



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

## CIVIL ENGINEERING

### COURSE DESCRIPTOR

<b>Course Title</b>	ENGINEERING DRAWING				
<b>Course Code</b>	AME001				
<b>Program</b>	B.Tech				
<b>Semester</b>	I	AE  ME CE			
<b>Course Type</b>	Core				
<b>Regulation</b>	IARE - R16				
<b>Course Structure</b>	<b>Theory</b>			<b>Practical</b>	
	<b>Lectures</b>	<b>Tutorials</b>	<b>Credits</b>	<b>Laboratory</b>	<b>Credits</b>
	2		4	3	4
<b>Chief Coordinator</b>	Prof. B.V. S. N. Rao, Professor				
<b>Course Faculty</b>	Ms. P Shruthilaya, Assistant Professor. Mr. G. Sarat Raju, Assistant Professor.				

#### I. COURSE OVERVIEW:

One of the best ways to communicate one's ideas is through some form of picture or drawing. This is especially true for the engineer. An engineering drawing course focuses on usage of drawing instruments, lettering, construction of geometric shapes, etc. Students study use of dimensioning, shapes and angles or views of such drawings. Dimensions feature prominently, with focus on interpretation, importance and accurate reflection of dimensions in an engineering drawing. Other areas of study in this course may include projected views, pictorial projections and development of surfaces. This course also gives basic concepts for studying machine drawing, building drawing, circuit drawings etc.

#### II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	AHS002	I	Linear Algebra and Differential Equations	4

#### III. MARKSDISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Engineering drawing	70 Marks	30 Marks	100

#### IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✓	Chalk & Talk	✓	Quiz	✓	Assignments	✗	MOOCs
✓	LCD / PPT	✓	Seminars	✗	Mini Project	✓	Videos
✗	Open Ended Experiments						

#### V. EVALUATION METHODOLOGY:

The SEE is conducted for 70 marks of 3 hours duration. 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 two sub divisions in a question. All the drawing related courses are evaluated in line with laboratory courses. The distribution shall be 30 marks for internal evaluation (20 marks for day-to-day work, and 10 marks for internal tests) and 70 marks for semester end lab examination. There shall be ONE internal test for 10 marks in each semester.

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

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.

#### VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	2	Assignments
PO 2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences	2	Term paper, Seminars
PO 4	<b>Conduct investigations of complex problems:</b> 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.	2	Assignments

3 = High; 2 = Medium; 1 = Low

#### VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	<b>Engineering knowledge:</b> Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication.	2	Lecture, Assignments.
PSO 2	<b>Broadness and diversity:</b> Graduates will have a broad understanding of economical, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage.	-	Assignments
PSO 3	<b>Self-Learning and service:</b> Graduates will be motivated for continuous self-learning in engineering practice and/ or pursue	-	-

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
	research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.		

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

### VIII. COURSE OBJECTIVES (COs):

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.

### 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
AME001.01	CLO 1	Understand the BIS conventions of engineering drawing with basic concepts, ideas and methodology	PO 1	3
AME001.02	CLO 2	Recognize the need of single stroke lettering in defining the components	PO 1	3
AME001.03	CLO 3	Understand the different line types according to BIS standards to engineering drawings.	PO 1	3
AME001.04	CLO 4	Sketch the various types of polygons for applying in solid modeling	PO 2	2
AME001.05	CLO 5	Discuss the various types of scales for engineering application like maps, buildings, bridges.	PO 2	2
AME001.06	CLO 6	Visualize parabolic and elliptical profiles in buildings and bridges	PO 2	2
AME001.07	CLO 7	Visualize cycloidal and involute profiles in developing new products like gears and other engineering applications.	PO 4	1
AME001.08	CLO 8	Solve specific geometrical problems in plane geometry involving points and lines.	PO 4	1
AME001.09	CLO 9	Understand the theory of projection in planes located in various quadrants and apply in manufacturing processes.	PO 2	2
AME001.10	CLO 10	Understand the orthographic projection concepts in solid modeling and apply the concepts in the areas of design.	PO 2	2
AME001.11	CLO 11	Apply the terminology of development of surfaces in the area of chimneys and chutes.	PO 1	3
AME001.12	CLO 12	Visualize the components by isometric projection by representing three dimensional objects in two dimensions in technical and engineering drawings.	PO 1	3
AME001.13	CLO 13	Interpret plumbing drawings typically found in construction by using transformation of projection.	PO 1	3
AME001.14	CLO 14	Convert the orthographic views into pictorial views by using transformation of projection.	PO 1, PO 2	3
AME001.15	CLO 15	Convert the pictorial views into orthographic views by using transformation of projection..	PO 2	2

