

**B. E. Semester: IV**  
**Automobile Engineering**  
**Subject Name: INDUSTRIAL DRAFTING AND MACHINE DESIGN (AE404)**

**Course Objective:**

- To present a problem oriented in depth knowledge of INDUSTRIAL DRAFTING AND MACHINE DESIGN
- To address the underlying concepts and methods behind INDUSTRIAL DRAFTING AND MACHINE DESIGN

**Teaching / Examination Scheme:**

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
AE404	<b>INDUSTRIAL DRAFTING &amp; MACHINE DESIGN</b>	4	0	2	6	5	3	70	30	20	30	150

**Detailed Syllabus:**

Part A: Machine Design

- 1 **Design consideration of machine parts:**  
 Loads, different types, factor of safety, stress, design stress factors affecting its selection, , tensile, compressive, shear, bending, bearing, crushing stresses, bending and torsional shear stress, transverse shear, principle stress determination. eccentric loading, bearing pressure.
- 2 **Cotter and Knuckle joints:**  
 Design of simple cotter joint, cotter joint with a sleeve, cotter foundation bolt, Gib and cotter joint, design of knuckle joint, applications.
- 3 **Design of riveted joint :**  
 Types of riveted joints, Design of double and triple riveted joint with equal and unequal cover plates. Design of lap joint. etc.
- 4 **Bolts and Riveted under eccentric loading:**  
 Design of riveted connection subjected to eccentric loading, design of bolts under eccentric loading when (a) load is parallel to the bolt axis (b) perpendicular to bolt axis.

- 5      **Keys and couplings:**  
Design of keys, design of a muff, clamp, flange(protected type) and bushed pin type of flexible flange coupling etc.
- 6      **Shafts:**  
Types of shafts, Their functions, Design of axles, spindles and shafts on the basis of strength and rigidity (effect of variable loading should not be considered).
- 7      **Design of springs:**  
Wahls' factor and its use in design of spring, effect of end connections on design of compression spring, design of helical tensile spring and compression spring for circular wire. Buckling of compression spring. length and number of turns calculation, design of leaf spring, design of disc springs, various arrangements of disc springs, spring materials & its selection etc.
- 8      **Struts and columns:**  
Design of connecting rod, push rod and piston rods .Power screws: Types of threads, design of screw with different types of threads used in practice. Design of nuts, design of C clamp, screw jack, design of toggle jack, design of coupler.
- 9      **Levers:**  
introduction to levers, design of a straight arm ,bell crank , rocker arm , curved levers .

**\*Part B and Part C are to be dealt in laboratory**

Part B: Industrial Drafting

1. Assembly drawing, standard drawing, machine shop drawing, pattern shop, sheet metal drawing.
2. Production drawing elements of production drawing. Information on drawing, tolerances, Mfg. methods
3. Limits, tolerances& fits indicating geometrical tolerances on the drawing, standard followed in industry.
4. Surface roughness, roughness and machining symbols, indication on drawing.

Part C:Computer Aided Drafting

Introduction, computer graphics, getting started with Auto-CAD, Command Entry , saving the drawing, Exploring draw commands, drawing space, units, drawing limits & scales, Exploring Modify Commands, Object Properties Tool bar, Working with layers, dimensions using auto CAD , creating isometric Drawing, introduction to 3D features of Auto-CAD.

**Lesson Planning:**

Sr.No.	Date/Week	Unit No.	% Weightage	Topic No:
1	1 <sup>st</sup> , 2 <sup>ed</sup> , 3 <sup>ed</sup>	Unit 1	20 %	1
2	4 <sup>th</sup> , 5 <sup>th</sup> , 6 <sup>th</sup>	Unit 2	20 %	2,3
3	7 <sup>th</sup> , 8 <sup>th</sup> , 9 <sup>th</sup>	Unit 3	20 %	4,5
4	10 <sup>th</sup> , 11 <sup>th</sup> , 12 <sup>th</sup>	Unit 4	20 %	6,7
5	13 <sup>th</sup> , 14 <sup>th</sup> , 15 <sup>th</sup>	Unit 5	20 %	8,9

### **Instructional Method & Pedagogy:**

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures. Experiments shall be performed in the laboratory related to course contents. Suggested list of experiment is given below

#### Part A: Machine Design

Design of machine elements and preparation of report:

- Design of screw, nut and other parts from topic no. 9
- Design of levers(one problem)
- Design of couplings(one problem)
- Design of spring (one problem)
- Design of riveted joint (one problem)
- Design of shaft (one problem)
- Design of column (one problem)
- Design Consideration (one problem)

#### **PART B Industrial drafting**

- Design an assembly and detailed drawing of
  - Cotter/ knuckle joint/connecting rod(one sheet)
  - Coupling/power screw ( one sheet)

#### **PART C COMPUTER AIDED DRAFTING**

preparation of assembly and detail drawing of machine components assembly using AUTOCAD/any other 2D/3D Drafting Package

NOTE:

Part B/Part C be taught in laboratory and be tested only in oral examination as under

- a) A Sketch be given of any parts design by them on Part A. Students are required to indicate and explain various symbols in drawing as studied in part B
- b) Students are required to work on computer for testing their knowledge in AUTOCAD/Any other 2D/3D Drafting Package -----
- c) Oral examination based on Part A report prepared

**Students Learning Outcomes:**

- The student can identify different areas of INDUSTRIAL DRAFTING AND MACHINE DESIGN
- Can find the applications of all the areas in day to day life.

**Recommended Study Materials:**

1. Elements of Machine Design by Pandya & Shah
2. Machine Design Vol I & II by Patel and Pandya.
3. Machine Design by R.K. Jain.
4. Machine Design by Sharma & Agrarval
5. Machine design by R.B. Gupta.
6. Mechanical engg. design by Dr. Sadhu singh.
7. Machine design by A.Sherif.
8. A text book on production drawing by Narayana & Reddy.
9. Computer aided drafting- Auto cad-ISTE Nomogram.
10. Instant refernce for Auto CAD'2000 by George Omura, BPB Pub. Co.
11. Inside AUTO CAD by Racker & Rice. Pub. Co.
12. Machine Design Vol.-I by F.H.Haideri, Nirali Prakashan, Pune
13. AutoCAD 2000 reference manual

