section; Moment of inertia referred to any set of rectangular axes; Stresses in beams subjected to unsymmetrical bending; Principal Axis Resolution of bending movements in to two rectangular axes, Location of neutral axis; Shear centre for symmetrical and unsymmetrical sections.

UNIT-IV	PRINCIPAL STRESSES AND STRAINS	Hours: 09

Introduction: Stresses on an inclined section of a bar under axial loading; compound stresses; Normal and tangential stresses on an inclined plane for biaxial stresses; Two perpendicular normal stresses accompanied by a state of simple shear; Mohr's circle of stresses; Principal stresses and strains; Analytical and graphical solutions.

Theories of failure: Introduction, various theories of failure, maximum principal stress theory, maximum principal strain theory, strain energy and shear strain energy theory.

UNIT-V	DEFLECTIONS OF BEAMS	Hours: 09

Bending into a circular arc, slope, deflection and radius of curvature, differential equation for the elastic line of a beam, double integration and Macaulay's methods, determination of slope and deflection for cantilever and simply supported beams subjected to various loads, Mohr's theorems, moment area method, application to simple cases including overhanging beams; Conjugate beam method, concept of conjugate beam method, difference between a real beam and a conjugate beam, deflections of determinate beams with constant and different moments of inertia.

Text Books:

1. F. Beer, E. R. Johnston, J. DeWolf , "Mechanics of Materials", Tata McGraw-Hill Publishing Company Limited, New Delhi, Indian 1st Edition, 2008.
2. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, "Mechanics of Materials", Laxmi Publications Private Limited, New Delhi, 4th Edition, 2007.
3. R. K. Rajput, "Strength of Materials: Mechanics of Solids", S. Chand & Co Limited, NewDelhi, 3rd Edition, 2007.
4. S. S. Rattan, "Strength of Materials", Tata McGraw-Hill Publishers, 4th Edition, 2011.

Reference Books :

1. J. M. Gere, S.P. Timoshenko, "Mechanics of Materials", CL Engineering, USA, 5th Edition, 2000.
2. E. G. Popov, "Engineering Mechanics of Solids", Pearson Education, India, 2nd Edition, 2015.
3. S. S. Bhavikatti, "Strength of Materials", Vikas Publishing House Pvt. Ltd., New Delhi, 3rd Edition, 2013.
4. R. K. Bansal, "A Textbook of Strength of Materials", Laxmi Publications Private Limited., New Delhi, 4th Edition, 2007.
5. D. S. Prakash Rao, "Strength of Materials A Practical Approach Vol.1", University Press India Private Limited, India, 1st Edition, 2007.

Web References:

1. http://www.nptelvideos.in/2012/11/strength-of-materials- prof.html
2. http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-050-solid-mechanics-fall-2004/lecture-notes/
3. https://www.youtube.com/watch?v=coRgpxG2pyY&list=PLLbvVfERDon3oDfCYxkwRct1Q6YeOzi9g

E-Text Books:

1. http://www.freeengineeringbooks.com/Civil/Strength-of-Material-Books.php
2. http://royalmechanicalbuzz.blogspot.in/2015/04/strength-of-materials-book-by-r-k-bansal.html

SURVEYING
(CE)

Semester: III

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A3102	Foundation	3	1	0	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. Evaluate the basics principles of surveying and its classification.
II. Calculate the unknown area and volume of the earth surface by mathematical approach.
III. Determine the contours points and their importance in surveying.
IV. Gain knowledge on mean sea level, temporary and permanent bench marks.
V. Educate and implement the advance surveying techniques using total station.

UNIT-I	INTRODUCTION, LINEAR AND ANGULAR MEASUREMENTS	Hours: 09

Definitions, primary divisions of surveying, objectives, principles and classifications, plan and map, errors due to wrong scale. Linear and angular measurements; Direct and indirect methods, use of chain and tape, errors in chaining, meridians, azimuths and bearings, declination, dip, computation of angle, errors due to local attraction.

UNIT-II	LEVELING AND CONTOURING	Hours: 09

Leveling: Concept and terminology, temporary and permanent adjustments, method of leveling, height of instrument and rise and fall method.
Contouring: Characteristics and uses of contours; methods of conducting contour surveys and their plotting.

UNIT-III	COMPUTATION OF AREAS AND VOLUMES	Hours: 09

Computation of areas directly from field measurements methods, computation of areas along irregular boundaries and regular boundaries.

Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

UNIT-IV	THEODOLITE AND TRAVERSE SURVEYING	Hours: 09

Theodolite, description of transit theodolite, definitions and terms, temporary and permanent adjustments, measurement of horizontal and vertical angles. Trigonometrical leveling height and distance problems, traverse survey and methods of traversing, closing errors in traversing.

UNIT-V	TACHEOMETRIC AND ADVANCED SURVEYING	Hours: 09

Tacheometry: Stadia and tangential methods of tacheometry. Distance, elevation and depression formulae for staff held in vertical and inclined position.
Curves: Definition, types of curves, design and setting out, simple and compound curves.
Advanced Surveying: Basic principles of total station, global positioning system and geographic information system.

Text Books:

1. Duggal S. K., "Surveying (Vol-1and 2)", Tata Mc Graw-Hill Publishers, New Delhi, 10th Edition, 2004.
2. C. Venkatramaiah, "Textbook of Surveying", Universities Press Pvt. Ltd., India, 3rd Edition, 2013.
3. Dr A. M. Chandra, "Surveying Problem Solving with theory and objective type questions", New

Age International Private Limited Publishers, New Delhi, 2nd Edition, 2005.
4. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain , "Surveying Vol.1", Laxmi Publications Private Limited, NewDelhi, 11th Edition, 2005.

Reference Books:

1. R. Subramanian, "Surveying and Leveling", Oxford University Press, New Delhi. 2nd Edition, 2012.
2. M. James, Anderson Edward Mikhail, "Surveying Theory and Practice", Tata McGraw Hill, New Delhi, 7th Edition, 2000.
3. Arthur R Benton, Philip J Taety, "Elements of Plane Surveying", McGraw-Hill Education, New Delhi. 8th Edition, 2000.
4. Sathish Gopi, R. Sathi Kumar N., "Advanced Surveying Total Station GIS and Remote Sensing", 1st Edition, 2006.

Web References:

1. https://en.wikipedia.org/wiki/Surveying
2. https://www.nptel.ac.in/courses/105107122/home.htm
3. https://www.aboutcivil.org/surveying-levelling%20II.html

E-Text Books:

1. http://www.freeengineeringbooks.com/Civil/Surveying-Books.php
2. https://www.jntubook.com/surveying-textbook-free-download/

ENGINEERING GEOLOGY
(CE)

Semester: III

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A3103	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. Know the geological classification of rocks into igneous, sedimentary and metamorphic rocks and identification of intrusive and extrusive igneous rocks.
II. Learn how to identify weathered minerals and rocks.
III. Learn about structural geology, mineralogy and petrology.
IV. Know case histories of failures of civil engineering constructions due to geological drawbacks and importance of geology from civil engineering point of view.

UNIT-I	WEATHERING OF ROCKS	Hours: 09

Introduction: Importance of geology from civil engineering point of view. Brief study of case histories of failures of some civil engineering constructions due to geological draw backs. Importance of physical geology, petrology and structural geology.

Weathering of Rocks: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like granite.

UNIT-II	MINERALOGY AND PETROLOGY	Hours: 09

Mineralogy: Definition of mineral, importance of study of minerals, different methods of study of minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldsper, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chrorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

Petrology: Definition of rock, geological classification of rocks into igneous, sedimentary and metamorphic. dykes and sills, common structures and textures of igneous, sedimentary and metamorphic rocks. Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate. Rock excavation, stone aggregates

UNIT-III	STRUCTURAL GEOLOGY	Hours: 09

Indian stratigraphy, palaeontology and geological time scale, out crop, strike and dip study of common geological structures associating with the rocks such as fold, faults unconformities, and joint types.

