ST.ANNE'S

COLLEGE OF ENGINEERING AND TECHNOLOGY

Subject Name: **ENGINEERING GRAPHICS**   **Code**   : GE3152

Year & Dept   : I year (S & H)   **Semester**   : I

QUESTION BANK

UNIT- I

Plane Curves (Eccentricity method only)

1. The focus of conic is 50mm from the directrix. Draw the locus of a point 'P' moving in such a way that its distance from the directrix is equal to its distance from the focus. Name the curve. Draw a tangent to the curve at a point 60mm from the directrix.

2. A fixed point F is in 3.5cm from a fixed straight line. Draw the locus of the point P moving in such a way that its distance from the fixed straight line is equal to its distance from F. Name the curve and draw a normal and tangent at any point on the curve.

3. Draw an ellipse when the distance of focus from the directrix is 40 mm &eccentricity is ¾ and draw a tangent at a point of the ellipse.

4. Draw a parabola when the distance of focus from the directrix is 40 mm. Draw a tangent at a point on the parabola.

5. Construct a curve when the distance of focus from the directrix is 35 mm and eccentricity is 4/3. Draw a tangent to a point on the curve. Name the curve.

CYCLOIDS AND INVOLUTES

1. Construct a cycloid given the diameter of the generating circle radius is 30 mm. Draw a tangent at point on the cycloid.

2. Construct the path traced by appoint on a circular disc radius of 30 mm rolls on a circular path of radius 100 mm.

3. Construct the path traced by appoint on a circular disc radius of 30 mm rolls on a circular path of radius 100 mm inside it.

4. A circle of radius 20 mm rolls on the concave side of another circle of radius 40 mm. Draw the path traced by a point on the rolling circle.

5. Draw the involutes of the following. (i) A square of side 30 mm (ii) Rectangular pentagon of side 25 mm. (iii) Circle of radius 25 mm.

6. A circular disc of radius 24 mm rolls on a plane surface. Draw the locus of a point which is at a distance of 300 mm from the centre of the disc, which rolls for one revolution.

7. Draw a hypocycloid of a circle of 40mm diameter that rolls inside another circle of 200mm diameter for one revolution. Draw tangent and normal at any point on the curve.

8. A circular wheel of 50mm diameter rolls without slipping along a straight line. Draw the curve traced by a point 'P' on its rim for one revolution of the wheel. Draw tangent and normal at any point M on the curve.

UNIT- II - Projection of Points

Draw the projections of the following points on the same reference straight line:

A- 10 mm above HP and 20mm in front of VP.
B- 20 mm above HP and 30mm behind of VP.
C- 30mm below HP and 40mm behind VP.
D- 40mm below HP and 50 mm in front of VP.
E- On HP and 20mm behind VP
F- On VP and 25mm below HP.
G- On both HP and VP.
H-20mm above HP and 20mm behind VP

Projection of Straight lines

STRAIGHT LINE PERPENDICULAR TO ONE PLANE AND PARALLEL TO OTHER

1. A line AB 60mm long has its end A10mm above HP and 20mm in front of VP. The line is kept perpendicular to HP and parallel to VP. Draw its projections.

2. A line BC 40mm has its end B 25mm above HP and 30mm in front of VP. The line is kept perpendicular to VP and parallel to HP. Draw its projections.

STRAIGHT LINE INCLINED TO ONE PLANE ONLY

1. A line DE 35mm long has its end D 5mm above HP and 10mm in front of VP. The line is kept inclined at 30° to HP and parallel to VP. Draw its projections.

2. A line EF 70mm long has its end E 40mm above HP and 20mm in front of VP. The line is inclined at 60° to VP and parallels to HP. Draw its projections.

3. A line FG 65mm long has its end F 25mm above HP and on VP. The line is inclined at 45° to HP. Draw its projections.

4. A line GH 35mm long has its end G 20mm in front of VP and on HP. The line is inclined at 35° to VP. Draw its projections.

5. A line PQ 70mm long has its end P 15mm above HP and 25mm in front of VP. The top view measures 40mm.Draw its projections and find the inclination of the line with HP.

6. A line QR 65mm long has its end Q 20mm above HP and 15mm in front of VP. Its front view has a length of 35mm. Draw the projections and find the inclination of the line with VP.

