Padre Conceição College of Engineering

Verna, Goa

Department of Mechanical Engineering

Course information handout for students

FE 270 – Engineering Graphics

F.E. COMP / MECH (Div - A & C), Semester II

March to July 2022

Course Overview and Plan

<table>
<tr><td>1.</td><td colspan="5">Course Name
Engineering Graphics</td></tr>
<tr><td>2.</td><td colspan="5">Course Code
FE 270</td></tr>
<tr><td>3.</td><td colspan="5">Course Instructor
Dr. Joe Kurian</td></tr>
<tr><td>4.</td><td colspan="5">Pre-requisites
Elementary Geometry</td></tr>
<tr><td>5.</td><td colspan="5">Semester & Year
F.E. - Computer - Semester II (Mar – July 2022) – AY 2021 - 22</td></tr>
<tr><td rowspan="2">6.</td><td>Total Student Learning Time (SLT)</td><td colspan="3">Face to Face</td><td>Total Guided Learning</td></tr>
<tr><td>L = Lecture
T = Tutorial
P = Practical</td><td>L
14</td><td>T
-</td><td>P
28</td><td>42 Hours</td></tr>
<tr><td>7.</td><td colspan="5">Credit Value
1Hr L x 14 Weeks = 14 Hrs
2Hrs P x 14 Weeks = 28 Hrs</td></tr>
<tr><td>8.</td><td colspan="5">Course Objectives
1. Understand and appreciate the importance of engineering graphics in engineering.
2. Develop the ability to visualize and communicate three-dimensional shapes.
3. Increase ability to communicate with people from an engineering background.
4. Understand the basic principles of technical/ engineering drawing.
5. Know how to create drawings which follow the engineering graphics conventions/standards.</td></tr>
<tr><td rowspan="5">9.</td><td colspan="5">Course Outcomes
After successful completion of this course, students will be able to:</td></tr>
<tr><td>CO ID</td><td colspan="3">CO Description</td><td>Bloom’s Level</td></tr>
<tr><td>FE 270.1</td><td colspan="3">Enhance the imagination skills required in converting ideas into drawings.</td><td>2</td></tr>
<tr><td>FE 270.2</td><td colspan="3">Understand projection systems used in engineering drawing</td><td>2</td></tr>
<tr><td>FE 270.3</td><td colspan="3">Analyse solids and their cut sections along with development of surfaces.</td><td>3</td></tr>
<tr><td>FE 270.4</td><td colspan="3">Understand Orthographic and Isometric projections of parts.</td><td>3</td></tr>
</table>

10. Teaching Learning Strategy

Criteria	Symbol
Lecture	L
Practical	P

11. Assessment Methods and Type

Assessments of learning are based on term work:

Assessment Method	Assessment Type
Term Work Assignments	Drawing sheets

12. Mapping of the Course Outcome to the Program Outcomes

CO-PO/PSO Matrices of ME 2.6 Engineering Graphics														
COs	**POs**												**PSOs**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
1	2	3	3	-	-	-	-	-	-	-	-	-	2	-
2	3	3	3	-	-	-	-	-	-	-	-	-	2	-
3	3	2	3	-	-	-	-	-	-	-	-	-	2	-
4	3	3	3	-	-	-	-	-	-	-	-	-	2	-

13. Justification of CO- PO mapping

PO 1, 2 and 3 have a strong correlation to all the course outcomes as each of the COs require the use of basic engineering knowledge of engineering graphics.

This being a basic subject of engineering, level 2 can be assigned for the program specific outcomes 01 (PSO-01).

