Course Title: **ENGINEERING GRAPHICS-I**	Course Code: 15ME12D
Credits (L:T:P) : **0:2:4**	Core/ Elective: **Core**
Type of course: **Lectures & Practice**	Total Contact Hours: **78**
CIE- 25 Marks	SEE – 100 Marks

(*****(Common to all Mechanical /AE/MTT/Chemical /Metallurgy Programme**)***

Prerequisites: Zeal to learn the subject

Course Objectives:

1. The course is aimed at developing Basic Graphic skills.
2. Develop Skills In Preparation Of Basic Drawings.
3. Skills in Reading and Interpretation of Engineering Drawings.

Course Outcomes:

On successful completion of the course, the students will be able to attain CO:

	Course Outcome	CL	Linked units	Linked PO	Teaching Hrs
CO1	Use the drawing instruments effectively and able to dimension the given figures	***U/A***	1	1,2,3,9,10	**12**
CO2	Appreciate the usage of engineering curves in tracing the paths of simple machine components	***U/A***	2	1,2,3,9,10	**18**
CO3	Understand the concept of projection and acquire visualization skills, projection of points	***A***	3	1,2,3,9,10	**12**
CO 4	Able to draw the basic views related to projections of Lines, Planes	***A***	4,5	1,2,3,9,10	**36**
				Total sessions	**78**

COURSE-PO ATTAINMENT MATRIX

Course	**Programme Outcomes**									
	1	2	3	4	5	6	7	8	9	10
ENGINEERING GRAPHICS-I	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**3**

LEVEL 3- HIGHLY ADDRESSED, LEVEL 2-MODERATELY ADDRESSED, LEVEL 1-LOW ADDRESSED.

METHOD IS TO RELATE THE LEVEL OF PO WITH THE NUMBER OF HOURS DEVOTED TO THE COS WHICH ADDRESS THE GIVEN PO.

IF ≥40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 3

IF 25 TO 40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 2

IF 5 TO 25% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 1

IF < 5% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS CONSIDERED NOT-ADDRESSED.

COURSE CONTENT AND BLUE PRINT OF MARKS FOR SEE

Unit No	Unit Name	Hour	Questions to be set for SEE/MARKS			Marks weightage	weightage (%)
			R	U	A		
1	DIMENSIONING	12	--	05	10	15	10
2	CONIC SECTIONS AND SPECIAL CURVES	18	--	10	30	40	28
3	ORTHOGRAPHIC PROJECTION AND PROJECTION OF POINTS	12	--	-	15	15	10
4	PROJECTION OF LINES	18	---	-	30	30	21
5	PROJECTIONS OF PLANE SURFACES	18	---	-	45	45	31
	Total	78		15	130	145	100

Legend: R; Remember, U: Understand A: Application

COURSE CONTENT

UNITI: DIMENSIONING **(12 Hours)**

Introduction to Engineering Drawing-Drawing Instruments – Standard Sizes of Drawing sheets-Layout of drawing sheets-Types of lines and their applications-Conventions for various materials-Introduction to Dimensioning-Elements of Dimensioning–Systems of Dimensioning-Methods of arrangements of Dimensioning- Dimensioning of common features like diameters, radii, arcs and chords- Dimensioning of counter sunk and counter bore-Introduction to Scale- Definition of R.F- Concept of reducing, enlarging and full size scale.

UNITII:CONIC SECTIONS AND SPECIAL CURVES **(18 Hours)**

Introduction to conic sections -Division of a line into equal number of parts- Types of conic section- Eccentricity- Construction of conic sections(Parabola, Ellipse and Hyperbola) when eccentricity and distance of the focus from the directrix is given-Construction of ellipse by Intersecting lines method(Rectangular and parallelogram methods)and Concentric circles method -Construction of parabola by rectangle method, parallelogram method and a tangent method-Construction of Rectangular/Equilateral Hyperbola-Construction of Involutes of a circle and to draw tangent and normal at any point on the curve- Construction of Cycloid and to draw a tangent and normal at any point on the curve.

UNITIII: ORTHOGRAPHIC PROJECTIONAND PROJECTION OF POINTS(12Hours)

Introduction to orthographic projection- Principal planes of projection- Four Quadrants- Concept of First angle &Third angle projection methods- Projection of points in all the four quadrants.