STRAIGHT LINE INCLINED TO BOTH HP AND VP (ROTATING LINE METHOD)

1. The end A of a line AB is 16mm above HP and 20mm in front of VP, while the end B is 60mm above HP and 50mm in front of VP. If the end projectors are at a distance of 70 mm, find the true length and true inclinations of the line. Also draw the traces.

2. The end P of a line PQ is 30mm above HP and 35mm in front of VP. The line is inclined at 35 degrees to HP. Its top view is 70mm long and inclined at 40 degrees to XY. Draw the projections of the straight line. Locate the traces. Find the true length and inclination of line with VP.

3. A line LM 70mm long has its end L 10mm above HP and 15mm in front of VP. Its top view and front view measures 60 mm and 40 mm respectively. Draw the projections of the line and determine its inclinations with HP and VP.

4. A straight line AB of length 50 mm is inclined at 30º to HP and 45º to VP. Point A is 15mm above HP and 20mm in front of VP. Draw the projections of the straight line.

5. A line BC 80mm long has its end B, 15mm from both HP and VP. Other end C is 40mm above HP and 50mm in front of VP. Draw the projections of the line and determine the inclination of the line with HP and VP.

6. A line CD 70mm long has its end C 35mm above HP and 30mm in front of VP. The top view and the front view has a length of 45mm and 60mm respectively. Draw its projections.

7. A line DE 75mm long has its end D on both HP and VP. The line is kept inclined at 45° to HP and 30° to VP. Draw its projections.

8. One end E of a line EF, 75mm long is 20mm above HP and 25mm in front of VP. The line is inclined at 30° to HP and the top view makes 45° with VP. Draw the projections of the line and find its true inclination with VP.

9. A line FG 50mm long has its end F 10mm above HP and 15mm in front of VP. The line is inclined at 35° to HP and 55° to VP. Draw its projections.

10. A line GH 85mm long has its end G 25mm above HP and 20mm in front of VP. End H is 60mm above HP and 50mm in front of VP. Draw the projections and find the inclinations of the line with HP and VP.

11. A line PQ measuring 75mm long has one of its ends, 50mm in front of VP and 15mm above HP. The top view of the line is 50mm long. Draw and measure the front view. The other end is 15mm in front of VP and is above HP. Determine the true inclinations of the line.

12. A line QR has its end Q 20mm above HP and 25mm in front of VP. The other end R is 45mm above HP and 55mm in front of VP. Distance between the end projectors is 60mm. Draw its projections and also find the true length and true inclinations of the line with HP and VP.

13. The mid point of the line RS 90mm long is 60mm above HP and 50mm in front of VP. It is inclined at 30°to HP and 45° to VP. Draw its projections.

Projection of Plane surfaces

1. A hexagonal plate of side 25mm is resting on HP such that one of its corners touches both HP and VP. Its surface makes 30 degrees with HP and 60 degrees with VP. Draw the projections of the plate.

2. A pentagonal; lamina of side 35mm is resting upon its edge on HP, so that the surface is inclined at 45 degrees to HP. The line joining the midpoint of the resting edge to the opposite corner is inclined at 30 degrees to VP such that the resting edge is away from VP. Draw the projections of the lamina.

3. A Square lamina PQRS of side 40mm rests on the ground on its corner P in such a way that the diagonal PR is inclined at 45 degrees to HP and apparently inclined at 30 degrees to VP.
Draw its projections.

4. A circular plate of 60mm diameter has a hexagonal hole of 20mm sides centrally punched. Draw the projections of the lamina resting on HP with its surface inclined at 30 degrees to HP and the diameter through the point on which the lamina rests on HP is inclined at 50 degrees to VP. Any two parallel sides of the hexagonal hole are perpendicular to the diameter of circular plate passing through the point on which it rests. Draw the projections.

5. A Square plane of side 40mm has its surface parallel to VP and perpendicular to HP. Draw its projections when one of the sides is inclined at 30° to HP.

6. A Circular plane of diameter 50mm has its surface parallel to HP and perpendicular to VP. Its Centre is 20mm above HP and 30mm in front of VP. Draw its projections.

7. A Pentagonal lamina of side 30mm is placed with one side on HP and the surface inclined at 50° to HP and perpendicular to VP. Draw its projections.