Ground water: Water table, common types of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield hazards, water in landslides their causes and effects, measures to be taken to prevent their occurrence. Importance of study of ground water, earthquake and landslides.

UNIT-IV	GEOLOGY OF DAMS AND RESERVOIRS	Hours: 09

Types of dams and bearing of geology of site in their selection, geological considerations in the selection of a dam site. Factors contributing to the success of a reservoir, geological factors influencing water tightness and life of reservoirs, geohazards, ground subsidence. Geophysical

studies: Importance of geophysical studies principles of geophysical study by gravity methods, magnetic methods, electrical methods, seismic methods, radio metric methods and geothermal method. Special importance of electrical resistivity methods and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of rock mechanics and environmental geology.

UNIT-V	TUNNELS	Hours: 09

Purpose of tunnelling, effects of tunnelling on the ground, role of geological considerations in tunnelling over break and lining in tunnels, tunnels in rock, subsidence over old mines, mining substances.

Text Books:

1. N. Chennkesavulu, "Engineering Geology", Mc Milan India Private Limited, New Delhi, India, 12th Edition, 2009.
2. Venkat Reddy, "Engineering Geology", Vikas Publications, New Delhi, India, 2nd Edition, 2011.
3. Vasudev Kanithi, "Engineering Geology", University Press, 1st Edition, 2013.
4. Gokhale, "Principles of Engineering Geology", BS Publications, 2009.

Reference Books:

1. F.G. Bell, "Fundamentals of Engineering Geology", Butterworth's Publications, 3rd Edition, New Delhi, 1992.
2. K. V. G. K. Gokhale, "Principles of Engineering Geology", BS Publications, New Delhi, India, 5th Edition, 5th Edition, 2008.

Web References:

1. http://ocw.mit.edu/courses/earth-atmospheric-and-planetary-sciences/12-001-introduction-to-geology-fall-2013/
2. http://nptel.ac.in/courses/105105106/

E-Text Books:

1. http://cepdf.blogspot.in/2012/07/geology-for-civil-engineers-pdf-book.html
2. http://nptel.ac.in/courses/105105106/

FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING
(Common for CE / ME)

Semester: III

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A3204	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 Kirchhoff laws and their applications in series and parallel electric circuits.
II. Discuss principle and operation of measuring instruments.
III. Analyze the application of AC and DC machines.
IV. Understand diode and transistor operation.

UNIT-I	ELECTRIC CIRCUITS AND MEASURING INSTRUMENTS	Hours: 10

Electrical circuits: Basic definitions, types of elements, Ohm's law, resistive networks, inductive networks, capacitive networks, Kirchhoff's laws, series, parallel circuits and star-delta and delta-star transformations, simple problems; Faraday's law of electromagnetic induction.
Instruments: Basic principle of indicating instruments-Permanent magnet moving coil and moving iron instruments.

UNIT-II	DC MACHINES	Hours: 07

DC machines: Principle of operation DC generator, EMF equation, types, DC motor types, torque equation, applications, three point starter.

UNIT-III	ALTERNATING QUANTITIES AND AC MACHINES	Hours: 11

Alternating quantities: sinusoidal AC voltage, average, RMS, form and peak factor, concept of three phases AC.
Transformer: Principle of operation of single phase transformers, EMF equation, losses, efficiency and regulation.

Induction motor: Principle of operation of induction motor, slip, torque characteristics, applications.
Alternator: Principle of operation of alternator, EMF equation, efficiency and regulation by synchronous impedance method.

UNIT-IV	DIODES AND TRANSISTORS	Hours: 09

P-N junction diode, symbol, V-I characteristics, diode applications, rectifiers, half wave, full wave and bridge rectifiers, simple problems; PNP and NPN junction transistor, CE, CB, CC configurations, transistor as an amplifier.

UNIT-V	DIGITAL ELECTRONICS	Hours: 08

Logic gates**,** flip-flops: D, T, J-K, SR, ripple counter; ring counter; shift register sequences, ring counter using shift register.

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 Mc Graw Hill, 7th Edition, 2010.
4. P.S. Bimbra, "Electrical Machines", Khanna Publishers, 2nd Edition, 2008.
5. J. P. J. Millman, C. C. Halkias, Satyabrata Jit, "Millman's Electronic Devices and Circuits", Tata Mc Graw Hill, 2nd Edition, 1998.

Reference Books:
1. David A. Bell, “Electric Circuits”, Oxford University Press, 9th Edition, 2016. 2. M. Arshad, “Network Analysis and Circuits”, Infinity Science Press, 9th Edition, 2016. 3. A. Bruce Carlson, “Circuits”, Cengage Learning, 1st Edition, 2008. 4. S. Salivahanan, N. Suresh Kumar, A. Vallavaraj, “Electronic Devices and Circuits”, Tata Mc Graw Hill, 2nd Edition, 2011.
Web References:
1. http://powerlab.ee.ncku.edu.tw 2. textofvideo.nptel.iitm.ac.in 3. textofvideo.nptel.iitm.ac.in
E-Text Books :
1. https://www.textbooksonline.tn.nic.in 2. https://www.bookboon.com 3. https://www.ktustudents.in

PROBABILITY AND PARTIAL DIFFERENTIAL EQUATIONS
(CE)

Semester: III

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A3805	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. Enrich the knowledge of probability on single random variables and probability distributions.
II. Express non periodic function to periodic function using Fourier series and Fourier transforms.
III. Apply the partial differential equations to solve the boundary value problems.

UNIT-I **SINGLE & MULTIPLE RANDOM VARIABLES** **Hours: 09**

Random variables: Discrete and continuous, probability distributions, mass function-density function of a probability distribution. Mathematical expectation. Moment about origin, central moments, moment generating function of probability distribution; joint probability distributions; joint probability mass, density, function, marginal probability, mass, density functions.

UNIT-II **PROBABILITY DISTRIBUTIONS** **Hours: 09**

Binomial, Poisson and normal distributions and their properties.

UNIT-III **FOURIER SERIES** **Hours: 09**

Definition of periodic function, determination of Fourier coefficients; Fourier expansion of periodic function in a given interval of length 2π.

Fourier series of even and odd functions; Fourier series in an arbitrary interval; Half- range Fourier sine and cosine expansions.

UNIT-IV **PARTIAL DIFFERENTIAL EQUATIONS** **Hours: 09**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions; Solutions of first order linear equation: Lagrange equation and nonlinear standard type equations.

UNIT-V **APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS** **Hours: 09**

Method of separation of variables, applications to one dimensional wave equation, heat equation and two dimensional Laplace's equation under initial and boundary conditions.

Text Books:

1. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Publishers, 10th Edition, 2010.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, 2013.

Reference Books:

1. Murray Spiegel, John Schiller, "Probability and Statistics", Schaum's Outline Series, 3rd Edition, 2010.
2. S. S. Sastry, "Introduction methods of numerical analysis", Prentice-Hall of India Private Limited, 5th Edition, 2005.

Web References:

1. http://www.efunda.com/math/math_home/math.cfm
2. http://ocw.mit.edu/resources/#Mathematics

3. http://www.sosmath.com/ 4. http://mathworld.wolfram.com/
E-Text Books:
1. http://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

SURVEYING LABORATORY
(CE)

Semester: III

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A3104	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36			

OBJECTIVES:

The laboratory course should enable the students to:

I. Gain practical knowledge on calculation of an area and volume of an irregular and regular land surface using chains and tapes.
II. Measure bearings and angles using prismatic compass.
III. Perform levelling and contouring of ground surfaces.
IV. Evaluating the corrections and errors in observations, if any.