UNIT IV: PROJECTION OF LINES (18 Hours)

Projection of lines – Line Parallel to both HP and VP –Line parallel to one plane and Perpendicular to other- Line parallel to one plane and Inclined to the other- Line inclined to both HP and VP. (**First angle projection should be followed).**

UNIT V: PROJECTION OF PLANE SURFACES (18Hours)

Construction of polygons-Projection of plane Surfaces–Plane surface parallel to one plane and Perpendicular toother two–Plane surface Perpendicular to one plane and inclined to the other- Plane surface inclined to both HP and VP.

Total Contact Hours: 78

TEXT BOOK

1.K.R.Gopalakrishna"Fundamentalsof Drawing" Subhas Publications, 2010.
2.K.R.Gopalakrishna"Engineering Drawing" (Vol. I & II), Subhas Publications, 2014.

REFERENCES

1. R.K. Dhawan, "A text book of Engineering Drawing", S. Chand Publishers, Delhi,2010.
2.G.S. Phull and H.S.Sandhu, "Engineering Graphics", Wiley Publications, 2014.
3. K.Venugopal and V.Prabhu Raja, "Engineering Graphics", New Age International Private Limited, 2008.
4. M.B.Shah and B.C.Rana, "Engineering Drawing", Pearson Education, 2005..
5. DhananjayA.Jolhe, "Engineering Drawing with an Introduction to AutoCAD", Tata McGraw Hill Publishing Company Limited, 2008.
6. BasantAgarwal and Agarwal.C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

Course Assessment and Evaluation Scheme:

	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment method	CIE*	IA	Students	Graded Exercises (Average marks of each graded exercise to be considered)	25	Drawing Sheets	1,2,3,4
	SEE*	End Exam		End of the course	100	Answer scripts at BTE	1,2,3,4
Indirect Assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1, 2,3 ,Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3,4,Effectiveness of Delivery of instructions & Assessment Methods

***CIE** – Continuous Internal Evaluation *SEE – Semester End Examination

NOTE:THIS SUBJECT SHOULD THOUGHT IN A BATCH OF 15 TO 20 STUDENTS. FACULTY INCHARGE PER BATCH HAS TO MONITER, EVALUATE OR ASSESS THE STUDENTS.

Model Question Paper

Diploma in Mechanical Engineering

1st semester

Course title: **Engineering Graphics-I (Conventional)**

Time; 4 Hrs. **Max. marks: 100**

Note: Part –A is compulsory. Answer ANY TWO full questions from Part-B,C& D

Part –A

1.(a)List the standard sizes of the drawing sheets. -- 05

(b)Mention the types of lines and their applications. --05

Part –B

1.Draw an ellipse when the distance of focus from the directrix is 40and Eccentricity is ¾.-15

2.A Stone thrown from the ground level reaches a maximum height of 45 metre and falls on the ground at a distance of 100metre from the point of projection. Trace the path of the stone in space. Select a scale of 1:1000 ---15

3.Draw the involute of a circle of diameter 50mm . Also draw a tangent and normal ---15 at any point on the curve.

PART- C

1. Draw the projections of the following points on a common reference line:

a)Point P is 25mm above the HP and 40mm behind the VP

b)Point Q is 30mm below the HP and 40mm behind the VP

c) Point R is 25mm above the HP and in the VP.

d)Point S is 30mm below the HP and in the VP

e)Point T is 35mm in front of the VP and in the HP.

--- 15

2. A line AB measuring 70mm has its end A is 15mm in front of VP and 20mm above HP. And the other end B is 60mm in front of VP and 50mm above HP.

Draw the projections of the line and find the Inclinations of the line with both the reference planes of projection.

--- 15

3.A line PQ has its end P 15mm above HP and 10mm in front of VP. The end Q is 55mm above HP and the line is inclined at 30° to HP. The distance between the end projectors of the line. When measured parallel to the line of intersection of HP and VP is 50mm.