8. A Hexagonal plane of side 30mm is placed with a side on VP and the surface inclined at 45° to VP and perpendicular to HP. Draw its projections.

9. A pentagon of side 30mm rests o the ground on one of its corners with the sides containing the corner being equally inclined to the ground. The side opposite to the corner on which it rests is

inclined at 30° to the VP and is parallel to HP. The surface of the pentagon makes 50° with the ground. Draw the top and front views of the pentagon.

10. Pentagonal lamina of side 30mm is resting on one of its edges on HP which is inclined at 45° to VP. Its surface is inclined to 30° to HP. Draw its projections.

UNIT- III - Projection of Solids

SOLIDS IN SIMPLE POSITION

1. A Cube of 40mm side rests on HP on one of its ends with a face parallel to VP and 25mm in front of VP. Draw the top and front views of the cube.

2. A Cube of side 40mm rests on HP on one of its ends with a vertical face inclined at 40° to VP. Draw its projections.

3. A Cube of side 40mm rests on HP on one of its ends with its vertical faces equally inclined to VP. Draw its projections.

4. Draw the top and front view of a square pyramid of base side 30mm and altitude 40mm when it is resting on HP on its base with one of the edges of the base inclined at 60° to VP.

5. Draw the projection of a pentagonal prism of base side 20mm and axis length 35mm when it is resting on HP on its base with one of the edges of the base inclined at 30° to VP.

6. Draw the projections of a hexagonal pyramid of side of base 30mm and altitude 60mm when it is resting on its base on a HP with an edge of the base inclined at 30° VP.

7. A square prism of base edge 25mm and axis length 60mm is lying on HP on one of its longer edges with its rectangular faces equally inclined to HP. Draw its projections when the axis is perpendicular to VP and parallel to HP.

8. A Pentagonal pyramid of base side 30mm and axis length 60mm rests on HP on one corner of the base. The base edge containing that corner makes 40° with HP. Draw its projections when the axis is perpendicular to VP and parallel to HP.

9. A hexagonal prism of base side 20mm and axis length 50mm lies on HP on one of its rectangular faces with the axis parallel to both HP and VP. Draw its projections.

10. A pentagonal prism of base side 40mm and axis 60mm long lies on HP on one of its longer edges with its axis parallel to both HP and VP. One of the rectangular faces containing the resting edge is inclined at 30° to HP. Draw its plan and elevation.

AXIS INCLINED TO ONE PLANE AND PARALLEL TO THE OTHER

1. A cone of diameter of base 55 mm and height 60 mm resting on HP on one of its generators with axis parallel to VP. Draw the projections of the cone.

2. Draw the top and front views of rectangular pyramid of side of base 20 X 25 mm and height 35 mm when it lies with one of its triangular faces containing the longer edge of the base on HP. This longer edge containing the triangular face lying on HP is perpendicular to VP.

3. A pentagonal prism side of base 25mm and axis 50 mm long rests with one of its shorter edges on HP such that the base containing that edge makes an angle of 30 degrees to HP and its axis is parallel to VP. Draw its projections.

4. A hexagonal pyramid of 26 mm side of base and 70 mm height rests on HP on one of its base edges such that the triangular face containing that resting edge is perpendicular to both HP and VP. Draw its projections.

5. A hexagonal prism of base side 35mm and height 60mm rests with one of its rectangular faces on HP. If the axis is inclined at 30 degrees to VGP draw its projections.

6. A pentagonal pyramid has an altitude of 60mm and base side 35mm. The pyramid rests with one of its sides of the base on HP such that the triangular face containing that side is perpendicular to both HP and VP.

7. Draw the projections of a pentagonal prism of 30mm side of base and 65mm long lying on one of its longer edges on the HP, with one rectangular face perpendicular to HP and axis makes 60 degrees with VP.

8. Draw the projections of the cone of base 30mm diameter and axis 50mm long resting on HP on a point of its base circle with the axis making an angle of 45 degrees with HP and parallel to VP.

9. A hexagonal prism of base side 30mm and axis length 60mm lies on HP on one of its base edges with its axis inclined at 60° to HP and parallel to VP. Draw its projections.

10. Draw the projections of a cube of side 40mm when it rests on HP on one of its corners and the face containing that corner is inclined at 30° to HP and parallel to HP.