OR (use anyone)

The CO-PO Mapping is done based on the number of hours devoted to a CO that address to a given PO.

$$Correlation = \frac{Total\ number\ of\ hours\ devoted\ to\ a\ particular\ PO\ across\ all\ COs}{Total\ number\ of\ hours\ devoted\ for\ the\ course}$$

Assignment of Level of PO is done on the following basis:

Level 1 : 5 to 25%;
Level 2 : 25 to 50%;
Level 3 : More than 50%

14. List of Assignments Mapped to COs and CLs

Sr. No.	List of Assignments for Term Work	Course Outcomes	Bloom's Level
1	Problems on engineering curves, projections of points.	FE 270.1	2
2	Problems on projections of lines.	FE 270.2	2
3	Problems on projections of planes.	FE 270.2	2
4	Problems on projections of solids.	FE 270.3	3
5	Problems on orthographic projections.	FE 270.4	3

15. List of Tutorials Mapped to COs (if any)

- N/A-

16. List of Practicals Mapped to COs

Sr. No.	List of Practical's	Course Outcomes
1	Term work sheet 1	FE 2.6.1
2	Term work sheet 2	FE 2.6.2
3	Term work sheet 3	FE 2.6.2
4	Term work sheet 4	FE 2.6.3
5	Term work sheet 5	FE 2.6.4

17. Syllabus

Unit	Topics
1	**Introduction to engineering graphics:** Different types of lines used in engineering graphics. Conic sections. **Orthographic Projection:** Introduction, principal planes of projection, quadrants. First angle projection, third angle projection, symbols of projection. **Projections of Points:** Points situated in all four quadrants.
2	**Projections of Straight Lines:** Line parallel to one or both the planes. Line contained by one or both the planes. Line perpendicular to one of the planes. Line inclined to one plane and parallel to the other plane. Line inclined to both the planes. Line contained by a plane perpendicular to both the reference planes. True lengths and true inclinations. **Projections of Planes:** Circle, square, triangle, rectangle, pentagon, hexagon.
3	**Projections of Solids:** Cube, cylinder, cone, pyramid, prism. **Orthographic Projection & Sections:** Using first angle projection. Simple machine parts & castings.

4	**Isometric Projection:** Simple machine parts. **Free hand sketching:** Sketching orthographic views given a three dimensional view or a simple machine part. Sketching isometric view given the orthographic views of a simple machine part.
18.	**Text Books & References:** 1. N. D. Bhatt; Engineering Drawing; Charotar Publishing House Pvt. Ltd.; 2015. 2. K. R. Gopalkrishna; Engineering Drawing; Subash Publishing House; 2012. 3. K. R. Mohan; Engineering Graphics; Dhanpat Rai Publishing Co.; 2015. 4. P. J. Shah; Engineering Drawing; Vol. 1 & 2 – Praveen Shah Publishers; 2003. 5. P. S. Gill; Engineering Drawing; S. K. Kataria & Sons; 2013.
19.	**Term Work Assignments** **Assignment No. 1: (Engineering Curves & Projections of Points)** **Q1.** Construct an ellipse by the general method given the distance between the focus and the directrix is 70 mm and eccentricity is 2/3. **Q2.** Draw and explain the different types of lines used in engineering drawing. **Q3.** Explain the 1st and 3rd angle of projection with neat symbols. Why is the 2nd and 4th angle method not used? **Q4.** Draw the projections of following points on the same line XY keeping the projectors 25mm apart: ● A, in the H.P. and 20 mm behind the V.P. ● B, 40mm above the H.P. and 25mm in front of the V.P. ● C, in the V.P. and 40mm above the H.P. ● D, 25mm below the H.P. and 25mm behind the V.P. ● E, 15mm above the H.P. and 50mm behind the V.P. ● F, 40mm below the H.P. and 25mm in front of the V.P. ● G, in both the H.P. and the V.P. **Assignment No. 2: (Projections of Lines)** **Q1.** The top view of 75 mm long line AB measures 65 mm while its front view is 50 mm. One end A of the line lies in the HP and 12 mm in front of VP. Draw the projections of the line. **Q2.** A line PQ 80mm long lies in the 1st quadrant and is inclined at 25° to the HP and at 65° to the VP. The point P lies in the HP and 20 mm in front of the VP. Draw the projections of the line. **Q3.** A line MN of length 80 mm makes an angle of 40° to the HP. Its top view makes an angle of 60° to the VP. Draw its projections given that point M lies 10 mm above the HP and 20 mm in front of the VP. **Q4.** A line PQ makes an angle of 40° to the HP and 35° to the VP. The top view of the line measures 55 mm. Draw its projections find the true length of PQ. **Q5.** A line AB 85mm long is inclined at 50° to the HP and parallel to the VP. The

point A lies 20mm above the HP and 30 mm in front of the VP and point B lies in the 1st quadrant. Draw the projections of the line.