Draw the Projections of line and find its inclination with VP. ---15

PART-D

1.Apentagonal plane lamina of edges 20mm is resting on HP with one of its corners touching it such that the plane surface makes an angle of 60° with HP. The two of the base edges containing the corner on which the lamina rests make equal inclination with HP. If the edge opposite to this corner makes an angle of 45° with the VP. Draw the top and front views of the plane lamina in this position. --15

2. A equilateral triangular lamina of 30mm side lies with one of its edges on HP such that The surface of the lamina is inclined to the HP at 60°. The edge on which it rests is inclined to the VP at 60°. Draw the projections. --15

3. A circular lamina of 60mm diameter rests on HP such that the surface of the lamina is inclined at 30° to HP. The diameter through which the point on which the lamina rests on HP appears to be inclined at 30° to VP in the top view. Obtain its projections. --15

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MODEL QUESTION BANK

Diploma in Mechanical Engineering

1ST semester

Course title: Engineering Graphics-I (Conventional)

CO 1: USE THE DRAWING INSTRUMENTS EFFECTIVELY AND ABLE TO DIMENSION THE GIVEN FIGURES

LEVEL:UNDERSTANDING

10 Marks Questions (Each sub questions carries 5 marks)

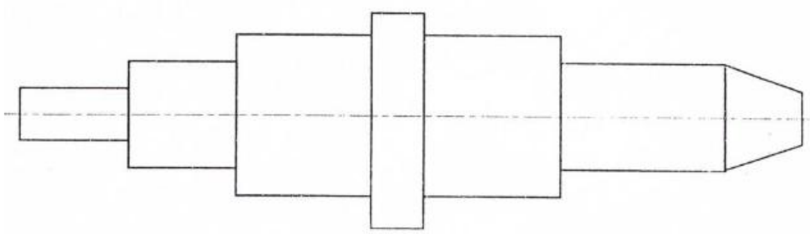
1. (a)List the standard sizes of drawing sheets.
   (b)Mention the types of lines and their applications.

2. a) Illustrate the elements of dimensioning with the help of a sketch.
   b) Illustrate the dimensioning of given common features: diameter, radius, chord, Arc and angle.
3. a)Mention the uses of the following drawing instruments.
   i) T-square ii) Set square iii)Bow compass iv) Clinograph v)Minidrafter
   b) Mention the uses of the following drawing instruments.
   i) French curves ii) Protractor iii) Clips iv)Erasing Shield v)Drafting machine
4. a) Define RF. Mention the types of scales based on RF.
   b) Give the conventional representation for the following materials.
   i) Cast iron ii) Lead iii)Bronze iv)Glass v)Wood
5. a) Illustrate the dimensioning of counter sunk and counter bore
   b)Draw the standard layout of aA2 size drawing sheet

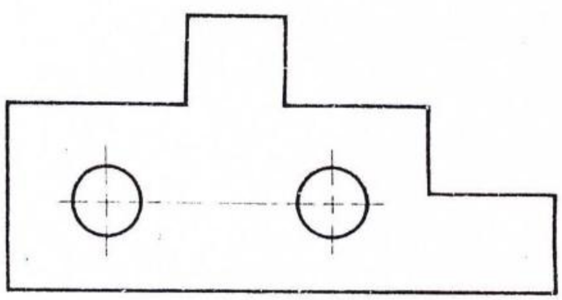
1. List the standard sizes of drawing sheets.
2. Mention the types of lines and their applications.
3.Illustrate the elements of dimensioning with the help of a sketch.
4.Illustrate the dimensioning of given common features: diameter, radius, chord, Arc and angle.
5. Mention the uses of the following drawing instruments.
i) T-square ii) Set square iii) Bow compass iv) Clinograph v) Minidrafter
6. Mention the uses of the following drawing instruments.
i) French curves ii) Protractor iii) Clips iv)Erasing Shield v) Drafting machine
7.Draw the standard layout of aA2 size drawing sheet

<u>LEVEL:APPLICATION</u>

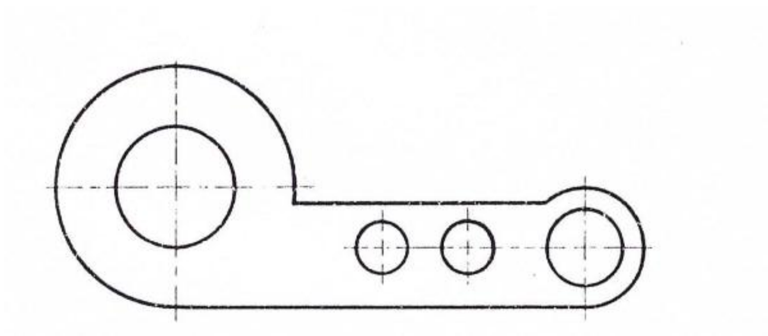
8. Copy the given sketch to 1:1 scale and dimension adopting aligned system with parallel dimensioning method.



