

<b>EST 110</b>	<b>ENGINEERING GRAPHICS</b>	<b>CATEGORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>CREDIT</b>	<b>Year of Introduction</b>
		ESC	2	0	2	3	2019

**Preamble:** To enable the student to effectively perform technical communication through graphical representation as per global standards.

**Prerequisite:** NIL

**Course Outcomes:** After the completion of the course the student will be able to

<b>CO 1</b>	Draw the projection of points and lines located in different quadrants
<b>CO 2</b>	Prepare multiview orthographic projections of objects by visualizing them in different positions
<b>CO 3</b>	Draw sectional views and develop surfaces of a given object
<b>CO 4</b>	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
<b>CO 5</b>	Convert 3D views to orthographic views
<b>CO 6</b>	Obtain multiview projections and solid models of objects using CAD tools

**Mapping of course outcomes with program outcomes**

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
<b>CO 1</b>	3											
<b>CO 2</b>	3											
<b>CO 3</b>	3	1										
<b>CO 4</b>	3									1		
<b>CO 5</b>	3									2		
<b>CO 6</b>	3				3					3		

**Assessment Pattern**

<b>Bloom's Category</b>	<b>Continuous Assessment Tests</b>		<b>End Semester Examination (100 Marks)</b>
	<b>Test 1 (15 Marks)</b>	<b>Test 2 (15 Marks)</b>	
Remember			
Understand	5		20
Apply	10	10	80
Analyse			
Evaluate			
Create			

### Mark distribution

Total Marks	CIE (Marks)	ESE (Marks)	ESE Duration
150	50	100	3 hours

### Continuous Internal Evaluation Pattern:

Attendance : 10 marks

CIA for section A carries 25 marks (15 marks for 1 test and Class work 10 marks)

CIA for section B carries 15 marks (10 marks for 1 test and Class work 5 marks)

### End Semester Examination Pattern:

ESE will be of 3 hour duration on A4 size answer booklet and will be for 100 marks. The question paper shall contain two questions from each module of Section A only. Student has to answer any one question from each module. Each question carries 20 marks.

### Course Level Assessment Questions

(Questions may be framed based on the outline given under each course outcome)

#### Course Outcome 1 (CO1):

1. Locate points in different quadrants as per given conditions.
2. Problems on lines inclined to both planes .
3. Find True length, Inclinations and Traces of lines.

#### Course Outcome 2 (CO2)

1. Draw orthographic views of solids and combination solids
2. Draw views of solids inclined to any one reference plane.
3. Draw views of solids inclined to both reference planes.

#### Course Outcome 3 (CO3):

1. Draw views of solids sectioned by a cutting plane
2. Find location and inclination of cutting plane given true shape of the section
3. Draw development of lateral surface of solids and also its sectioned views

#### Course Outcome 4 (CO4):

1. Draw Isometric views/projections of solids
2. Draw Isometric views/projections of combination of solids
3. Draw Perspective views of Solids

#### Course Outcome 5 (CO5):

1. Draw Orthographic views of solids from given three dimensional view

**Course Outcome 6 (CO6):**

1. Draw the given figure including dimensions using 2D software
2. Create 3D model using modelling software from the given orthographic views or 3D figure or from real 3D objects

**Model Question paper**

QP CODE:

PAGES:3

Reg No: \_\_\_\_\_

Name : \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY FIRST SEMESTER B.TECH DEGREE EXAMINATION,  
MONTH & YEAR****Course Code: EST 110****ENGINEERING GRAPHICS****Max.Marks:100****Duration: 3 Hours****PART A****Answer all Questions. Each question carries 3 Marks****Instructions: Retain necessary Construction lines****Show necessary dimensions****Answer any ONE question from each module****Each question carries 20 marks****MODULE I**

1. The end point A of a line is 20mm above HP and 10mm in front of VP. The other end of the line is 50mm above HP and 15mm behind VP. The distance between the end projectors is 70mm. Draw the projections of the line. Find the true length and true inclinations of the line with the principal planes. Also locate the traces of the line.
2. One end of a line is 20mm from both the principal planes of projection. The other end of the line is 50mm above HP and 40mm in front of VP. The true length of the line is 70mm. Draw the projections of the line. Find its apparent inclinations, elevation length and plan length. Also locate its traces.

**MODULE II**

3. A pentagonal pyramid of base side 25mm and height 40mm, is resting on the ground on one of its triangular faces. The base edge of that face is inclined  $30^\circ$  to VP. Draw the projections of the solid.

- A hexagonal prism has side 25mm and height 50mm has a corner of its base on the ground and the long edge containing that corner inclined at  $30^\circ$  to HP and  $45^\circ$  to VP. Draw the projections of the solid.

