



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

## MECHANICAL ENGINEERING

### COURSE DESCRIPTOR

Course Title	RESEARCH METHODOLOGY AND IPR				
Course Code	BCSB31				
Programme	M.Tech (CAD/CAM)				
Semester	III				
Course Type	Core				
Regulation	R18				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	2	-	2	-	-
Course Faculty	Dr. P. Raghavulu, Professor				

#### I. COURSE OVERVIEW:

The main aim of research is to find out the truth which is hidden and which has not been discovered as yet. Though each research study has its own specific purpose. A clearly defined objective directs a researcher in the right direction. Clearly defined objectives are important feature of a good research study. Without a clear objective a researcher is aimless and directionless in conducting the study. Without focused objectives, no replicable scientific findings can be expected. The objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work. To get registration in our country and foreign countries of their invention, designs and thesis or theory written by the students during their project work and for this they must have knowledge of patents, copy right, trademarks, designs and information Technology Act.

#### II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	-	-	-	-

#### III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Research Methodology and IPR	70 Marks	30 Marks	100

#### IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✓	LCD / PPT	✓	Seminars	✓	Videos	✓	MOOCs
✓	Open Ended Experiments						

#### V. EVALUATION METHODOLOGY:

The 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 CIA examinations or the marks scored in the make-up examination.

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 modules and each module 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 module. Each question carries 14 marks. There could be a maximum of two sub divisions in a question.

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

50 %	50 % To test the objectiveness of the concept.
50 %	To test the analytical skill of the concept OR to test the application skill of the concept.

#### Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 25 marks for Continuous Internal Examination (CIE), 05 marks for Technical Seminar and Term Paper.

Table 1: Assessment pattern for CIA

Component	Theory		Total Marks
	CIE Exam	Technical Seminar and Term Paper	
CIA Marks	25	05	30

#### Continuous Internal Examination (CIE):

Two CIE exams shall be conducted at the end of the 9th and 17th week of the semester respectively. The CIE exam is conducted for 25 marks of 2 hours duration, consisting of 5 one mark compulsory questions in part-A and 4 questions in part-B. The student has to answer any 4 questions out of five questions, each carries 5 marks. Marks are awarded by taking average of marks scored in two CIE exams.

#### Technical Seminar and Term Paper:

Two seminar presentations and the term paper with overview of topic are conducted during II semester. The evaluation of technical seminar and term paper is for maximum of 5 marks. Marks are awarded by taking average of marks scored in two Seminar Evaluations.

## VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	<b>Engineering Knowledge:</b> Apply advanced level knowledge, techniques, skills and modern tools in the field of computer aided engineering to critically assess the emerging technological issues.	3	Seminar and Term paper
PO 2	<b>Develop Novel Designs:</b> Have abilities and capabilities in developing and applying computer software and hardware to mechanical design and manufacturing fields.	3	Guest Lecture
PO 3	<b>Analyze Complex Systems:</b> Conduct experimental and/or analytical study and analyzing results with modern mathematical / scientific methods and use of software tools.	3	Seminar and Term paper
PO 4	<b>Development of Solutions:</b> Independently carry out research / investigation and development work to solve practical problems..	3	Seminar and Term paper
PO 5	<b>Teamwork and Project Management:</b> Function on multidisciplinary environments by working cooperatively, creatively and responsibly as a member of a team.	3	Seminar and Term paper
PO 6	<b>Technical Presentation Skills:</b> Write and present a substantial technical report / document.	3	Seminar and Term paper
PO 7	<b>Lifelong Learning:</b> Design and validate technological solutions to defined problems and recognize the need to engage in lifelong learning through continuing education.	3	Seminar and Term paper

**3 = High; 2 = Medium; 1 = Low**

## VII. COURSE OBJECTIVES:

The course should enable the students to:	
<b>I</b>	Identify an appropriate research problem in their interesting domain.
<b>II</b>	Understand ethical issues
<b>III</b>	Understand the Preparation of a research project thesis report.
<b>IV</b>	Understand the law of patent and copyrights.
<b>V</b>	Understand the Adequate knowledge on IPR

## VIII. COURSE OUTCOMES (COs):

Cos	Course Outcomes	CLOs	Course Learning Outcomes
CO1	Understand the research problem and research process.	CLO1	Understand the characteristics, objects of a good research problem.
		CLO2	Understand the selection, approaches of research problem.
		CLO3	Understand concepts of data collection, analysis
CO2	Understand research ethics	CLO4	Understand the principles of ethics and ethical issues in science and engineering.
		CLO5	Understand the analysis Plagiarism