LIST OF EXPERIMENTS

Week-1	**CHAIN SURVEY**
Survey of an area by chain survey (closed traverse) and Plotting.	
Week-2	**CHAIN SURVEY**
Chaining across obstacles.	
Week-3	**COMPASS SURVEY**
Determination of distance between two inaccessible points with compass.	
Week-4	**COMPASS SURVEY**
Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.	
Week-5	**COMPASS SURVEY**
Correction for local attraction by prismatic compass.	
Week-6	**PLANE TABLE SURVEY**
Radiation method, intersection methods by plane Table survey.	
Week-7	**PLANE TABLE SURVEY**
Two point problems in plane table survey.	
Week-8	**PLANE TABLE SURVEY**
Three point problems in plane table survey.	
Week-9	**PLANE TABLE SURVEY**
Traversing by plane table survey.	
Week-10	**LEVELING**
Fly leveling (differential leveling).	
Week-11	**SECTIONING**
An exercise of longitudinal section and cross Section and plotting.	
Week-12	**CONTOURS**
Two exercises on contouring.	

Reference Books:
1. H. S. Moondra, Rajiv Gupta, “Laboratory Manual for Civil Engineering”, CBS Publishers Pvt.Ltd., New Delhi, 2nd Edition, 2013. 2. James M. Anderson, Edward M. Mikhail, “Surveying: Theory and Practice”, Tata McGraw-Hill Education, 2012. 3. S. S. Bhavikatti, “Surveying Theory and Practice”, IK Books, New Delhi, 2010. 4. IARE Surveying-I Laboratory Manual.
Web References:
1. https://archive.org/details/surveyingfieldwo00wil

LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 30 STUDENTS:

S. No.	List of equipments	Quantity
1	Chains	6
2	Cross Staff	6
3	Measuring Tapes	6
4	Steel Arrows	30
5	Ranging Rods	50
6	Total station	2
7	Plane Table set with stand	6
8	Dumpy level	1
9	Aluminum Leveling Staff	3
10	Theodolites	5

COMPUTER AIDED DRAFTING OF BUILDINGS
(CE)

Semester: III

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A3105	**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 to take data and transform it into graphic drawings.
II. Learn basic AutoCAD skills.
III. Learn basic engineering drawing formats for buildings.
IV. Develop the students to draft the building drawings using AutoCAD.
V. Prepare the student for future engineering positions.

LIST OF EXPERIMENTS

Week 1:	
Introduction to computer aided drafting.	
Week 2:	
Application of CAD.	
Week 3:	
Practice exercises on CAD software.	
Week 4:	
Basic drawing of plans of building using software.	
Week 5-6:	
Single storied building.	
Week 7-8:	
Multi storied building.	
Week 9-10:	
Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software.	
Week 11-12:	
Exercises on development of working of buildings.	

Reference Books:

1. M. N. Sesha Prakash, Dr. G. S. Servesh, "Computer Aided Design Laboratory", Laxmi Publications, 2012.
2. P. J. Sha, "Engineering Graphics", S. Chand Publishers, 2014.

Web References:

1. https://www.youtube.com/results?search_query=autocad+tutorial+for+civil+engineers
2. http://www.vidyarthiplus.com/vp/thread-22964.html#.V0l5Pvl97IU

LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 30 STUDENTS:

S. No	Equipment Name	Quantity
1.	Lenovo Monitor, Lenovo CPU intelCore P4, Processor @ 2.4 Ghz, 500 GB, hdd, 2GB RAM, Keyboard, Mouse, LAN 0/100/1000.	30
2.	Dell Monitor, Lenovo CPU intel Core P4, Processor @ 2.4 Ghz, 500GB, hdd, 2GB RAM, Keyboard, Mouse, LAN 0/100/1000.	4
3.	AutoCAD Software, STAAD PRO software.	50
4.	Printer TVS 250 star.	2

ENGINEERING GEOLOGY LABORATORY
(CE)

Semester: III

Course Code	Category	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A3106	Core	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES:

The course lab should enable the students to:

I. Prepare students for a career in geotechnical engineering.
II. Educate students in rock engineering concepts and approaches in the design and construction of underground openings.
III. Provide students with background and tools to identify the basic behavior of rock in underground openings.

LIST OF EXPERIMENTS

Week 1-3:

Study of physical properties and identification of minerals referred under theory.

Week 4-6:

Megascopic and microscopic description and identification of rocks referred under theory.

Week 7-8:

Megascopic and microscopic identification of rocks and minerals.

Week 9-10:

Interpretation and drawing of section for geological maps showing titled beds, faults, uniformities etc.

Week 11-12:

Simple structure geology problems.

Reference Books:

1. Fred G. Bell, "Engineering Geology and Construction" Spon Press, London, 2004.
2. Robert B. Johnson, Jerome V. Degraff , "Engineering Geology: A Lab Manual", Macmillan Publishing Company, 1st Edition, 1994.

Web References:

1. https://www.youtube.com/results?search_query=engineering+geology+lab
2. http://www.wctmgurgaon.com/pdf/EG%20Lab%20Manual.pdf
3. http://civil.gecgudlavalleru.ac.in/pdf/manuals/EngineeringGeologyLabManual.pdf

LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 30 STUDENTS:

S. No.	Equipment Name	Quantity
1.	Mineral specimens	43
2.	Rock specimens	26
3.	Streak collection (10 minerals)	1
4.	Streak plates	30
5.	Plastic specimen trays	100
6.	Geological Maps	4
7.	Binocular Polarizer and Ore Microscope	1
8.	Magnifying glass	3

MECHANICS OF MATERIALS AND STRUCTURES
(CE)

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4101	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. Classify the various types of loads and stresses acting on deformable solids.
II. Apply the concepts of strain energy and virtual work to calculate deflections in beams.
III. Understand the behavior of materials under torsion, axially loaded compressive stress and under pressure and their failure mechanism.
IV. Evaluate the stresses and deflections in members due to torsion, axial loads, combined direct & bending stresses, and hydrostatic pressure.

UNIT-I | **DEFLECTIONS BY ENERGY METHODS** | **Hours: 09**

Strain Energy: Resilience gradual, sudden, impact and shock loadings simple applications. Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear force.

Energy Methods: Work energy method, principal of virtual work, unit load method, Castigliano's theorems. Deflections of simple beams and pin jointed trusses. Concept extended to frames and indeterminate structures. Maxwell's theorem of reciprocal deflections; Betti's Law.

UNIT-II | **TORSION OF CIRCULAR SHAFTS** | **Hours: 09**

Theory of pure torsion: derivation of torsion equations: $\frac{T}{J} = \frac{q}{r} = \frac{N\theta}{L}$; Assumptions made in the theory of pure torsion, torsional moment of resistance, polar section modulus, power transmitted by shaft, combined bending and torsion and end thrust, design of shafts according to theories of failure. Introduction to springs, types of springs, deflection of close and open coiled helical springs under axial pull and axial couple, springs in series and parallel.

UNIT-III | **COLUMNS AND STRUTS** | **Hours: 09**

Introduction: Types of columns, short, medium and long columns, axially loaded compression members, crushing load, Euler's theorem for long columns, assumptions, derivation of Euler's critical load formulae for various end conditions, Equivalent length of a column, slenderness ratio, Euler's critical stress, Limitations of Euler's theory, Rankine's and Gordon formula, Long columns subjected to eccentric loading, Secant formula, Empirical formulae, Straight line formula and Prof. Perry's formula.

UNIT-IV | **BEAM COLUMNS - DIRECT AND BENDING STRESSES** | **Hours: 09**

Laterally loaded struts subjected to uniformly distributed and concentrated loads, maximum bending moment and stress due to transverse and lateral loading. Stresses under the combined action of direct loading and bending moment, core of a section, determination of stresses in case of chimneys, retaining walls and dams, conditions for stability, stresses due to direct loading and bending moment about both the axes.

UNIT-V	THIN AND THICK CYLINDERS, SPHERICAL SHELLS	Hours: 09

Thin seamless cylindrical shells, derivation of formula for longitudinal and circumferential stresses, hoop, longitudinal and volumetrical strains, changes in diameter and volume of thin cylinders, thin spherical shells. Lames theory for thick cylinders, derivation of Lames formulae, distribution of hoop and radial stresses across thickness, design of thick cylinders, compound cylinders, necessary difference of radii for shrinkage, thick spherical shells.

