INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

INFORMATION TECHNOLOGY ENGINEERING

COURSE DESCRIPTOR

Course Title	**ENGINEERING GRAPHICS AND DESIGN LABORATORY**				
Course Code	AMEB02				
Programme	B.Tech				
Semester	I	CE|ECE|EEE			
	II	AE|ME|CSE|IT			
Course Type	Core				
Regulation	IARE - R18				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	1	-	-	4	3
Chief Coordinator	Mr. B V Satya Narayana Rao, Associate Professor				
Course Faculty	Mr. C Labesh Kumar, 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. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Engineering graphics and design laboratory	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:

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

Semester End Examination (SEE): 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.

The emphasis on the experiments 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 calculations and graphs related to the concern experiment.
20 %	To test the results and the 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 lab assessment during day to day performance, 10 marks for final internal lab assessment.

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 exams 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	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	Lab exercises
PO 2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	2	Lab exercises
PO 4	**Conduct investigations of complex problems**: 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.	1	Lab exercises

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer - based systems of varying complexity.	1	Lab exercises
PSO 2	**Software Engineering Practices:** The ability to apply standard practices and strategies in software service management using open-ended programming environments with agility to deliver a quality service for business success.	-	-
PSO 3	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.	-	-

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
AMEB02.01	CLO 1	Understand the BIS conventions of engineering drawing with basic concepts, ideas and methodology	PO 1	3
AMEB02.02	CLO 2	Principles of dimensions and their execution. Introduction to AutoCAD.	PO 1	3
AMEB02.03	CLO 3	Apply the commands used in AutoCAD for different basic geometries	PO 1	3
AMEB02.04	CLO 4	Visualize parabolic, Hyperbola and elliptical profiles in buildings and bridges	PO 1, PO 2, PO 4	2
AMEB02.05	CLO 5	Visualize cycloidal and involutes profiles in developing new products like gears and other engineering applications.	PO 1	2
AMEB02.06	CLO 6	Discuss the various types of scales for engineering application like maps, buildings, bridges.	PO 1, PO 2, PO 4	2
AMEB02.07	CLO 7	Solve specific geometrical problems in plane geometry involving points and lines.	PO 1, PO 2	2
AMEB02.08	CLO 8	Understand the theory of projection in planes located in various quadrants and apply in manufacturing processes.	PO 1, PO 2	2
AMEB02.09	CLO 9	Understand the concept of projection of solids inclined to both the planes	PO 1, PO 2	2
AMEB02.10	CLO 10	Understand the concept of projection of section of solids inclined to both the planes	PO 1	2
AMEB02.11	CLO 11	Apply the terminology of development of surfaces in the area of chimneys and chutes.	PO 1	3
AMEB02.12	CLO 12	Understand the orthographic projection concepts in solid modeling and apply the concepts in the areas of design.	PO 1, PO 2	3
AMEB02.13	CLO 13	Visualize the components by isometric projection by representing three dimensional objects in two dimensions in technical and engineering drawings.	PO 1	3

3 = High; 2 = Medium; 1 = Low

X. MAPPING COURSE LEARNING OUTCOMES 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		
CLO 2	3												1		
CLO 3	3												1		
CLO 4	3	2		1									1		
CLO 5	2														
CLO 6	2	2		1											
CLO 7	2	2											1		
CLO 8	2	2											1		
CLO 9	2	2													
CLO 10	2														
CLO 11	3														
CLO 12	3	3													
CLO 13	3														

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2, PO 4	SEE Exams	PO 1, PO 2, PO 4	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 2, PO 4	Student Viva	PO 1, PO 2, PO 4	Mini Project	-	Certification	-