Assignment No. 3: (Projections of Planes)

Q1. Draw the projections of a regular pentagon of side 30 mm, resting on one of its corners in the VP. Its side opposite to this corner makes an angle of 50° to the HP and the surface makes an angle of 40° with the VP.

Q2. Draw the projections of a regular hexagon of side 30 mm, resting on one of its corner A in the HP and 35mm in front of the VP. Its side AB makes an angle of 45° to the VP and the surface makes an angle of 40° with the HP.

Q3. A circular lamina of 60mm diameter rests on HP such that the surface of the lamina is inclined at 40° to the HP. The diameter through the point on which the lamina rests on HP is inclined at 30 ° to the VP. Draw its projections.

Q4. Draw the projections of rhombus having diagonals 100mm and 40mm long resting on one of its corner in the HP and inclined to the VP in such a way that top view looks like a square. Smaller diagonal is inclined at 30° to the VP. Draw the projections of the plane and indicate its inclination with the HP.

Assignment No. 4: (Projections of Solids)

Q1. Draw the projections of a pentagonal prism, base 25 mm side and axis 50 mm long, resting on one of its rectangular faces on the H.P., with the axis inclined at 45° to the V.P.

Q2. Draw the projections of a cone, base 75 mm diameter and axis 100 mm long, lying on the H.P. on one of its generators, with the axis parallel to the V.P..

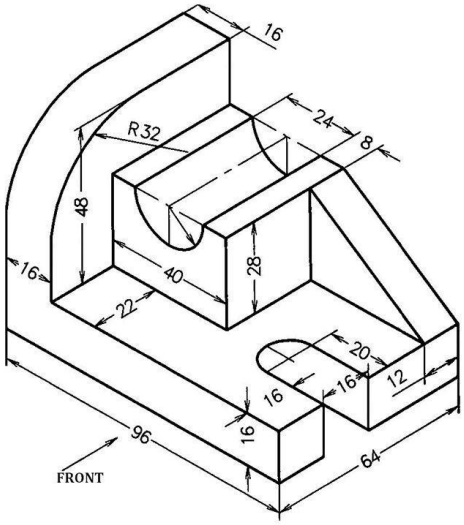
Q3. A square prism, base 40 mm side & height 65 mm, has its axis inclined at 45° to the H.P. and has an edge of its base, on the H.P and inclined at 30° to the V.P. Draw its projections.

Q4. A regular pentagonal pyramid with the sides of its base 30 mm & height 80 mm rests on an edge of its base. The base is tilted until its apex is 50 mm above the level of the edge of the base on which it rests. Draw the projections of the pyramid when the edge on which it rests, is parallel to the V.P. with its apex pointing towards the V.P.

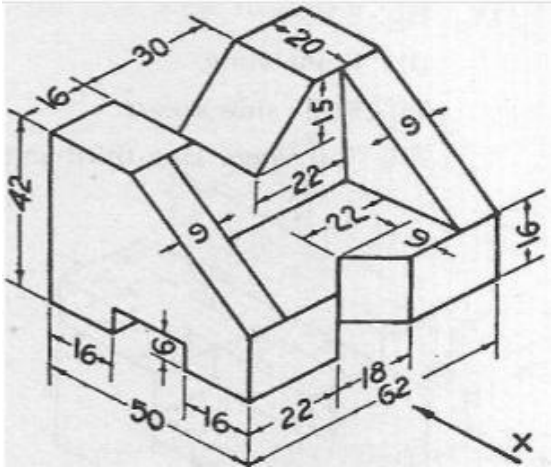
Assignment No. 5: (Orthographic Projections)