Text Books:

1. F. Beer, E. R. Johnston, J. DeWolf , "Mechanics of Materials", Tata McGraw-Hill Publishing Company Ltd., New Delhi, India, 1st Edition, 2008.
2. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, "Mechanics of Materials", Laxmi Publications Pvt. Ltd.,
3. New Delhi, 12th Edition, 2007.
4. S. S. Bhavikatti, "Strength of Materials", Vikas Publishing House Pvt. Ltd., New Delhi, 5th Edition, 2013.
5. R. K. Bansal, "A Textbook of Strength of Materials", Laxmi Publications (P) Ltd., New Delhi, 2nd Edition, 2007.

Reference Books:

1. D. S. Prakash Rao, "Strength of Materials A Practical Approach Vol.1", Universities Press (India) Pvt. Ltd., India, 3rd Edition, 2007.
2. J. M. Gere, S.P. Timoshenko, "Mechanics of Materials, SI units edition", CL Engineering, USA., 5th Edition, 2000.
3. E. G. Popov, "Engineering Mechanics of Solids", Pearson Education, India, 21st Edition, 2015.
4. N. Krishan Raju and D.R.Gururaje, "Advanced Mechanics of Solids and Structures", Narosa Publishing House, 4th Edition, 2014.

Web References:

1. http://www.nptelvideos.in/2012/11/strength-of-materials-prof.html
2. http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-050-solid-mechanics-fall-2004/lecture-notes/
3. https://www.youtube.com/watch?v=coRgpxG2pyY&list=PLLbvVfERDon3oDfCYxkwRct1Q6YeOzi9g

E-Text Books:

1. http://physics.fe.uni-lj.si/students/literatura/20131029083424925_2.pdf
2. http://staff.fit.ac.cy/eng.sh/lessons/AMEM%20314/AMEM_314_Theory.doc

FLUID MECHANICS
(CE)

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4102	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. Study the effect of fluid properties on a flow system.
II. Understand the concept of fluid pressure, its measurements and applications.
III. Understand the static, kinematic and dynamic behavior of fluids, their flow characteristics, their governing equations and their applications to real life engineering problems.
IV. Analyse fluid flow and study the flow parameters using measuring devices.

UNIT-I	FLUID STATICS	Hours: 09

Introduction: Dimensions and units, physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion pressure at a point, Pascal's law, hydrostatic law, atmospheric, gauge and vacuum pressure, measurement of pressure. Pressure gauges, manometers: Differential and micro manometers.

Hydrostatic forces: Hydrostatic forces on submerged plane, horizontal, vertical, inclined and curved Surfaces, center of pressure. Derivations and problems.

UNIT-II	FLUID KINEMATICS	Hours: 09

Fluid Kinematics: Description of fluid flow, stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows, equation of continuity for one, two , three dimensional flows , stream and velocity potential functions, flow net analysis.

UNIT-III	FLUID DYNAMICS AND FLUID MEASUREMENTS	Hours: 09

Fluid Dynamics: Surface and body forces , Euler's and Bernoulli's equations for flow along a stream line for 3D flow, Navier, Stokes equations (explanation), momentum equation and its application , forces on pipe bend.

Fluid measurements: Pitot tube, venturimeter and orifice meter, classification of orifices, flow over rectangular, triangular and trapezoidal and stepped notches, broad crested weirs.

UNIT-IV	BOUNDARY LAYER THEORY	Hours: 09

Boundary Layer Theory: Approximate Solutions of Navier Stoke's Equations, Boundary layer, concepts, Prandtl contribution, characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent boundary layers, boundary layer in transition, separation of boundary layer, control of boundary layer, flow around submerged objects, drag and lift, magnus effect.

UNIT-V	CLOSED CONDUIT FLOW	Hours: 09

Closed Conduit Flow: Reynold's experiment, characteristics of laminar and turbulent flows. Flow between parallel plates, flow through long tubes, flow through inclined tubes. Laws of fluid friction, Darcy's equation, minor losses, pipes in series, pipes in parallel, total energy line and hydraulic gradient line. Pipe network problems, variation of friction factor with Reynold's number, moody's chart.

Text Books:

1. A.K. Jain, "Fluid Mechanics including Hydraulic Machines", Khanna Publishers, New Delhi, 12th Edition, 2009.
2. S. K. Som, G. Biswas, "Introduction to Fluid Machines", Tata McGraw-Hill Publishers Pvt. Ltd., 2nd Edition, 2009.
3. R.K Rajput, "Fluid Mechanics and Hydraulic Machines", Standard book house, 11th Edition, 2009.
4. P.N. Modi, S.M. Seth, "Hydraulics and Fluid Mechanics", Rajsons Publications Pvt. Ltd., 25th Edition, 2004.

Reference Books:

1. Frank M White, "Fluid Mechanics," Tata McGraw Hill Pvt. Ltd., NewDelhi, 7th Edition, 2011.
2. Dr. R. K Bansal ,"Fluid Mechanics and Hydraulic Machines", Laxmi Publications (P) ltd., NewDelhi, 12th Edition, 2004.
3. A. K. Mohanty, "Fluid Mehanics", Prentice Hall of India Pvt. Ltd., New Delhi, 7th Edition, 1994.
4. D. Ramdurgaia, "Fluid Mechanics and Machinery", New Age Publications,3rdEdition, 2007.

Web References:

1. http://web.mit.edu/hml/ncfmf.html
2. http://nptel.ac.in/courses/105101082/
3. http://ocw.mit.edu/courses/aeronautics-and-astronautics/16-01-unified-engineering-i-ii-iii-iv-fall-2005-spring-2006/fluid-mechanics/

E-Text Books:

1. http://nptel.ac.in/courses/105101082/
2. http://bookboon.com/en/engineering-fluid-mechanics-ebook
3. http://www.potto.org/downloads.php

CONCRETE TECHNOLOGY
(CE)

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
4103	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. Classify basic principles in concrete science.
II. Understand the influence of various materials in concreting.
III. Analyze the mechanism of concrete and its properties.
IV. Identify the various defects in concrete.
V. Create various concrete mix designs.
VI.

UNIT- I	CEMENTS AND ADMIXTURES	Hours: 10

Cements and admixtures: Portland cement, chemical composition, hydration, setting of cement, structure of hydrate cement, test on physical properties, different grades of cement. Admixtures: Mineral and chemical admixtures, properties, dosage, effects, usage.

UNIT-II	AGGREGATES	Hours: 09

Aggregates: Classification of aggregate, particle shape and texture, bond, strength and other mechanical properties of aggregate, specific gravity, bulk density, porosity, adsorption and moisture content of aggregate, bulking of sand, deleterious substance in aggregate, soundness of aggregate, alkali aggregate reaction, thermal properties, sieve analysis, fineness modulus, grading curves, grading of fine and coarse aggregates, gap graded aggregate, maximum aggregate size.

UNIT-III	FRESH CONCRETE	Hours: 10

Fresh concrete: Workability, factors affecting workability, measurement of workability by different tests, setting times of concrete, effect of time and temperature on workability, segregation and bleeding, mixing and vibration of concrete, steps in manufacture of concrete, quality of mixing water.

UNIT-IV	HARDENED CONCRETE	Hours: 09

Hardened concrete: Water cement ratio, Abram's law, gel space ratio, nature of strength of concrete, maturity concept, strength in tension and compression, factors affecting strength, relation between compression and tensile strength, curing.

Testing of hardened concrete: Compression tests, tension tests, factors affecting strength, flexure tests, splitting tests, non-destructive testing methods, codal provisions for non destructive testing.

Elasticity, creep and shrinkage: Modulus of elasticity, dynamic modulus of elasticity, Poisson's ratio, creep of concrete, factors influencing creep, relation between creep and time, nature of creep, effects of creep, shrinkage, types of shrinkage.

UNIT-V	MIX DESIGN	Hours: 07

Mix design: Factors in the choice of mix proportions, durability of concrete, quality control of concrete, statistical methods, acceptance criteria, proportioning of concrete mixes by various methods, Bureau of Indian standard method of mix design.