11. A square prism of base side 35mm and axis length 60mm rests on one of its base edges on HP with its axis inclined at 30° to HP and parallel to VP. Draw its projections.

12. A cylinder of base diameter 30mm and axis length 50mm is resting on HP on a point of base so that its axis is inclined at 45° to HP and parallel to VP. Draw its front view and top views.

13. A hexagonal pyramid of base edge 40mm and height 80mm lies on one of its base edges on HP with its axis inclined at 30° to HP and parallel to VP. Draw its projections.

14. A square pyramid of base side 30mm and height 60mm lies on HP on one of its triangular faces with its axis parallel to VP. Draw its projections.

15. A pentagonal pyramid of base edge 25mm and axis 60mm long rests on a base side on HP such that the highest base corner is 20mm above HP and its axis is parallel to VP. Draw its projections.

16. A cone of base diameter 40mm and altitude 60mm rests on HP with its axis inclined at 30° to HP and parallel to VP. Draw its projections.

17. Draw the projections of a cone of base diameter 50mm and axis length 70mm when it lies on the ground on one of its generators with its axis parallel to VP.

18. A hexagular pyramid of base side 30mm and axis length 60mm is resting on HP on one of its base corners with its axis inclined at 35° to VP and parallel to HP. Draw its projections when the base sides containing the resting corner are equally inclined to HP.

UNIT- IV – SECTION OF SOLIDS

1. A pentagonal pyramid side of base 35 mm and axis 60mm long rests on HP such that one of the edges of the base is perpendicular to VP. A section plane perpendicular to HP and parallel to VP cuts the pyramid at a distance of 20mm from the corner of the base nearer to the observer. Draw its top and sectional front views.

2. A pentagonal pyramid side of base 40mm and axis 80mm long rests on HP such that one of the edges of the base is perpendicular to VP. It is cut by a section plane inclined at 45 degrees to HP and passing through the mid-point of the axis removing the apex. Draw its top, sectional front views and true shape of the section.

3. A Square prism side of base 30mm and axis 60mm long rests with its base on HP and one of its rectangular faces is inclined at 30 degree to VP.A Section plane is perpendicular to VP and inclined at 60 degrees to HP cuts the axis of the prism at a point 20mm from its top end. Draw the sectional top view and true shape of the section.

4. A Square pyramid base of side 25mm and height 40 mm rests on HP with its base edges equally inclined to VP. It is cut by a plane perpendicular to VP and inclined at 30 degrees to HP meeting the axis at 21 mm from the base. Draw the sectional top views and true shape of the section.

5. A square prism of base side 30mm and axis length 60mm is resting on HP on one of its faces with a base side inclined at 25° to VP. It is cut by plane inclined at 40° to HP and perpendicular to VP and is bisecting the axis of the prism. Draw its front view, sectional top view and true shape of the section.

6. A pentagonal pyramid of base side 40mm and axis length 75mm is resting on HP on its base with one of its base sides parallel to VP. It is cut by a plane inclined at 35° to HP and perpendicular to VP and is bisecting the axis. Draw its front view, sectional top view and true shape of the section.

7. A hexagonal prism of base side 30mm and axis length 60mm is resting on HP on its base with two of the vertical faces perpendicular to VP. It is cut by a plane inclined at 50° to HP and perpendicular to VP and passing through a point at a distance of 12mm from the top face. Draw its front view, sectional top view and true shape of the section.

8. A cylinder of base diameter 45mm and height 65mm lies on its base on HP. It is cut by a plane perpendicular to VP and inclined at 30° to HP. And meeting the axis at a distance of 30mm from the base. Draw its front view, sectional top view and true shape of the section.

9. A cone of base diameter 50mm and axis length 75mm is resting on HP on its base .It is cut by a plane inclined at 45° to HP and perpendicular to VP and is bisecting the axis. Draw its front view, sectional top view and true shape of the section.

10. A hexagonal pyramid of base side 30mm and height 60mm is resting on HP on its base with two of the base sides perpendicular to VP. It is cut by a section plane perpendicular to VP and parallel to and 25mm above HP. Draw its front view and sectional top view.

