INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

MECHANICAL ENGINEERING

COURSE DESCRIPTOR

Course Title	Machine Drawing through CAD Laboratory				
Course Code	AMEB07				
Programme	B.Tech				
Semester	III	ME			
Course Type	Core				
Regulation	IARE - R18				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Practical**	**Credits**
	-	-		3	1.5
Chief Coordinator	Dr. G.V.R Seshagiri Rao, Professor				
Course Faculty	Mr. M. Sunil Kumar, Assistant Professor				

I. COURSE OVERVIEW:

The primary objective of this course is to study and how to design machine components to explain the underlying principles and to provide insight on the applications of various types of machine components and also to assist students to master the art of computer aided drafting. The comprehensive and practical overview of machine drawing with an aim to serve as source to venture into the thrilling world of computer aided drafting.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	AMEB02	II	Engineering graphics and design laboratory	3

III. MARKSDISTRIBUTION

Subject	SEE Examination	CIA Examination	Total Marks
Machine Drawing through CAD Laboratory	70 Marks	30 Marks	100

IV. DELIVERY/INSTRUCTIONAL METHODOLOGIES:

X	CHALK & TALK	X	LCD / PPT	X	OPEN ENDED EXPERIMENTS
✔	LCD/ PPT	✔	Seminar	X	Mini Project
X	Open Ended Experiment				

V. EVALUATION METHODOLOGY:

Each laboratory is 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 20 marks for day to day performance and 10 marks for the final lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall conducted by two examiners, one of them being internal examiners and other being External Examiner both nominated by the principal from the panel of experts recommended by chairman BOS.

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

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculation and graph related to the concern experiment.
20 %	To test the results and error analysis of the experiment.
20 %	To test the subject knowledge through viva-voce

Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 20 marks for Continuous Internal Examination (CIE), 05 marks for Quiz and 05 marks for Alternative Assessment Tool (AAT).

Table 1: Assessment pattern for CIA

Component	**Laboratory**		**Total Marks**
Type of Assessment	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):

One CIE examination shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	**Performance**	**Calculations and Graph**	**Results and error analysis**	**Viva**	**Total**
2	2	2	2	2	2

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes		Level	Proficiency Assessed by
PO1	**Engineering Knowledge** Capability to apply the knowledge of mathematics, science and engineering in the field of mechanical engineering.	3	Exercise, Discussion and Seminars
PO2	**Problem Analysis:** An ability to analyze complex engineering problems to arrive at relevant conclusion using knowledge of mathematics, science and engineering.	3	Exercise and Discussion
PO3	**Design/development of solutions:** Competence to design a system, component or process to meet societal needs within realistic constraints.	2	Exercise, Discussion and Seminars
PO4	**Conduct investigations of complex problems:** To design and conduct research oriented experiments as well as to analyze and implement data using research methodologies.	3	Lab Experiments
PO5	**Modern tool usage:** An ability to formulate solve complex engineering problem using modern engineering and Information technology tools.	2	Seminars

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes		Level	Proficiency assessed by
PSO1	**Professional Skills:** To produce engineering professional capable of synthesizing and analyzing mechanical systems including allied engineering streams.	1	------
PSO2	**Problem solving skills**: An ability to adopt and integrate current technologies in the design and manufacturing domain to enhance the employability.	1	------
PSO3	**Successful career and Entrepreneurship**: To build the nation, by imparting technological inputs and managerial skills to become technocrats.	2	Lab Experiments

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES:

The course should enable the students to:

I	Understand Code of drawing practice as per BIS conventions for mechanical elements using AutoCAD.
II	Practice the drawing methods for sectioning of joints, couplings, bearings, keys.
III	Prepare assembly drawings, sectional views and bill of materials for selected assemblies.

IX. COURSE LEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AMEB07.01	CLO 1	Sketch the conventional representation of the machine elements	PO1	1
AMEB07.02	CLO 2	Draw the different types of sectional views.	PO 1	1
AMEB07.03	CLO 3	Understand of various fasteners.	PO 1	1
AMEB07.04	CLO 4	Understand of various joints	PO 1	1

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AMEB07.05	CLO 5	Draw the different types of couplings	PO 2	2
AMEB07.06	CLO 6	Draw the different types of bearings	PO 2	2
AMEB07.07	CLO 7	Creation of working drawings of Machine parts	PO 2	2
AMEB07.08	CLO 8	Create the Assembly drawings	PO 3	3
AMEB07.09	CLO 9	Ability to do part drawing	PO 3	3
AMEB07.10	CLO 10	Assemble the various parts of an engine	PO 4	3