Text Books :

1. M. S. Shetty, "Concrete Technology", S. Chand and Company Limited, New Delhi, 7th Edition, 2014.
2. M. L. Gambhir, "Concrete Technology", Tata McGraw-Hill Publishing Company Limited, New Delhi, 3rd Edition, 2008.

3. A. R. Santha Kumar, "Concrete Technology", Oxford University Press, New Delhi, 1st Edition, 2007.
Reference Books:
1. A.M. Neville, "Properties of Concrete", J J Brooks, 5th Edition, 2014.
Web References:
1. http://www.concretetech.com/ 2. http://www.cement.org/for-concrete-books-learning/concrete-technology 3. http://www.concretec.ae/ 4. http://theconstructor.org/concrete/
E-Text Books:
1. https://www.jntubook.com/concrete-technology-textbook-free-download/ 2. http://www.civilenggforall.com/2015/09/concrete-technology-theory-and-practice-by-ms-shetty-free-download-pdf-civilenggforall.html

STRUCTURAL ANALYSIS
(CE)

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4104	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 processes of analysis of various structures such as beams, trusses, arches and frames.
II. Distinguish between determinate and indeterminate structural analysis.
III. Analyze the various structures to calculate critical stresses and deformations.
IV. Apply the force and displacement methods of analysis of indeterminate structures.
V. Create the shear force, bending moment and influence line diagrams for various structures.

UNIT-I	ANALYSIS OF PIN-JOINTED FRAMES (TRUSSES)	Hours: 09

Types of frames: perfect, imperfect and redundant. Pin jointed frames (trusses), Analysis of determinate pin jointed frames, Analysis of determinate pin jointed frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

UNIT-II	ARCHES	Hours: 09

Introduction, Types of Arches, Comparison between three hinged and two hinged arches. Normal thrust and radial shear in an arch. Geometrical properties of parabolic and circular arch.

Three hinged circular arch at different levels. Absolute maximum bending moment diagram for a three hinged arch.

Two hinged arches: Introduction, classification of two hinged arches, analysis of two hinged parabolic arches, secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

UNIT-III	FORCE METHOD OF ANALYSIS OF INDETERMINATE BEAMS	Hours: 09

Analysis of propped cantilever and fixed beams using the method of consistent deformation, including the beams with varying moments of inertia, subjected to uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads, shear force and bending moment diagrams for propped cantilever and fixed Beams, deflection of propped cantilever and fixed beams; effect of rotation of a support.

Continuous beams, Clapeyron's theorem of three moments, analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed, continuous beams with overhang. Effects of sinking of supports.

UNIT-IV	DISPLACEMENT METHOD OF ANALYSIS: SLOPE DEFLECTION AND MOMENT DISTRIBUTION	Hours: 09

Derivation of slope, deflection equation, concept of moment distribution method, application of the methods to continuous beams with and without settlement of supports. Shear force and bending moment diagrams, elastic curve. Application of the methods to single bay-single storey frames with and without sway.

UNIT-V	MOVING LOADS AND INFLUENCE LINES	Hours: 09
Introduction, maximum shear force and bending moment at a given section and absolute maximum shear force and bending moment due to various load cases focal length. Definition of influence line for shear force, influence line for bending moment, load position for maximum shear force at a section, load position for maximum bending moment at a section.		

Text Books:

1. Devadas Menon, "Structural Analysis Vol.1 and Vol. 2", Narosa Publishers, New Delhi, 7th Edition, 2010.
2. S. S. Bhavikatti, "Structural Analysis Vol.1 and Vol. 2", Vikas Publishing House, New Delhi, 12th Edition, 2010.
3. R. C. Hibbler, "Structural Analysis", Pearson Education, India, 2008.
4. C. S. Reddy, "Basic Structural Analysis", McGraw-Hill Education (India), Delhi, 2000.

Reference Books:

1. T. S. Thandavamoorthy, "Structural Analysis", Oxford Higher Education, India, 3rd Edition, 2011.
2. C. K. Wang, "Intermediate Structural Analysis", McGraw-Hill Education, Delhi, 5th Edition, 2014.

Web References:

1. http://nptel.ac.in/courses/105101085/
2. http://nptel.ac.in/courses/105105109/
3. http://freevideolectures.com/Course/97/Structural-Analysis-II

E-Text Books:

1.http://engineeringfreedownload.blogspot.in/2014/02/structural-analysis-book-by-r-c.html
2. http://mosttutorials.blogspot.in/2010/11/download-free-civil-engineering-ebooks.html

BUILDING MATERIALS, CONSTRUCTION AND PLANNING
(CE)

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4105	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. To impart knowledge on the basic materials used in construction practices and their properties.
II. To introduce students to the basic concepts of construction planning.
III. To impart knowledge on the basic building components and construction components.
IV. To give knowledge in construction practices and awareness of building laws.

UNIT-I	BASIC BUILDING MATERIALS	Hours: 09

Stones, bricks and tiles: Building stones, classification and quarrying: properties structural requirements, dressing, bricks, composition of brick earth, manufacture and structural requirements.

Wood, aluminum, glass and paints: wood, structure, types and properties, seasoning, defects; alternate materials for wood, GI / fiber reinforced glass bricks, steel and aluminum.

UNIT-II	CEMENT AND ADMIXTURES	Hours: 09

Ingredients of cement, manufacture, chemical composition, hydration, field & lab tests, admixtures, mineral and chemical admixtures, uses.

UNIT-III	BUILDING COMPONENTS AND SERVICES	Hours: 09

Building components: Lintels, arches, and vaults stair cases, types of floors, types of roofs: Flat, curved, trussed; foundations types; Damp proof course; joinery, doors, windows, materials, types.

Building services: Plumbing services: water distribution, sanitary, lines and fittings; ventilations: functional requirements systems of ventilations. Air conditioning, essentials and types; Acoustics, characteristic absorption, acoustic design; fire protection, fire hazards, classification of fire resistant materials and constructions.

UNIT-IV	MASONARY, FINISHING, FORMWORK	Hours: 09

Masonry: Brick masonry, types, bonds; stone masonry, types; composite masonry, Brick-stone composite; concrete reinforced brick. Finishers: Plastering, pointing, painting, cladding, types, tiles.

UNIT-V	FORMWORK, BUILDING PLANNING	Hours: 09

Form Work: Requirements, standards, scaffoldings, design; shoring, under pinning

Planning: Principles of building planning, classification of buildings and building by laws.

Text Books:

1. S.P. Arora, S.P. Bindra, "Building Materials and Construction", Dhanpat Rai Publications, New Delhi, 4th Edition, 2012.
2. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, "Building Construction, Laxmi Publications (P) Ltd., New Delhi, India, 11th Edition, 2005.
3. S. Mahaboob Basha, "Building Materials, Construction and Planning", Anuradha Publications, Chennai, 1st Edition, 2012.

Reference Books:

1. S. K. Duggal, "Building materials", New Age International Publishers, 4th Edition, 2012.
2. P. C. Varghese, "Building construction", PHI Learning Pvt. Ltd., 2nd Revised Edition, 2015.
3. R. Chuddy, "Construction technology – Volume 1 & 2", Longman, U.K., 1st Edition, 2015.

Web References:

1. http://nptel.ac.in/courses/105102088/
2. http://iare.ac.in/?q=civil-engineering/building-materials-construction-planning
3. https://en.wikipedia.org/wiki/Building_material

E-Text Books:

1. https://www.scribd.com/doc/62204255/Engineering-Materials
2. https://drive.google.com/file/d/0B_S5UcX4PQJuWUpZclQ3Z3BLUHc/edit?pref=2&pli=1

INTELLECTUAL PROPERTY RIGHTS

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4801	Audit	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 different types of intellectual property.
II. Familiarize with the rights of ownership, evaluation, registration, protection and acquisition of trademarks with procedures.
III. Understand law of intellectual property, auditing and advantages.
IV. Explore knowledge in trademarks, copyrights, patents and trade secrets.
V. Enhance knowledge in new developments in intellectual property.