11. A square pyramid of base side 30mm and axis length 60mm is resting on HP on its base with one side of the base inclined at 30° to VP. It is cut by a plane perpendicular to VP and parallel to and 15mm above HP. Draw its front view and sectional top view.

12. A pentagonal prism of base side 30mm and axis length 60mm is resting on HP on one of its rectangular faces with its axis perpendicular to VP. It is cut by a section plane inclined at 40° to VP and perpendicular to HP and passing through a point 25mm from the rear face of the prism. Draw its front view, sectional top view and true shape of the section.

13. A cone of base diameter 60mm and axis length 70mm is resting on HP on its base. It is cut by a plane perpendicular to VP and parallel to an end generator (contour generator) and is 10mm away from it. Draw its front view, sectional top view and true shape of the section.

Development of Lateral surfaces

1. Draw the development of the lower portion of a cylinder of diameter 50mm and axis 70mm when sectioned by a plane inclined at 40 degrees to HP and perpendicular to V.P and bisecting the axis.

2. A cone of base diameter 80mm and axis height 80mm rests on HP on its base. A square hole of side 40mm is cut horizontally through the cone such that the axis of the hole and square intersect at a height of 16mm from the base. If the sides of the hole are equally inclined to the HP, draw the development of lateral surface of the cone.

3. A Cube of 40mm edge stands on one of its faces on HP with a vertical face making 45 degrees to VP.A horizontal hole of 30mm diameter is drilled centrally through the cube such that the hole passes through the opposite vertical edges of the cube. Draw the development of lateral surface of the cube with the hole.

A square prism of base side 30mm and axis length 60mm is resting on HP on one of its faces with a base side inclined at 30 to VP. It is cut by plane inclined at 40° to HP and perpendicular to VP and is bisecting the axis of the prism. Draw its development.

4. A pentagonal prism of base side 30mm and axis length 60mm is resting on HP on its base with one of its base sides parallel to VP. It is cut by a plane inclined at 35° to HP and perpendicular to VP and meets the axis at a distance of 35mm from the base. Draw the development of the lower portion of the solid.

5. A hexagonal prism of base side 30mm and axis length 60mm is resting on HP on its base with two of the vertical faces perpendicular to VP. It is cut by a plane inclined at 50° to HP and perpendicular to VP and passing through a point at a distance of 10mm from the top face. Draw the development of the lower portion of the solid.

6. A cylinder of base diameter 45mm and height 65mm lies on its base on HP. It is cut by a plane perpendicular to VP and inclined at 30° to HP. And meeting the axis at a distance of 30mm from the base. Draw the development of the lower portion of the solid.

7. A cone of base diameter 50mm and axis length 75mm is resting on HP on its base .It is cut by a plane inclined at 45° to HP and perpendicular to VP and is bisecting the axis. Draw the development of the lower portion of the solid.

8. A pentagonal pyramid of base side 30mm and axis length 60mm is resting on HP on its base with a side parallel to VP. It is cut by a plane inclined at 40° to HP and perpendicular to VP and passing through a point at a distance of 15mm from the base.. Draw the development of the lower portion of the solid.

UNIT- V – ISOMETRIC PROJECTIONS

1. Draw the isometric view of the frustum of a hexagonal pyramid when it is resting on its base on the HP with two sides of the base parallel to VP. The pyramid has base side of 30mm and top side of 10mm. The height of the frustum is 60mm.

2. A hexagonal prism side of base 25mm and height 50 mm rests on HP and one of the edges of its base is parallel to VP. A section plane perpendicular to VP and inclined at 50 degrees to HP bisects the axis of the prism. Draw the isometric projections of truncated prism.

3. A cylinder of diameter of base 60mm and height 70mm rests with its base in HP. A section plane perpendicular to VP and inclined at 45 degrees to HP cuts the cylinder such that it passes through a point on the axis 50mm above the base. Draw the isometric projection of the truncated cylinder showing the cut surface.

4. A waste paper basket is in the form of frustum of hexagonal pyramid of side of base 18mm and top 30mm. Height is 400mm. Draw the isometric projection.

5. Draw the isometric projection of a hexagonal prism of base side 25mm and axis height 60mm when it rests on HP on its base with a base edge parallel tom VP.

6. Draw the isometric projection of a cylinder of base diameter 50mm and axis height 60mm when it rests on HP on its base.