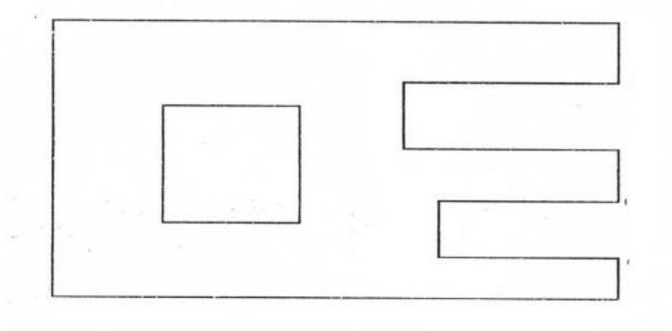
9. Copy the given sketch to 1:1 scale and dimension adopting aligned system with progressive dimensioning method.



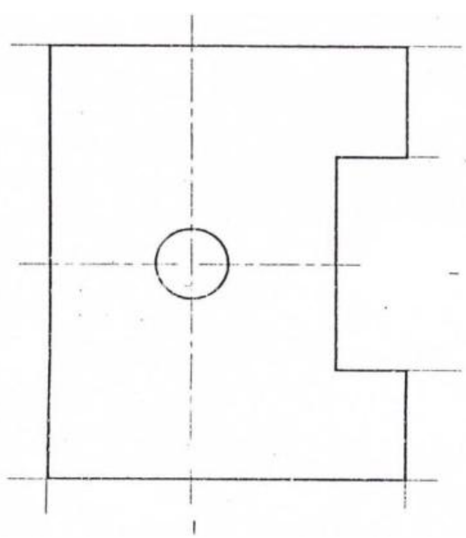
10. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with chain dimensioning method.



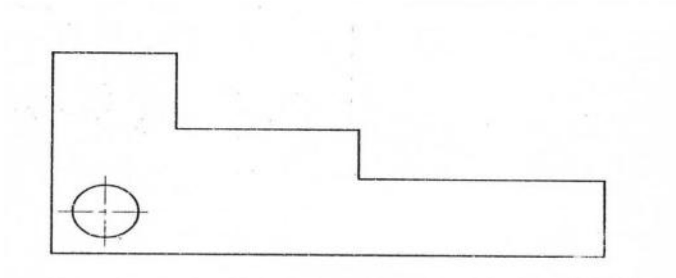
11. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with combined dimensioning method.



12. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with parallel dimensioning method.



13. Copy the given sketch to 1:1 scale and dimension adopting aligned system with chain dimensioning method.



C0 2: APPRECIATE THE USAGE OF ENGINEERING CURVES IN TRACING THE PATHS OF SIMPLE MACHINE COMPONENTS

LEVEL:UNDERSTANDING

10 Marks Questions

1. Inscribe an ellipse in a rectangle of 130x80mm by intersecting lines method.
2. A parallelogram has sides 130mm and 80mm at an included angle of 60°. Inscribe an ellipse In the parallelogram. Find the major and minor axes of the ellipse.
3. Draw a parabola when the distance of the focus from the directrix is 30mm.
4. Construct a Parabola in a parallelogram of the sides 100mmx45mm and with an included angle of 75°.

LEVEL:APPLICATION

15Marks Questions

5. A Stone thrown from the ground level reaches a maximum height of 45 meter and falls on the ground at a distance of 100metre from the point of projection. Trace the path of the stone in space. Select a scale of 1:1000
6. A shot is discharged from the ground level at an inclination of 55° to the ground which is assumed to be horizontal. The shot returns to the ground at a point 75metre distant from the point of discharge. Trace the path of the shot. Scale 1:1000. Use tangent method only.
7. Draw an ellipse when the distance of focus from the directrix is 40 mm &eccentricity is ¾.
8. An ellipse has the major axis and minor axis in the ratio 3:2. Draw the ellipse when the major is axis is 135mm by concentric circles Method.
9. Construct a hyperbola when the distance of focus from the directrix is 35 mm and eccentricity is 4/3.
10. Construct a rectangular hyperbola given a point P on it at a distance of 20 mm and 15 mm from the two asymptotes.
11. Draw the involute of a circle of diameter 40 mm. Also draw a tangent and normal at any point on the curve.
12. A circle of 50 mm diameter rolls on a line. A point on the circumference of the circle is in

Contact with the line in the beginning and after one complete revolution. Draw the cycloidal path of the point. Draw a tangent and normal at any point on the curve.