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

**X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC 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		
CLO 2	3												1		
CLO 3	3												1		
CLO 4		2													
CLO 5		2				1									
CLO 6		2													
CLO 7				1											
CLO 8				1											
CLO 9		2											1		
CLO 10		2											1		
CLO 11	3					1									
CLO 12	3														
CLO 13	3														
CLO 14	3	2											1		
CLO 15		2													

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

**XI. ASSESSMENT METHODOLOGIES–DIRECT**

CIE Exams	PO 1	SEE Exams	PO 1	Assignments	PO 2	Seminars	PO 2
Laboratory Practices	PO 2	Student Viva	-	Mini Project	-	Certification	-
Term Paper				Project			

**XII. ASSESSMENT METHODOLOGIES-INDIRECT**

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

**XIII. SYLLABUS**

<b>UNIT-I</b>	<b>FUNDAMENTALS OF ENGINEERING DRAWING, SCALES AND CURVES</b>
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, epicycloids, hypocycloid and involutes..	
<b>UNIT-II</b>	<b>ORTHOGRAPHIC PROJECTION, PROJECTION OF PLANES</b>
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.	
<b>UNIT-III</b>	<b>PROJECTION OF SOLIDS</b>
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 Page   5 plane projection method.	
<b>UNIT-IV</b>	<b>DEVELOPMENT OF SURFACES, ISOMETRIC PROJECTIONS</b>
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.	
<b>UNIT-V</b>	<b>TRANSFORMATION OF PROJECTIONS</b>
Transformation of projections: Conversion of isometric views to orthographic views and conversion of orthographic views to isometric views..	
<b>Text Books:</b>	
1. N. D. Bhatt, "Engineering Drawing", Charotar Publications, 49thEdition, 2012. 2. C. M. Agrawal, Basant Agrawal, "Engineering Drawing", Tata McGraw Hill, 2ndEdition, 2013.	
<b>Reference Books:</b>	
1. K.Venugopal, "Engineering Drawing and Graphics", New Age Publications, 2ndEdition, 2010. 2. K. C. John, "Engineering Drawing", PHI Learning Private Limited", 2nd Edition, 2009. 3. Dhananjay. A. Johle, "Engineering Drawing", Tata McGraw Hill, 1st Edition, 2008.	

#### XIV. COURSE PLAN:

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

Lecture No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Principles of engineering drawing – various drawing instruments and their uses. (general exercises).	CLO 1	T1:1.1
2	Conventions in Drawing – Lettering – BIS	CLO 2	T1:1.1
3	Geometrical constructions.	CLO 2	T1: 2.1
4	Construction of various scales for engineering use-Plain and diagonal	CLO 2	T1:2.2 R1: 2.2.3
5	Construction of various scales for engineering use- Vernier scales	CLO 1	T1: 2.3
6	Construction of various curves.-general method	CLO 2	T1: 3.1
7	Construction of various curves- ellipse, parabola & hyperbola	CLO1	T1:3.3
8	Construction of various curves cycloid, epicycloids, hypocycloid and involutes.	CLO 2	T1:3.4, R1: 4.1
9	Projection of points and lines inclined to single plane.	CLO 2	T1: 4.1
10	Projection of lines inclined to both planes	CLO1	T1: 4.3
11	Projection of planes-simple position.	CLO 1	T1: 4.3.2
12	Projection of planes- inclined to a both planes.	CLO1	T1:4.3
13	Projection of solids inclined to single plane.	CLO 2	T1: 4.4
14	Projection of solids inclined to a both planes.	CLO 2	T1: 5.2
15	Projection of solids Auxiliary plane method	CLO 2	T1: 5.2.3
16	Draw the development of surfaces	CLO 1	T1: 6.1
17	Draw the isometric projections	CLO 2	T1: 8.1

Lecture No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
18	Convert the pictorial views to orthographic views	CLO 2	T1:8.1.2

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

S No	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	Increase ability to communicate with people.	Seminars	PO 1, PO 2,	PSO 1
2	Learn to take data and transform it into graphic drawings	Guest Lectures	PO4, PO 5	PSO 2
3	Students will become familiar with office practices and standards.	Assignments / Laboratory Practices	PO9, PO10	PSO 3

**Prepared by:**

Ms. P Shruthilaya, Assistant Professor.

**HOD, CIVIL ENGINEERING**