### MODULE III

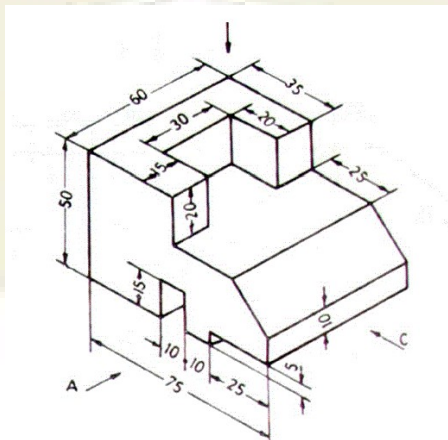
- A triangular prism of base side 40mm and height 70mm is resting with its base on the ground and having an edge of the base perpendicular to VP. Section the solid such that the true shape of the section is a trapezium of parallel sides 30mm and 10mm. Draw the projections showing the true shape. Find the inclination of the cutting plane with the ground plane.
- Draw the development of a pentagonal pyramid of base side 30mm and height 50mm. A string is wound from a corner of the base round the pyramid and back to the same point through the shortest distance. Show the position of the string in the elevation and plan.

### MODULE IV

- The frustum of a cone has base diameter 50mm and top diameter 40mm has a height of 60mm. It is placed centrally on top of a rectangular slab of size 80x60mm and of thickness 20mm. Draw the isometric view of the combination.
- A hexagonal prism has base side 35mm and height 60mm. A sphere of diameter 40mm is placed centrally on top of it. Draw the isometric projection of the combination.

### MODULE V

- Draw the perspective view of a pentagonal prism, 20mm side and 45mm long lying on one of its rectangular faces on the ground and having its axis perpendicular to picture plane. One of its pentagonal faces touches the picture plane and the station point is 50mm in front of PP, 25mm above the ground plane and lies in a central plane, which is 70mm to the left of the center of the prism.
- Draw three orthographic views with dimensions of the object shown in figure below.



(20X5=100)

**SCHEME OF VALUATION**

1. Locating the points and drawing the projections of the line – 4 marks  
Finding true length by any one method – 6 marks  
Finding true inclination with VP – 2 marks  
Finding true inclination with HP – 2 marks  
Locating horizontal trace – 2 marks  
Locating vertical trace – 2 marks  
Dimensioning and neatness – 2 marks

Total = 20 marks

2. Locating the points and drawing true length of the line – 4 marks  
Finding projections by any method – 6 marks  
Finding length of elevation and plan – 2 marks  
Finding apparent inclinations – 2 marks  
Locating horizontal trace – 2 marks  
Locating vertical trace – 2 marks  
Dimensioning and neatness – 2 marks

Total = 20 marks

3. Drawing initial position plan and elevation – 4 marks  
First inclination views – 4 marks  
Second inclination views -8 marks  
Marking invisible edges – 2 marks  
Dimensioning and neatness – 2 marks

Total = 20 marks

*(Any one method or combination of methods for solving can be used.*

*If initial position is wrong then maximum 50% marks may be allotted for the answer)*

4. Drawing initial position plan and elevation – 4 marks  
First inclination views – 4 marks  
Second inclination views -8 marks  
Marking invisible edges – 2 marks  
Dimensioning and neatness – 2 marks

Total = 20 marks

*(Any one method or combination of methods for solving can be used*

*If initial position is wrong then maximum 50% marks may be allotted for the answer)*

5. Drawing initial position plan and elevation – 4 marks  
Locating section plane as per given condition – 5 marks  
Drawing true shape -5 marks  
Finding inclination of cutting plane – 2 marks  
Dimensioning and neatness – 2 marks

Total = 20 marks

6. Drawing initial position plan and elevation – 4 marks  
Development of the pyramid – 6 marks

Locating string in development -2 marks

Locating string in elevation – 3 marks

Locating string in plan – 3 marks

Dimensioning and neatness – 2 marks

Total = 20 marks

7. Drawing initial positions – 4 marks

Isometric View of Slab -6 marks

Isometric View of Frustum – 10 marks

Dimensioning and neatness – 2 marks

Total = 20 marks

*(Initial position is optional, hence redistribute if needed.*

*Reduce 4 marks if Isometric scale is taken)*

8. Drawing initial positions – 4 marks

Isometric scale – 4 marks

Isometric projection of prism -5 marks

Isometric projection of sphere – 5 marks

Dimensioning and neatness – 2 marks

Total = 20 marks

*(Initial position is optional, hence redistribute if needed.*

9. Drawing the planes and locating the station point – 4 marks

Locating elevation points – 2 marks

Locating plan points – 2 marks

Drawing the perspective view – 10 marks

Dimensioning and neatness – 2 marks

Total = 20 marks

10. Drawing the elevation – 8marks

Drawing the plan – 4 marks

Drawing the side view – 4 marks

Marking invisible edges – 2 marks

Dimensioning and neatness – 2 marks

Total = 20 marks

## SYLLABUS

### General Instructions:

- First angle projection to be followed
- Section A practice problems to be performed on A4 size sheets
- Section B classes to be conducted on CAD lab

## SECTION A

### Module 1

Introduction : Relevance of technical drawing in engineering field. Types of lines, Dimensioning, BIS code of practice for technical drawing.