		CLO6	Understand research ethic concepts
CO3	Prepare a well -structured research paper and scientific presentations.	CLO7	Understand significance, effective technical writing and report.
		CLO8	Paper developing a research proposal and report.
		CLO9	Understand writing a research report as per format.
		CLO10	Report presentation and assessment by a review committee.
CO4	Explore on various IPR components and process of filing	CLO11	Understand the techniques of interpretation, and making scientific presentation
		CLO12	Understand the patent laws, patent and searching process.
		CLO13	Understand International cooperation on intellectual property
CO5	Understand the adequate knowledge on patent and rights	CLO14	Understand the patent laws, patent and searching process, patent data base.
		CLO15	Understand the patent rights and transfer of technology.
		CLO16	Study of new developments in IPR.

#### IX. COURSE LEARNING OUTCOMES(CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to	PO's Mapped	Strength of Mapping
BCSB31.01	CLO 1	Understand the characteristics, objects of a good research problem.	PO 1, PO 2	3
BCSB31.02	CLO 2	Understand the selection, approaches of research problem.	PO 1, PO 2	3
BCSB31.03	CLO 3	Understand concepts of data collection, analysis	PO 1, PO 2	3
BCSB31.04	CLO 4	Understand the principles of ethics and ethical issues in science and engineering.	PO 1, PO 2 & PO 4	2
BCSB31.05	CLO 5	Understand the analysis Plagiarism	PO 2, PO 5	2
BCSB31.06	CLO 6	Understand research ethic concepts	PO 2, PO 5	3
BCSB31.07	CLO 7	Understand significance, effective technical writing and report.	PO 1, PO 4	3
BCSB31.08	CLO 8	Paper developing a research proposal and report.	PO 1, PO 4, PO 6	2
BCSB31.09	CLO 9	Understand writing a research report as per format.	PO 4, PO 5 & PO 6	3
BCSB31.10	CLO 10	Report presentation and assessment by a review committee.	PO4, PO 6	3
BCSB31.11	CLO 11	Understand the techniques of interpretation, and making scientific presentation	PO 5, PO 6	3
BCSB31.12	CLO 12	Understand the patent laws, patent and searching process.	PO 5, PO 6	3
BCSB31.13	CLO 13	Understand International cooperation on intellectual property	PO 5, PO 6	2
BCSB31.14	CLO 14	Understand the patent laws, patent and searching process, patent data base.	PO 2, PO 4	3

BCSB31.15	CLO 15	Understand the patent rights and transfer of technology.	PO 2, PO 4	3
BCSB31.16	CLO 16	Study of new developments in IPR.	PO 2, PO 4	3

3 = High; 2 = Medium; 1 = Low

**X. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES**

Course Outcomes (COs)	Program Outcomes				
	PO1	PO2	PO4	PO5	PO6
CO 1	3	3			
CO 2	3	3	3		
CO 3	3		3	3	
CO 4			3	3	3
CO 5				3	3

**XI. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES**

Course Learning Outcomes (CLOs)	Program Outcomes				
	PO1	PO2	PO4	PO5	PO6
CLO 1	3	3			
CLO 2	3	3			
CLO 3	3	3			
CLO 4	3	2	3		
CLO 5		2		2	
CLO 6	3			2	
CLO 7	3		3		2
CLO 8	2		3		3
CLO 9			2	5	3
CLO 10			3		3
CLO 11				3	3
CLO 12				3	3
CLO 13				2	2
CLO 14		3	3		
CLO 15		2	3		
CLO16		3	2		

**XII. ASSESSMENT METHODOLOGIES – DIRECT**

CIE Exams	PO 1, PO 2 , PO4, PO5, PO6	SEE Exams	PO 1,PO 2 , PO4, PO5, PO6	Seminars and term paper	PO 6
VIVA	-	Student Viva	-	Mini Project	-

**XIII. ASSESSMENT METHODOLOGIES – INDIRECT**

✓	Early Semester Feedback	✓	End Semester OBE Feedback
✗	Assessment of Mini Projects by Experts		

**XIV. SYLLABUS**

<b>UNIT-I</b>	<b>MEANING OF RESEARCH PROBLEM</b>	<b>Classes: 09</b>
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.		
<b>UNIT-II</b>	<b>RESEARCH ETHICS</b>	<b>Classes: 09</b>
Effective literature studies approaches, analysis Plagiarism, and Research ethics.		
<b>UNIT-III</b>	<b>RESEARCH PROPOSAL</b>	<b>Classes: 09</b>
Effective technical writing, how to write report, Paper Developing a Research Proposal. Format of research proposal, a presentation and assessment by a review committee.		
<b>UNIT-IV</b>	<b>PATENTING</b>	<b>Classes: 09</b>
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.		
<b>UNIT-V</b>	<b>PATENT RIGHTS</b>	<b>Classes: 09</b>
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.		