CO: 3 UNDERSTAND THE CONCEPT OF PROJECTION AND ACQUIRE VISUALIZATION SKILLS,PROJECTION OF POINTS

LEVEL:APPLICATION

(15Marks Questions)

1. a) Draw the symbolic representation of First angle projection method.
   b) Draw the projections of the following points:
   i) P is 25mm below the HP and in the VP
   ii) Q is 40mm behind the VP and in the HP
   iii) R is 30mm below the HP and 30mm in front of the VP
   iv) S is 25mm above the HP and 25mm behind the VP

2. a) Draw the symbolic representation of Third angle projection method.
   b)Draw the projections of the following points:
   i) T is 25mm above the HP and 30mm in front of the VP.
   ii) U is in both the VP and HP
   iii) V is 35mm below the HP and 30mmm behind the VP
   iv) W is 30mm above the HP and 35mm behind the VP

3. a) Draw the projections of the following points:

   i)A is 25mm above the HP and 35mm in front of the VP
   ii)B is 25mm above the HP and 40mm behind the VP
   iii)C is 30mm below the HP and 40mm behind the VP
   iv)D is 30mm below the HP and 35mm in front of the VP
   v)E is 25mm above the HP and in the VP.
   vi) F is 30mm below the HP and in the VP
   vii)G is 35mm in front of the VP and in the HP
   viii)H is 40mm behind the VP and in the HP
   ix)M lies in all the three principal planes

4. a) A point P is 40 mm in front of VP, 50 mm above HP and 30 mm in front of left PP. Draw the three principal views of the point.
   b) A point P is 30 mm above HP, 50 mm behind VP and 45 mm in front of left PP. Draw the three principal views of the point
5. a) Draw the three principal views of a point P lying 40 mm behind VP, 60 mm below HP and 30 mm behind the right PP
   b)Draw the three principal views of a point P lying 60 mm below HP, 50 mm in front of VP and 45 mm in front of the left PP.

CO4: ABLE TO DRAW THE BASIC VIEWS RELATED TO PROJECTIONS OF LINES.

LEVEL:APPLICATION

(15Marks Questions)

1.a)Draw the three principal views of a line 80 mm long placed parallel to VP and perpendicular to HP. The line is 70mm in front of VP and 60mm in front of right PP. The lower end of the line is 30mm above HP.

b) Draw the three principal views of a line 80 mm long when it is placed parallel toboth HP & VP. One of the ends of the line is 70 mm above HP, 60 mm in front of VP and 30mm in front of the right PP.

2. a) A line AB 80 mm long is inclined at 30° to HP and parallel to VP. The line is 90 mm in front of VP. The lower end A is 35 mm above HP,110 mm in front of the right PP and is away from it than the higher end. Draw the three principal views of the line.

b) A line AB 80 mm long is inclined at 45° to VP and parallel to HP. The end nearer to VP is 30mm in front of VP, 60 mm above HP and 100 mm in front of right PP. Draw the three principal views of the line.

3. a) Draw the projections of a line AB, 80 mm long inclined at 30° to HP and parallel to VP. The line is 40 mm in front of VP. The lower end A is 20 mm above HP.

b) The length of a line is 100 mm long and is inclined at 45° to VP and parallel to HP.The line is 15 mm above HP and one end of the line is 10 mm in front of VP. Draw the projections of the line and measure top and front views.

4.a)The length of top view of a line which is parallel to VP and inclined at 45° to HP is 50 mm. One end of the line is 12 mm above HP and 25 mm in front of 45° to VP. Draw the projections of the line and determine its true length.

b) Draw the projections of a line 70 mm long lying in VP and inclined at 45° to HP. The lower end of the line is 10 mm above HP.

5. A straight line AB, 80 mm long makes an angle of 45° to HP and 30° to VP. The end A is 10 mm in front of VP and is on HP. Draw the projections of the line.

6.A line AB 60 mm long has one of its extremities 20 mm in front of VP and 15 mm above HP. The line is inclined at 30° to HP and 45° to VP. Draw its top and front views.

7.A line AB is 75 mm long. The end A is touching VP and 10 mm above HP. The end B is 50 mm in front of VP and 30 mm above HP. Draw the top view of the line AB and finds the true inclinations of the line AB with HP & VP.

8.A line AB measuring 70 mm has its end A 15 mm in front of VP and 20 mm above HP. The other end B is 60 mm in front of VP and 50 mm above HP. Draw the projections of the line with HP & VP.