7. A hexagonal prism of base side 25mm and axis height 50mm rests on HP on its base with a base edge parallel tom VP. It is cut by a plane inclined at 50° to HP and perpendicular to VP and is bisecting the axis. Draw the isometric view of truncated prism.

8. A cylinder of base diameter 50mm and axis height 60mm rests on HP on its base. It is cut by a plane inclined at 55° to HP and perpendicular to VP and passing through a point at a distance of 45mm from the base. Draw the isometric view of the cylinder.

9. Draw the isometric projection of a hexagonal pyramid of base side 30mm and axis height 75mm when it rests on HP on its base with a base edge parallel tom VP.

10. Draw the isometric projection of a cone of base diameter 40mm and axis height 60mm when it rests on HP on its base.

11. A pentagonal pyramid of base side 30 mm and axis length 65 mm is resting on HP on its base with a side of base perpendicular to VP. It is cut by a plane inclined at 30° to HP and perpendicular to VP and passing through a point ON the axis at a distance of 30 mm from the apex. Draw the isometric view of the truncated cylinder.

12. A cone of base diameter 50mm and axis height 70 mm rests on HP on its base. It is cut by a plane inclined at 30° to HP and perpendicular to VP and meets the axis at a distance of 40 mm from the base. Draw the isometric view of the truncated cone.

13. A square prism of base side 20 mm and height 40 mm rests on HP on its base. With its side equally inclined to VP. It is cut by a plane inclined at 45° to HP and perpendicular to VP and meets the axis at a distance of 7 mm from the Face. Draw the isometric view of the truncated prism.

Perspective Projections

1. A square prism of base 25 X 25 mm and height 40mm rests on the GP on one of its ends with the rectangular face receding away from the PP towards right making 60 degrees with PP. The corner of the base nearest to PP is 40mm to the left of the station point and 20mm behind the PP. The station point is 60mm above GP and 50mm in front of PP. Draw the perspective projections of the prism by visual ray method.

2. A rectangular pyramid of side of base 30mm and 20mm and height 35mm rests with its base on the ground such that one of its longer base edges is parallel to the Picture plane and 30mm behind it. The station point is 50mm in front of the PP, 30mm to the left of the axis of the pyramid and 50mm above the ground. Draw the perspective view of the pyramid.

3. A square prism of side base 30mm and height 50mm rests with its base on the ground and one of the rectangular faces inclined at 30 degrees to PP. The nearest vertical edge touches the PP. The station point is 60 mm above GP, 45mm in front of PP and opposite to the nearest vertical edge touches the PP. Draw the perspective view of the square prism.

4. Draw the perspective view of the pentagonal prism of bade side 30mm and height 50mm when it rest on its base on the ground plane with one of its rectangular faces parallel to and 20mm behind the picture plane. The station point is 45mm in front of the picture p-lane and 60mm above the GP. The observer is 20 mm to the left of the axis. Using the top view and the end view draw the perspective view of the prism using visual ray method.

5. A pentagonal pyramid of side 25mm and height 55mm rests on HP on its base with an edge in PP. The station point is 60mm in front of PP, 75 mm above GP and lying on a central plane passing through the apex. Draw the perspective view.

6. A square prism of base side 30mm and height 60mm rests on its base with the nearest edge of the base is parallel to and 5 mm behind PP. The station point is 60mm in front of PP, 50 mm above GP and lying on a central plane 25mmto the left of the mid of the solid.. Draw the perspective projection.

7. A rectangular prism of base size 25x 40x 60 mm rests with its on the ground such that the longer base edge recedes 30 to the right of PP with one end of it behind PP. The station point is 45mm in front of PP, 35 mm above GP and lying on a central plane 35 mm from the nearest vertical edge. Draw the perspective view.

8. A square pyramid of base 30 mm and axis height 65mm rests on ground vertically with a base edge in PP. on its base with an edge in PP. The station point is 40mm in front of PP, 90 mm above GP and lying on a central plane passing through the point 20 mm to the left of the axis. Draw the perspective projection

9. A cylinder of diameter 50 mm rests on ground vertically with its axis 5 mm behind PP. The observer point is 40mm in front of PP, 100 mm above GP and is 10 mm to the right of the nearest base corner point. A central plane passing through the apex. Draw the perspective projection.