UNIT-I	INTRODUCTION TO INTELLECTUAL PROPERTY	Hours: 09

Introduction: Types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II	TRADE MARKS	Hours: 08

Purpose and function of trademarks, acquisition of trademarks rights, protectable matter, selecting and evaluating trademark and trademark registration processes.

UNIT-III	LAW OF COPYRIGHTS AND LAW OF PATENTS	Hours: 10

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 transfers.

UNIT-IV	TRADE SECRETS AND UNFAIR COMPETITION	Hours: 10

Trade secrets law: Determination of trade secrets status, liability for misappropriations of trade secrets, protection for submission, trade secrets litigation, misappropriation of right of publicly and false advertising.

UNIT-V	NEW DEVELOPMENTS OF INTELLECTUAL PROPERTY	Hours: 08

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, 1st Edition, 2009.
2. Prabuddha Ganguli, "Intellectual Property Right - Unleashing the knowledge economy", Tata Mc Graw Hill Publishing Company Ltd, 2001.

Reference Books

1. Catherine J. Holland, "Intellectual property: patents, trademarks, copyrights", trade secrets Entrepreneur Press, 2007.
2. Stephen Elias, "Patent, copyright and trademark: a desk reference to intellectual property law", Nolo Press, 1996.

Web References:
1. http://www.en.wikipedia.org/wiki/Intellectual property 2. http://www.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

TOTAL QUALITY MANAGEMENT

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4802	Audit	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 quality.
II. Interpret the knowledge about different tools of total quality management.
III. Apply different methods and tools for quality improvement.
IV. Formulate the new strategies for quality improvement.

UNIT-I	PRINCIPLES AND PRACTICES	Hours: 09

Introduction: Gurus of total quality management, historic review, benefits of total quality management 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	PROCESS IMPROVEMENT	Hours: 08

Continuous process improvement: The Juran trilogy, The plan, do, check, act 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	Hours: 10

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 14000 series, benefits of environmental management system, relation to healthy and safety, quality function deployment, the voice of the customer, building a house of quality, quality function deployment process.

UNIT-IV	QUALITY BY DESIGN	Hours: 10

Benefits, communication model, failure mode and effective analysis, failure rate, the process failure mode and effective analysis 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	Hours: 08

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

1. Joel E Ross, " Total Quality Management", CRC press, 3rd Edition, 2015.

REFERENCE BOOKS
1. Dale H. Besterfeild, Carlon Bester field, “Total Quality Management”, Pearson Education, 2015. 2. Sridhara bhat, “Total Quality Management Texts and Cases”, Himalaya, 2015. 3. Poornima M Charantimath, “Total Quality Management”, Pearson Education, 2015.
Web References:
1. http://www.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://www.bookboon.com/en/quality-management-ebook

PROFESSIONAL ETHICS AND HUMAN VALUES

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4803	Audit	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 fundamental, theoretical and historiographical topics of professional ethics and human values.
II. Use independence and self evaluation professional ethics and human values, so that they can grasp the core values as independent thinkers.
III. Develop analytical and pragmatic abilities and situational reasoning aligned towards right and wrong.

UNIT-I	INTRODUCTION TO PROFESSIONAL ETHICS	Hours: 08

Basics of profession: Engineering and professionalism, two model s 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	Hours: 10

Engineering ethics, variety of moral issues, types of inquiry moral dilemmas, moral autonomy, 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	Hours: 09

Human values, morals, values, 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 AND RIGHTS	Hours: 10

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 AND VALUES	Hours: 09

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. P. S. R. Murthy, "Indian Culture Values and Professional Ethics", BS Publications, 2013.
2. Caroline Whit back, "Ethics in Engineering Practice and Research", Cambridge University Press, 2011.
3. Mike Martin and Roland Schinzinger, "Ethics in Engineering" McGraw Hill, 2003.

Reference Books:
1. Charles E. Harris, Micheal J. Rabins, "Engineering Ethics, Cengage Learning", 5th Edition, 2013. 2. Edmund G. Seebauer and Robert L. Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.
Web References:
1. http://bit.ly/2a83ZJ2 2. http://bit.ly/29SyL7i 3. http://ow.ly/57eB302kbTS
E-Text Books:
1. https://goo.gl/xzg6CM 2. https://goo.gl/x7n1wq

LEGAL SCIENCES

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4804	Audit	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. Acquaint the law 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 practical training in conducting research in this course.

UNIT-I	CONCEPT OF LEGAL SCIENCE	Hours: 08

Fundamentals of legal science and 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 AND LEGAL SYSTEMS	Hours: 10

Principles of corporate law conjunction; temporal, subordinate clauses complex sentences, intellectual property rights, contract law, cyber law.

UNIT-III	CONSTITUTION AND ADMINISTRATIVE LAW	Hours: 09

Minorities law and human rights: International and national sphere, media law, health law, globalization vis-a-vis human rights, significance of human rights.

UNIT-IV	HUMAN RIGHTS INTERNATIONAL AND NATIONAL SPHERE	Hours: 09

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, the role of Indian judiciary, critical examination of the human rights, human rights commission, treaty mechanism with respect to covenants international covenant on economic, social and cultural rights, international covenant on civil and political rights, convention on the elimination of discrimination against women and child rights convention.

UNIT-V	SCIENTIFIC METHODOLOGY IN LEGAL SYSTEMS	Hours: 09

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, interdisciplinary research and legal research models, arm chair research vis-a-vis empirical research, legal research, common law, civil law, legal systems.

Text Books:

1. Robert Watt, “Concise book on Legal Research”.
2. Ram Ahuja, “Research Methodology”.
3. Good and Hatt, “Research Methodology”.
4. Pauline Young, “Research Methodology”.
5. Earl Babbie, “Research Methodology”.

6. Anwarul Yaqin, “Legal Research Methodology”.
Reference Books:
1. Wilkinson Bhandarkar, “Research Methodology”. 2. Selltis Johoda, “Research Methodology”. 3. Stott D, “Legal Research”. 4. Robert Watt and Francis Johns, “Concise Legal Research”. 5. S.K. Verma and Afzal Wani, “Legal Research Methodology”.
Web References:
1. http://www.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://www.humansecurityconf.polsci.chula.ac.th/Documents/Presentations/Shanawez.pdf
E-Text Books:
1. http://www.as.nyu.edu/docs/IO/1172/globaljustice.pdf

GENDER SENSITIVITY

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4805	Audit	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. Introduce basic concepts relating to gender and to provide logical understanding of gender roles.
II. Present various perspective of body and discourse on power relationship.
III. Conscientise on cultural construction of masculinity and femininity.
IV. Trace the evolution of gender studies from women's studies.

UNIT-I	INTRODUCTION	Hours: 09

Sex and Gender: Types of gender, gender roles and gender division of labor, gender stereotyping and gender discrimination, the other and objectification, male gaze and objectivity.

UNIT-II	GENDER PERSPECTIVES OF BODY	Hours: 08

Biological, phenomenological and socio, cultural perspectives of body, body as a site and articulation of power relations, cultural meaning of female body, women's lived experiences, gender and sexual culture.

UNIT-III	SOCIAL CONSTRUCTION OF FEMININITY	Hours: 10

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	Hours: 10

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	Hours: 08

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. Cecilia L. Ridgeway, "Framed by Gender: How Gender Inequality Persists in the Modern World", Oxford scholarship, 2011.
2. William M Johnson, "Recent reference books in religion".

Reference Books

1. Alolajis mustapha, sara mils, "Gender representation in learning materials", Routledge, 2016.

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://www.en.wikipedia.org/wiki/Gender_sensitization
E-Text Books:
1. http://www.ebooklibrary.org/articles/gender_sensitization 2. http://www.cbseacademic.in/publication_ebooks.html

CLINICAL PSYCHOLOGY

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4806	Audit	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 broad foundation of knowledge pertinent to the organism, developmental, social and situational factors that are relevant to the initiation and maintenance of human behavior.
II. Able to identify when issues of diversity are present and implement effective strategies to deal with these issues during work with patients.
III. Professional identity and practice as clinical psychologists through fundamental knowledge of psychology, commitment to professional ethics, understanding of multiculturalism and diversity, and by participation in life-long learning.