XII. ASSESSMENT METHODOLOGIES – INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

LIST OF EXPERIMENTS	
Week-1	**PARABOLA BY ALL METHODS**
Draw the parabola by Eccentricity Method, Rectangle Method, and Parallelogram Methods.	
Week-2	**ELLIPSE BY ALL METHODS**
Draw the Ellipse by Eccentricity Method, Concentric circle method, Rectangle Method, and Parallelogram Methods.	
Week-3	**HYPERBOLA BY ALL METHODS**
Draw the Hyperbola by Eccentricity Method, and Rectangular Method.	
Week-4	**CYCLOIDS AND INVOLUTES**
Draw the Cycloid, Epi-Cycloid, Hypo-Cycloid, Involutes for Circle, Polygons.	
Week-5	**SCALES**
Construct the Plain scale, Diagonal Scale, and Vernier scales.	
Week-6	**POINTS AND LINES**
Locate the projection of points in different coordinates. Draw the projection of the lines, parallel and perpendicular to planes, and inclined to planes.	
Week-7	**PLANES**
Draw the projection of the Planes, parallel and perpendicular to planes, and inclined to planes.	
Week-8-9	**SOLIDS**
Draw the projection of the Solids whose axis is, parallel and perpendicular to planes, and inclined to planes.	
Week-10	**SECTION OF SOLIDS**
Draw the projection of Section of Solids whose axis is, parallel and perpendicular to planes, and inclined to planes.	
Week-11-12	**DEVELOPMENT OF SURFACES**
Draw the lateral surface developments for cylinder, Prism, Pyramid, and cone.	
WeeK-13-14	**TRANSFORMATIONS**
Conversion of Isometric Projections to Orthographic Projection, and vice-versa.	
Week-15	**ISOMETRIC VIEWS**
Draw the Isometric views.	
Text Books:	
1. N. D. Bhatt, "Engineering Drawing", Charotar Publications, 49th Edition, 2012. 2. C. M. Agrawal, Basant Agrawal, "Engineering Drawing'', Tata McGraw Hill, 2nd Edition, 2013.	
Reference Books:	
1. K.Venugopal, "Engineering Drawing and Graphics", New Age Publications, 2nd Edition, 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.

Week No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Principles of engineering drawing – various drawing instruments and their uses. (General exercises). Geometrical constructions.	CLO 1	T1:1.4 R1:1.2
2	Principles of dimensions and their execution. Introduction to AutoCAD.	CLO 2	T1:1.5 R1:2.4
3	Familiarization of AutoCAD. Draw and Modify commands, Dimensions, Line properties, Status bar, etc..,	CLO 3	T1:2.5 R1:2.5
4	Construction of parabola curves. - Eccentricity Method, Rectangle Method, and Parallelogram Methods.	CLO 4	T2:2.5 R1:2.6
5	Construction of Elliptical curves- Eccentricity Method, Rectangle Method, concentric circle method, and Parallelogram Methods.	CLO 4	T1:22.7
6	Construction of Hyperbola curves- Eccentricity Method, Rectangle Method.	CLO 4	T1:6.3 R2:5.3
7	Construction of various curves cycloid, epicycloids, hypocycloid and involutes	CLO 5	T1:7.5 R1:6.3
8	Construction of various scales for engineering use-Plain, Diagonal, and Vernier.	CLO 6	T1:8.5 R1:6.8
9	Projection of points and lines inclined to single plane and both the planes.	CLO 7	T1:12.2 R3:13.1
10	Projection of planes- inclined to single plane and both the planes.	CLO 8	T1:12.3 R1:13.2
11	Projection of solids inclined to single plane and both the planes.	CLO 9	T1:12.10 R2:13.7
12	Projection of Section of Solids whose axis is, parallel and perpendicular to planes, and inclined to planes.	CLO 10	T1:11.2 R1:10.2
13	Draw the development of surfaces.	CLO 11	T2:2.5 R1:2.5
14	Convert the pictorial views to orthographic views	CLO 12	T2:22.7
15	Draw the basic isometric figures.	CLO 13	T1:12.10 R2:13.7

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

S No	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	Learn to take data and transform it into graphic drawings	NPTEL	PO 4, PO 2	PSO 1
2	Students will become familiar with office practices and standards.	NPTEL	PO 2	PSO 1

Prepared by:

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