Note: All dimensions are in mm
Arrow direction denotes the direction for viewing the front of the object
All views are to be drawn as per first angle projection method

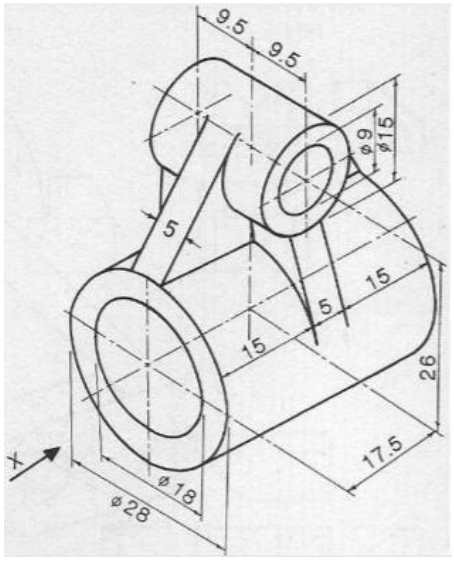
Q1. Figure shows a pictorial view. Draw the front view and the right hand side view:



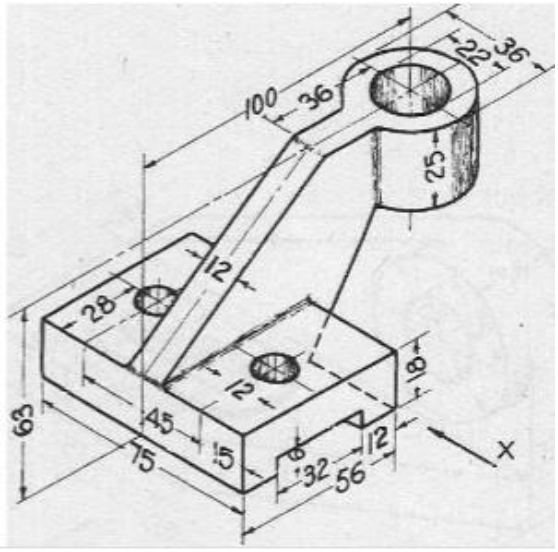
Q2. From the given pictorial view, draw the front view and the top view:



Q3. From the given pictorial view, draw the front view and the top view:



Q4. The figure depicts a pictorial view. Draw the front view, top view and the left hand side view:



20.	**Lecture Plan**

Faculty:Dr. Joe Kurian

Lec. No	Unit	Topics to be Covered	Course Outcome
01	1	Introduction to Engineering Graphics: Different types of lines used in engineering graphics.	FE 270.1
02	1	Introduction to Engineering Graphics: Conic sections	FE 270.1
03	1	Projections of Points: Introduction, points in all four quadrants	FE 270.1
04	2	Projections of Lines: Line parallel to one or both the planes, line contained by one or both the planes, line perpendicular to one of the planes, line contained by a plane perpendicular to both the reference planes	FE 270.2
05	2	Projections of Lines: Line inclined to one plane and parallel to the other plane, line inclined to both the planes, true lengths and true inclinations	FE 270.2
06	2	Projections of Planes: Introduction, circle, square, triangle	FE 270.2
07	2	Projections of Planes: Rectangle, pentagon, hexagon	FE 270.2
08	3	Projections of Solids: Introduction, cube	FE 270.3
09	3	Projections of Solids: Cylinder, cone	FE 270.3
10	3	Projections of Solids: Pyramid, prism	FE 270.3
11	3	Orthographic Projection & Sections: Using first angle projection, simple machine parts & castings	FE 270.4
12	4	Isometric Projection: Simple machine parts	FE 270.4
13	4	Free hand sketching: Sketching orthographic views given a three dimensional view or a simple machine part	FE 270.4
14	4	Free hand sketching: Sketching isometric view given the orthographic views of a simple machine part	FE 270.4

21. Other Additional Information

****