UNIT-I	BASIC PSYCHOLOGY	Hours: 09

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	Hours: 08

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, visual sense, auditory sense, the other senses; Consciousness meaning, functions, divided consciousness, stages of sleep, dreams, meditation, hypnosis.

UNIT-III	ATTENTION AND PERCEPTION	Hours: 10

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	Hours: 10

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 AND MENTAL HEALTH	Hours: 08

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, professional code of conduct and ethical issues.

Text Books

1. M. S. Bhatia, “Clinical Psychology”, 2008
2. Paul Bennett, “Abnormal and Clinical Psychology”, Oxford university press, 2006.

Reference Books
1. Dorling Kindersley, "Baron, R. A. Psychology", 5th Edition, New Delhi, 2009. 2. Hillgard, E. R., C. A. Richard, and L. A. Rita, "Introduction to Psychology", Oxford & IBH, 6th Edition, New Delhi 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

ENGLISH FOR SPECIAL PURPOSES

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4807	Audit	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 Speak English effectively.
II. Familiarize students with different dialects of English language.
III. Overcome their stage fear.
IV. Improve their presentation skills and reading skills.

UNIT-I	PRESENTATION SKILLS	Hours: 08

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	Hours: 10

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	Hours: 09

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	Hours: 09

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	Hours: 09

Actively participate in group discussions 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", 2009.
2. Clive Oxenden , Christina Latham -Koenig, Paul Seligson, "New English File, Intermediate, Workbook," 2006

Reference Books:

1. Wren and Martin, "English Grammar & Composition", S.Chand & Co, New Delhi.2009.
2. Ron Cowan, "The Teacher's Grammar of English: A Course Book and Reference Guide, with answers", Cambridge University Press, 2008.
3. Geofrey Leech, "An A-Z of English Grammar & Usage", Pearson Education Limited, 2001.

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

ENTREPRENEURSHIP

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4808	Audit	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 mindset of the entrepreneurs.
II. Able to identify ventures for launching the new companies
III. Develop an idea on the legal framework and also understand strategic perspectives in entrepreneurship.

UNIT-I	UNDERSTANDING ENTREPRENEURIAL MINDSET	Hours: 08

The revolution impact of entrepreneurship, the evolution of entrepreneurship, approaches to entrepreneurship, process approach, and twenty first centaury trends in entrepreneurship.

UNIT-II	THE INDIVIDUAL ENTREPRENEURIAL MINDSET	Hours: 10

The individual entrepreneurial mind set and personality, the entrepreneurial journey, stress and the entrepreneur, the entrepreneurial ego, entrepreneurial motivations, corporate entrepreneurial mindset the nature of corporate entrepreneur, conceptualization of corporate entrepreneurship strategy sustaining corporate entrepreneurship

UNIT-III	LAUNCHING ENTREPRENEURIAL VENTURES	Hours: 09

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	Hours: 10

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, critical factors for new venture development, the evaluation process, feasibility criteria approach.

UNIT-V	STRATEGIC PERSPECTIVES IN ENTREPRENEURSHIP	Hours: 09

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. D F Kuratkoand, T V Rao, "Entrepreneurship-A South-Asian Perspective", Cengage Learning, 1st Edition, 2012.
2. Gordon & K.Natarajan, "Entrepreneurship Development", Himalaya, 2008.
3. Coulter, "Entrepreneurship in Action", PHI, 2nd Edition.
4. S.S. Khanka, "Entrepreneurial Development", S. Chand & Co. Ltd, 2007.

Reference Books:

1. Vijay Sathe, "Corporate Entrepreneurship", 1st Edition, Cambridge, 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, 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

GERMAN LANGUAGE

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4809	Audit	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. Develop the language skills in listening, speaking, reading and writing in German language.
II. Understand the learners to the lifestyle in Germany and the German culture.

UNIT-I	GERMAN SOUNDS	Hours: 08

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	Hours: 10

Infinite sentences; Use of konjunktiv i and konjunktiv ii, plusquam perfect, Modal verb, conjunction temporal, subordinates clauses complex sentences.

UNIT-III	GERMAN BASIC GRAMMAR	Hours: 09

Verbs - different forms - past tense and present perfect tense, adjectives and their declension, degrees of comparison;

Prepositions, genitive case - konjunktiv ii; Different conjunctions (co-coordinating and subordinating), simple, complex and compound sentences; Active and passive voice; Relative pronouns.

UNIT-IV	PURPOSE OF LANGUAGE STUDY	Hours: 09

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	Hours: 09

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 and Friedrich Schmoe Braun, “Deutsch als Fremdsprache IA Grundkurs”, 1994.

Reference Books:

1. Schulz/Griesbach, “Moderner Gebrauch der deutschen Sprache”.
2. Gerhard Kaufmann, “Wie sage ich das auf Deutsch”.
3. Hermann Glaser U.A, “Wege zur deutschen Literature”.
4. Benno Von Wiese (Auswahl und Einleitung): Deutschland erzahlt Von Arthur Schnitzler bis Uwe Johnson

Web References:
1. http://www.prsformusicfoundation.com/docs/408/Schenke%20-%20Seago%20-%20Basic%20German.pdf 2. https://www.upload.wikimedia.org/wikipedia/commons/2/2d/German.pdf
E-Text Books:
1. http://www.staidenshomeschool.com/files/Learning_German_Ebook.pdf 2. https://www.weblearn.ox.ac.uk/access/content/group/modlang/general/handbooks/09-10/prelims/german_language_guide_0910.pdf

DESIGN HISTORY

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4810	Audit	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 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, identifying the influences at work between the various different creative disciplines.
III. Develop their analytical and critical abilities, focusing on their search for their own expressive design language.

UNIT-I	INTRODUCTION TO DESIGN HISTORY	Hours: 08

Materials and techniques of design, design in the machine age, design, body, environmental design.

UNIT-II	DESIGN PRODUCTS	Hours: 10

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	Hours: 09

Styles of global innovation design, the service design basics, concepts of vehicle design, techniques of design engineering.

UNIT-IV	THE DESIGN INTERACTIONS	Hours: 10

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	Hours: 09

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", 2005.
2. Nicolas Nova, "Beyond Design Ethnography", 2014.

Reference Books:

1. Victor Margolin, Nynke Tromp, Bert van Meggelen, "Design for the Good Society Edited by Max Bruinsma".
2. Gilead Duvshani, "Foundation Design Studio".
3. Beppe Finessi, "How to Break the Rules of Brand Design in 10+8 Easy Exercises "

Web References:
1. http://www.artbook.com/9781938922398.html 2. http://www.artbook.com/9789064506437.html 3. http://www.artbook.com/1933045213.html
E-Text Books:
1. http://www.artbook.com/087070012x.html 2. http://www.artbook.com/9780910503877.html 3. http://www.artbook.com/9783775723312.html

STRENGTH OF MATERIALS LABORATORY
(CE)

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4106	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. Examine the mechanical properties of different solid engineering materials.
II. Identify the behavior of various material samples under different loads and equilibrium conditions.
III. Experiment with materials subjected to tension, compression, shear, torsion, bending and impact.
IV. Learn the science and art of extracting and analyzing material testing data and its interpretation.

LIST OF EXPERIMENTS

Week- 1 DIRECT TENSION TEST

To evaluate the tensile strength, the elastic limits and the young's modulus of a mild steel bar in tension using the Universal Testing Machine.

Week-2 BENDING TEST ON CANTILEVER BEAM

(a) To evaluate the deflections of the beam made of wood.
(b) To evaluate the deflections of the beam made of steel.

Week-3 BENDING TEST ON SIMPLY SUPPORTED BEAM

(a) To evaluate the deflections of the beam made of wood.
(b) To evaluate the deflections of the beam made of steel.

Week-4 TORSION TEST

To conduct torsion test on mild steel or cast iron specimen to determine modulus of rigidity.

Week-5 HARDNESS TEST

To conduct hardness test on mild steel, carbon steel, brass and aluminum specimens using
(a) Brinell's Hardness Test.
(b) Rockwell's Hardness Test.