3 = High; 2 = Medium; 1 = Low

X. MAPPING COURSE OBJECTIVES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	3	1			2								1		3
CLO 2	1	3	1										1		3
CLO 3	1	1	3		3								1		1
CLO 4	2				2								2		

3 = High; 2 = Medium; 1 = Low

XI. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAMOUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	3	1											1		
CLO 2	3	1													
CLO 3		3											1		
CLO 4			1										1		
CLO 5		1	1												
CLO 6		1													
CLO 7			1	1											
CLO 8		3		1											
CLO 9		3													3
CLO 10				1											

3 = High; 2 = Medium; 1 = Low

XII. SYLLABUS:

LIST OF EXERCISES	
Week - 1	**CONVENTIONAL REPRESENTATION**
Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs and ribs; Introduction to AutoCAD.	
Week - 2	**SECTIONAL VIEWS**
Types of sections, selection of section planes and drawing of sections and auxiliary sectional views, parts not usually sectioned.	
Week - 3	**DIMENSIONING**
Methods of dimensioning, general rules for sizes, and placement of dimensions for holes, centers, and curved and tapered features	
Week - 4	**WORKING DRAWINGS**
Types of drawings–working drawings for machine parts.	
Week - 5	**MACHINE ELEMENTS**
Drawing of machine elements and simple parts; Selection of orthogonal views and additional views for the following machine elements and parts with drawing proportion, popular forms of screw threads, bolts, nuts and stud bolts.	
Week - 6	**KEYS AND COTTER JOINTS**
Keys, cotter joints, and knuckle joint.	
Week - 7	**RIVETED JOINTS**
Riveted joints for plates.	
Week - 8	**COUPLINGS**
Shaft couplings and spigot joint.	
Week - 9	**BEARINGS**
Journal, pivot, and collar bearing.	
Week - 10	**ASSEMBLY DRAWINGS-ENGINE PARTS**
Assembly drawings Assembly drawings for the following, using conventions and drawing proportions: Engine parts–stuffing box.	
Week - 11	**CONNECTING ROD AND ECCENTRIC**
Eccentrics, I.C. engine connecting rod.	
Week - 12	**SCREW JACK**
Screw jack.	
Week - 13	**TAIL STOCK AND MACHINE VICE**
Machine vice and tailstock.	
Week - 14	**SAFETY VALVES**
Rams-bottom Safety Valve, feed check valve.	

TEXT BOOKS:

1	K.L. Narayana, P. Kannaiah, K. Venkata Reddy, "Machine Drawing", New Age Publishers, 3rd Edition, 2012
2	K.C. John, "Text book of Machine Drawing", PHI Eastern Economy, 1st Edition, 2010.
3	P.S Gill, "Machine Drawing", S.K Kataria & Sons, 1st Edition, 2013

REFERENCES:

1	N. D. Bhatt, V. M Pancahal, "Machine Drawing", Charotar, 1st Edition, 2014.
2	R. K. Dhavan, "A Text book of Machine drawing", S.Chand Publication & Co, New Delhi, 2nd Edition, 2008.

XIII. COURSE PLAN:

The course plan is meant as a guideline. There may probably be changes.

Exp. No.	Experiment	Program outcomes attained	Reference
1	Conventional representation of materials, machine elements.	PO1, PO4	T1,T2
2	Sectional views.	PO1, PO4	T1,T2
3	Dimensioning	PO1, PO3	T1,T2, R2
4	Working drawing	PO2, PO3	T1,T2
5	Machine Elements	PO1, PO3	T1,T2
6	Keys, cotter and Knuckle Joints	PO1, PO3	T1,T2
7	Riveted Joints	PO2, PO3	T1,T2
8	Coupling	PO1, PO2	T1,T2
9	Bearing	PO1, PO2	T1,T2
10	Assembly Drawing- Engine Parts	PO2, PO3	T1,T2, R2
11	Connecting rod, Eccentric	PO1, PO2	T1,T2, R1
12	Screw jack	PO1, PO3	T1,T2, R1
13	Tail stock and machine vice	PO1, PO4	T1,T2, R1
14	Safety valves	PO1, PO4	T1,T2, R2

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

S. No	Description	Proposed Actions	Relevance With POs	Relevance With PSOs
1	Understand of part drawing section.	NPTEL & Exercise Practices	PO1, PO2	PSO1
2	Geometrical tolerances on the drawing.	NPTEL & Exercise Practices	PO1, PO2	PSO1
3	Introduce of 3D modelling (Isometric Views)	Seminars & Exercise Practice	PO1, PO2	PSO1

Prepared by:

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HOD, ME