9.A line PQ has its end P 15 mm above HP and mm in front of VP. The end Q is 55 mm above HP and the line is inclined at 30° to HP. The distance between the end projectors of the line when measured parallel to the line of intersection of HP & VP is 50 mm. Draw the projections of the line and find its inclinations with VP.

10.The distance between the end projectors passing through the end points of a line AB is 40 mm. The end A is 20 mm above HP and 15 mm in front of VP. The line AB appears as 65 mm long in the front view. Complete the projections. Find the true length of the line and its inclinations with HP & VP.

11. The top view of a line PQ, 75 mm long measures 50 mm. The end P is 50 mm in front of VP and 15 mm above HP. The end Q is 15 mm in front of VP. Draw the projections of the line PQ and fine its inclinations with HP & VP.

12.The front view of a line is 80 mm in length and makes 40° with XY line. One of its ends is 10 mm in front of VP and 15 mm above HP. The other end is 50 mm in front of VP. Draw the top and front views of the line. Determine the true length and inclinations of the line with HP & VP.

13.The front view of a line AB, 125 mm long, is 75 mm and its top view is 100 mm long. Its end A is 30 mm from both the planes of projection. Draw the projections and find the inclinations of the line with the reference planes of projection.

14.Line measuring 75 mmlong has one of its ends 50mm in front of VP and 15mm above HP. The top view of the line is 50mm long. The other end is 15mm in front of VP and above HP. Draw the projections of the line and find the true inclination.

CO 5: ABLE TO DRAW THE BASIC VIEWS RELATED TO PROJECTIONS OF PLANES

(15Marks Questions)

1. An equilateral triangular lamina of side 40mm rests with one its sides on HP so that the surface of the lamina is inclined at 30° to HP. The side on which the lamina rests is inclined at 45° to VP. Draw the projections of the lamina.
2. An equilateral triangular lamina of sides 30mm is resting with one of its corners on HP, The surface of the lamina is inclined at 45° to HP and the side opposite to the corner on which the lamina rests is inclined at 45° to VP. Draw the projections of the lamina.

3. A square lamina of 40mm side rests with one of its sides on HP so that the surface of the lamina is inclined at 30° to HP. The side on which the lamina rests is inclined at 45° to VP. Draw the top and front views of the square lamina in this position.

4. A square lamina of 40mm sides rests with one of its corner on HP. The diagonal passing through this corner is inclined at 45° to HP and appears to be inclined at 45° to VP. Draw its projections.
5. A square lamina of side 40mm rests with one of its corner on HP. The diagonal passing through this corner is inclined at 45° to HP and 30° to VP. Draw its projections.
6. A regular pentagonal lamina has its sides as 30mm. It is resting with one of its corners on HP so that the side opposite to this corner touches VP. The plane surface of the lamina is inclined at 30° to HP.
7. A hexagonal lamina of sides 30mm rests on one of its sides on HP so that the surface of the lamina is inclined at 45° to HP. The side parallel to the side on which the lamina rests is inclined at 45° to VP. Draw the top and front views of the lamina.
8. A hexagonal lamina of side 30mm is resting with one of its corner on HP so that the diagonal passing through that corner is inclined at an angle of 45° and appears to be inclined at 30° to VP. Draw the top and front views of the lamina.
9. A square lamina of ABCD of 30mm side rests on the corner C such that diagonal AC appears as at 30° to the VP in the top view. The two sides BC and CD containing the corner C make equal inclinations with the HP. The surface of the lamina makes 45° with HP. Draw its top and front views.
10. A pentagonal plane lamina of edges 20mm is resting on HP with one of its corner touching it such that plane surface makes an angle of 60° with HP. The two of the base edges containing the corner on which the lamina rests make equal inclinations with HP. If the edge opposite to this corner makes an angle of 45° with the VP. Draw the top and front views of the plane lamina in this position.
11. A hexagonal lamina of 30mm sides rests on HP on one of its sides. The side which is on HP is perpendicular to VP and the surface of the lamina is inclined to HP at 45°. The lamina is then rotated through 90° such that the side on HP is parallel to the VP, while the surface is still inclined to HP at 45°. Draw the front view and the top view of the lamina in its final position.
12. A circular lamina of 60mm diameter rests on HP such that the surface of the lamina is inclined at 30° to HP. The diameter through the point on which the lamina rests on HP appears to be inclined at 30° to the VP in the top view. Obtain its projections.