Orthographic projection of Points and Lines: Projection of points in different quadrants, Projection of straight lines inclined to one plane and inclined to both planes. Trace of line. Inclination of lines with reference planes True length of line inclined to both the reference planes.

### Module 2

Orthographic projection of Solids: Projection of Simple solids such as Triangular, Rectangle, Square, Pentagonal and Hexagonal Prisms, Pyramids, Cone and Cylinder. Projection of solids in simple position including profile view. Projection of solids with axis inclined to one of the reference planes and with axis inclined to both reference planes.

### Module 3

Sections of Solids: Sections of Prisms, Pyramids, Cone, Cylinder with axis in vertical position and cut by different section planes. True shape of the sections. Also locating the section plane when the true shape of the section is given.

Development of Surfaces: Development of surfaces of the above solids and solids cut by different section planes. Also finding the shortest distance between two points on the surface.

### Module 4

Isometric Projection: Isometric View and Projections of Prisms, Pyramids, Cone , Cylinder, Frustum of Pyramid, Frustum of Cone, Sphere, Hemisphere and their combinations.

### Module 5

Perspective Projection: Perspective projection of Prisms and Pyramids with axis perpendicular to the ground plane, axis perpendicular to picture plane.

Conversion of Pictorial Views: Conversion of pictorial views into orthographic views.

## SECTION B

*(To be conducted in CAD Lab)*

Introduction to Computer Aided Drawing: Role of CAD in design and development of new products, Advantages of CAD. Creating two dimensional drawing with dimensions using suitable software. (Minimum 2 exercises mandatory)

Introduction to Solid Modelling: Creating 3D models of various components using suitable modelling software. (Minimum 2 exercises mandatory)

### Text Books

1. Bhatt, N.D., Engineering Drawing, Charotar Publishing House Pvt. Ltd.
2. John, K.C. Engineering Graphics, Prentice Hall India Publishers.

### Reference Books

1. Anilkumar, K.N., Engineering Graphics, Adhyuth narayan Publishers
2. Agrawal, B. And Agrawal, C.M., Engineering Darwing, Tata McGraw Hill Publishers.
3. Benjamin, J., Engineering Graphics, Pentex Publishers- 3<sup>rd</sup> Edition, 2017
4. Duff, J.M. and Ross, W.A., Engineering Design and Visualisation, Cengage Learning.
5. Kulkarni, D.M., Rastogi, A.P. and Sarkar, A.K., Engineering Graphics with AutoCAD, PHI.
6. Luzaddff, W.J. and Duff, J.M., Fundamentals of Engineering Drawing, PHI.
7. Varghese, P.I., Engineering Graphics, V I P Publishers
8. Venugopal, K., Engineering Drawing and Graphics, New Age International Publishers.

### Course Contents and Lecture Schedule

No	SECTION A	No. of Hours
1	<b>MODULE I</b>	
1.1	Introduction to graphics, types of lines, Dimensioning	1
1.2	Concept of principle planes of projection, different quadrants, locating points on different quadrants	2
1.3	Projection of lines, inclined to one plane. Lines inclined to both planes, trapezoid method of solving problems on lines.	2
1.4	Problems on lines using trapezoid method	2
1.5	Line rotation method of solving, problems on line rotation method	2
2	<b>MODULE II</b>	
2.1	Introduction of different solids, Simple position plan and elevation of solids	2
2.2	Problems on views of solids inclined to one plane	2
2.3	Problems on views of solids inclined to both planes	2
2.4	Practice problems on solids inclined to both planes	2



3	<b>MODULE III</b>	
3.1	Introduction to section planes. AIP and AVP. Principle of locating cutting points and finding true shape	2
3.2	Problems on sections of different solids	2
3.3	Problems when the true shape is given	2
3.4	Principle of development of solids, sectioned solids	2
4	<b>MODULE IV</b>	
4.1	Principle of Isometric View and Projection, Isometric Scale. Problems on simple solids	2
4.2	Isometric problems on Frustum of solids, Sphere and Hemisphere	2
4.3	Problems on combination of different solids	2
5	<b>MODULE V</b>	
5.1	Introduction to perspective projection, different planes, station point etc. Perspective problems on pyramids	2
5.2	Perspective problems on prisms	2
5.3	Practice on conversion of pictorial views into orthographic views	2
	<b>SECTION B</b> <i>(To be conducted in CAD lab)</i>	
1	Introduction to CAD and software. Familiarising features of 2D software. Practice on making 2D drawings	2
2	Practice session on 2D drafting	2
3	Introduction to solid modelling and software	2
4	Practice session on 3D modelling	2