**XV. COURSE PLAN:**

The course plan is meant as a guideline. Probably there may be changes.

Lecture No	Topic Outcomes	Topic/s to be covered	Reference
1	Understand the concept of research, types of research	Introduction, Definition, types of research	T1:2.1
2	Understand the objectives and elements research.	Scope, objectives, elements of research	T1:2.3
3	understand research problem and its characteristics.	Sources of research problem, characteristics of good research problem	T1:2.3.1

4	Understand the research process	Research process	T1:7.2
5	Understanding the concepts Types of research design	Research design	T1:7.3
6	Understand the problems encountered and errors in selecting a research problem.	Problems encountered by researchers, errors in selecting a research problem	T1:7.4
7	Understand the concepts of research design.	Research design, types of research design	T1:7.5
8	Understand the data collection process and methods.	Data collection	T1:8.1
9	Understand the concepts of data interpretation.	Analysis interpretation of data and instrumentation	
11	Understand the ethics and importance of ethics.	Introduction to ethics, Importance of ethics, Effective literature studies approaches	T1:8.2
12	Understand the ethical issues in during research.	Ethical issues in conducting research	T1:8.3
13	Understand the principles of research.	Principles of research ethics	T1:8.4
14-15	Understand concepts of data analysis.	Analysis	T1:8.5
16	understand the concepts of Plagiarism.	Plagiarism- types of plagiarism	T1:8.6
17	Understand the tips of to avoid plagiarism.	Tips to avoid plagiarism	T1:9.1
18	understand the other ethical issues.	Other ethical issues	T1:9.2, 9.3
19	Understanding the Interpretation techniques.	Interpretation, Interpretation Techniques and precautions	T2:9.3.4
20	Understand effective technical writing. Significance of report writing.	Effective technical writing, significance of report writing.	T1:9.5
21	Understand steps involved for writing and steps involved.	Writing of report and steps involved.	T2:7.1
22	Understand the layout of research report.	Layout of research report	T2:7.2
23	Understand the different types of report.	Types of reports	T2:7.3
24	Understand for developing a research proposal.	Paper developing a research proposal	T2:7.4
25	Understand the to write format of research proposal.	Format of research proposal	T2:8.3
26	Develop skills in presentation o of report.	Presentation of report	T2:8.4
27	Develop skills to analyze summary of findings.	Summary of findings	T3:8.5
28	Attain qualities of assessment committee.	Assessment by review committee.	T3:8.6
29	Understand Intellectual property rights.	Introduction, types of intellectual Property rights.	T3:10.7
30	Understand the international organizations ,agencies and treaties methodology.	international organizations ,agencies and treaties	T3:10.8

31	Understand the importance of intellectual property rights	Importance, nature of intellectual property . types of intellectual property.	T3:11.9
32	Understand the intellectual property concepts.	Intellectual property –trademark & service marks, federal registration of trademark and patents	T3:11.10
33	Understand PTO .	United state patents and trade mark office, international organization and agencies	T3:11.12
34	Understand process of patenting.	Process of patenting and development	T3:11.14
35	Understand technical research innovation.	Technical research, innovation, patenting	T3:11.15
36	Understand developments in patenting	Developments in patenting	T3:11.17
37	Understand the International scenario, International cooperation on Intellectual property.	International scenario, International cooperation on Intellectual property	T3:11.19
38	Understand procedure for grant of patents.	Procedure for grant of patents.	T3:11.21
39	Understand patenting under PCT.	Patenting under PCT, Provisional patent application.	T3:11.23
40	Understand scope of patent rights, law of patents.	Patent rights, scope of patent rights, law of patents.	T3:11.25
41	Understand licensing and transfer of technology	Licensing and transfer of technology	T3:11.27
42	Under stand new developments in IPR.	New development in IPR	T3:11.28
43-44	Understand patent information and data base searching methods.	Patent information and data base, searching methods and tools	T3:11.30
45	Understand patent application process, geographical indications.	Patent application process, Geographical indications	T3:12.1
46	Under administration of patent system.	Administration of patent system,	T3:12.4
47	Understand IPR of biological system.	IPR of Biological system	T3:12.7
48	Understand IPR of computer software.	IPR of computer software	T3:12.10
49	Understand technical knowledge case studies.	Technical knowledge case studies	T3:12.13

#### XIV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S No	Description	Proposed actions	Relevance with POs
1	Knowledge on research problems.	Seminars/NPTEL	PO 2,PO 4

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