Week-6 SPRING TEST

To determine the stiffness and modulus of rigidity of a spring wire.

Week-7 COMPRESSION TEST

(a) Wooden block.
(b) Concrete block.

Week-8 IMPACT TEST

(a) Izod test.
(b) Charpy Test.

Week-9	SHEAR TEST
To evaluate the shear strength of the given specimens using Universal Testing Machine.	
Week-10	**MAXWELL'S RECIPROCAL THEOREM**
To verify the Maxwell's Reciprocal theorem for beam deflections.	
Week-11	**STRAIN MEASUREMENT**
Use of electrical resistance strain gauges.	
Week-12	**CONTINUOUS BEAM**
To evaluate deflections on a continuous beam.	

Reference Books:

1. Hemant Sood, **"**Laboratory Manual on Testing of Engineering Materials", New Age International Publishers, New Delhi, 2nd Edition, 2007.
2. H.S. Moondra, Rajiv Gupta, "Laboratory Manual for Civil Engineering", CBS Publishers, New Delhi, 4th Edition, 2015.
3. IARE Strength of Materials Lab Manual.

Web Reference:

1. https://www.youtube.com/user/MaterialsScience 2000.

CONCRETE TECHNOLOGY LABORATORY
(CE)

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4107	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

OBJECTIVES:

The laboratory course should enable the students to:

I. Classify basic principles in concrete science.
II. Understand the influence of various materials in concreting.
III. Analyse the mechanism of concrete and its properties.
IV. Identify the various defects in concrete.
V. Create various concrete mix designs.

LIST OF EXPERIMENTS

Week-1

Aggregate crushing value.
Aggregate impact value.

Week-2

Specific gravity of coarse and fine aggregates.

Week-3

Attrition test.
Abrasion test.
Shape test.

Week-4

Penetration test.
Ductility test.

Week-5

Softening point test.
Flash and fire point tests.

Week-6

Normal consistency and Fineness of cement.

Week-7

Initial and final setting times of cement.
Specific gravity and Soundness of cement.

Week-8

Compressive strength of cement.

Week-9

Workability tests on fresh concrete by Compaction factor test, slump and Vee-bee.

Week-10
Young's modulus and compressive strength of concrete.
Week-11
Bulking of sand.
Week: 12-14
Non-destructive testing of concrete.
Reference Books:
1. U. S. Department of the Interior Water, "Concrete Manual" CBS Publishers, New Delhi, 1st Edition, 2015. 2. H. S. Moondra and Rajiv Gupta, "Laboratory Manual for Civil Engineering," CBS Publishers, New Delhi, 1st Edition, 2015.
Web Reference:
1. https://www.youtube.com/results?search_query=nitttr+chandigarh+concrete+technology

LIST OF EQUIPMENTS REQUIRED FOR A BATCH OF 30 STUDENTS:

S. No.	Equipment Name	Quantity
1	Apparatus for aggregate crushing test (IS 9376-1979)	1
2	Aggregate impact testing machine	1
3	Pycnometer	1
4	Length and elongation gauges(IS 2389)	1
5	Bitumen Penetration Set up	1
6	Ring and ball apparatus (IS 1205)	1
7	Penkey martins apparatus (IS 1448)	1
8	Vicats apparatus (IS 5513)	1
9	Lechatlirers apparatus (IS 5514)	1
10	Slump and compaction factor set up	1
11	Specific gravity bottle 50ml	3
12	Longitudinal compress meter	1
13	Ductility testing machine as per IS:1208	1
14	Los angles abration test machine(IS: 10070)	1
15	Devals Abrasion Test Machine (IS 2346 part IV)	1
16	Compressive testing machine of 200KN capacity	1
17	Vicat apparatus	2
18	Lechatlier's apparatus	3
19	Bulking of fine aggregate	1
20	Aggregate crushing and impact value apparatus	1
21	Workability test on SSC	1
22	Air Entrainment Test	1

23	Marsh cone test	1
24	Permeability of Concrete	1
25	Rebound hammer	1
26	Accelerated Curing Tank	1
27	Vee Bee Consistometer	1
28	Compaction factor test	1
29	Bitumen Extractor	1
30	Benzene 500ml	1
31	Ultra Sonic Pulse Velocity	1
32	J-Ring	1
33	Electric resistance strain meter	1
34	Flexural Testing Equipment for concrete	1
35	Rectangular beam mould for Flexure	1

ADVANCED SURVEYING LABORATORY
(CE)

Semester: IV

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A4108	Core	0	0	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. Gain practical knowledge on measuring horizontal and vertical angles.
II. Calculate heights and distances using trigonometric method.
III. Study about curves and their importance in practice.
IV. Plotting of contour and tracing the profile or plan.
V. Enhance the application of higher surveying instruments such as total station.

LIST OF EXPERIMENTS

Week-1

Study of theodolite in detail-practice for measurement of horizontal and vertical angles.

Week-2

Measurement of horizontal angles by method of repetition and reiteration.

Week-3

Trigonometric leveling- heights and distance problems.

Week-4

Heights and distances using principles of tacheometric survey.

Week-5

Curve setting: different methods.

Week-6

Setting out works for buildings and pipe lines.

Week-7

Determination of an area using total station.

Week-8

Traversing using total station.

Week-9

Contouring using total station.

Week-10

Determination of remote height using total station.

Week-11

State-out using total station.

Weeks 12-15
Calculating distance, gradient and different heights between two inaccessible points using total station.
Reference Books:
1. James M. Anderson, Edward M. Mikhail, "Surveying: Theory and Practice", Tata McGraw-Hill Education, 7th Edition, 2012. 2. S. S. Bhavikatti, "Surveying Theory and Practice" IK Books New Delhi, 4th Edition, 2010. 3. H.S. Moondra, Rajiv Gupta "Laboratory Manual for Civil Engineering", CBS Publishers Pvt .Ltd New Delhi, 2nd Edition, 2013. 4. P. Venugopala Rao, Vijayalakshmi Akella, "Textbook on surveying", PHI Learning, New Delhi, 1st Edition, 2015.
Web Reference:
1. https://archive.org/details/surveyingfieldwo00wil

LIST OF EQUIPMENTS REQUIRED FOR A BATCH OF 30 STUDENTS:

S. No.	Equipment Name	Quantity
1	Ranging rods (3 folds)	50
2	Cross staff with rod	6
3	Plane table set with stand	6
4	Measuring tape (30mtrs)	6
5	Optical square	6
6	Auto level	2
7	Aluminum levelling staffs	3
8	Planimeter	2
9	Theodolite	5
10	Total station	2

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 CIVIL ENGINEERING

Programme Educational Objectives (PEO's)

The current Civil Engineering program educational objectives were developed as part of the program's ongoing efforts to maintain through innovation in undergraduate program that meets the needs of our constituents. The current educational objectives of the Civil Engineering program are:

PEO – I: Capable to analyze, design, build, maintain, or improve civil engineering-based systems in the context of environmental, economic, and societal requirements.

PEO – II: Graduates will be provided with an educational foundation that prepares them to design and conduct experiments, to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability as well as to analyze and interpret data.

PEO – III: Graduates will demonstrate their ability to function on multidisciplinary teams.

PEO – IV: Graduates will develop an ability to identify, formulate, and solve engineering problems and to engage in life-long learning in advanced areas of Civil Engineering and related fields.

PEO – V: Graduates will have an ability to use the techniques, skills, and modern engineering tools necessary for Civil engineering practice and serve the community as ethical and responsible professionals.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO – I: **Understanding:** Graduates will have an ability to describe, analyze, and solve problems using mathematics and systematic problem-solving techniques.

PSO – II: **Analytical Skills:** Graduates will have an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

PSO – III: **Broadness:** Graduates will have a broad education necessary to understand the impact of engineering solutions in a global, economic, and societal context.

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.

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

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. 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.

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 80% in every course as stipulated by Institute. I am fully aware that an attendance of less than 70% in more than three 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