

**S'05 : 4 FN : AN 207 (07)****RS****ENGINEERING DRAWING & GRAPHICS***Time : Three hours**Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A, ANY TWO from Group B and ALL from Group C.*

*All parts of a question ( a, b, etc ) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing data or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

**Group A**

1. An hexagonal prism of side of base 25 mm and height 50 mm rests on the floor, with its axis vertical, such that one of its rectangular faces is parallel to the wall. Draw its views as per the following projection principles :

- |                   |   |
|-------------------|---|
| (i) Orthographic. | 8 |
| (ii) Isometric.   | 6 |
| (iii) Oblique.    | 6 |

( Turn Over )

2. (a) Define :

(i) Representative fraction of a scale.

(ii) Least count of a scale.

(iii) Retrograde vernier scale. 6

(b) The distance of 200 km between two cities, on a map, is represented by a length of 10 cm. Draw a diagonal scale for reading this map up to a maximum distance of 300 km. What is the R.F. of the scale? Indicate the following distances on the scale. (i) 138 km  
(ii) 205 km. 14

3. (a) A magician performs the trick of a floating stick. As seen by a person sitting right in front, as per the orthographic projection rules, the stick has its ends 0.75 m and 1.25 m above the floor; appears to be inclined at  $30^\circ$  to floor. The same two ends are found to be 0.25 m and 1.0 m in front of the screen, arranged behind the stick. Using suitable scale, draw the projections of the stick. What is the true length of the stick? 10

(b) A rhombus of diagonals 100 mm & 60 mm, with longer diagonal horizontal, represents the top view of a square 100 mm long diagonals, with a corner on H.P. Draw the front view of the rhombus. 10

4. A hexagonal pyramid of 30 mm side of base and 70 mm height, rests with one of its base edges in V.P. and its apex on H.P. Axis of the pyramid is inclined at  $60^\circ$  to H.P. and  $30^\circ$  to V.P. Draw the top view and front view of pyramid. 20

**Group B**

5. A sheet metal funnel is to be prepared as per the following details :

Larger diameter of conical portion : 80 mm.

Height of the conical portion : 50 mm

Diameter of the cylindrical stem : 25 mm

Height of the cylindrical stem : 40 mm.

Draw the complete development, so that the sheets may be cut accordingly. 20

6. Orthographic views of a simple machine part are shown in the Fig. 1. Draw the isometric projection of the part, using isometric scale. 20

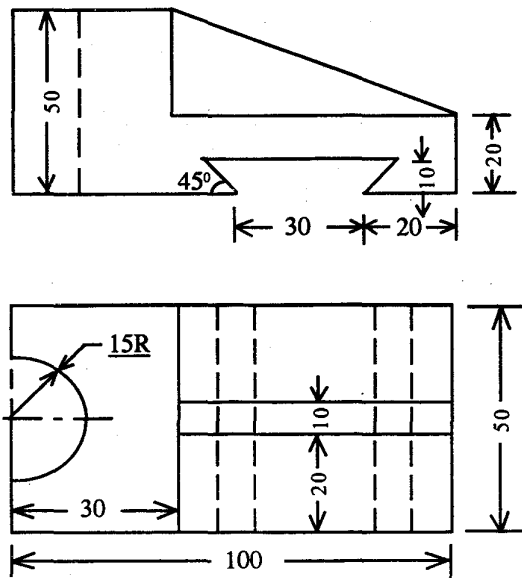


Fig. 1

7. A cone of base 50 mm diameter and height 75 mm rests with its base on H.P. It is cut by a section plane, the vertical trace of which, is a line parallel to one of the generators and passes through a point on the axis at a distance of 40 mm from the base. Draw the sectional top view and the true shape of the section. 20
8. Draw the following orthographic views of the machine part shown in *Fig. 2* :
- (i) Front view, looking along the direction of the arrowhead. 6
- (ii) Top view. 8
- (iii) Side view. 6

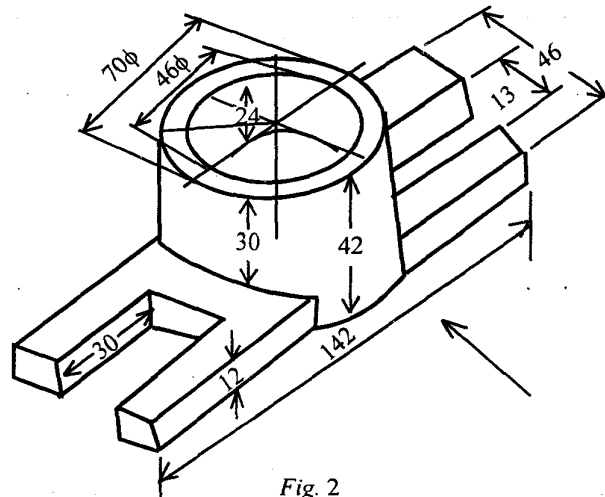


Fig. 2

**Group C**

**9. (A) Choose the *correct* answer among the three answers suggested for each question : 1 x 10**

**(i) Divider is used for**

- (a) drawing circles and curves**
- (b) transferring dimensions**
- (c) measuring length.**

**(ii) B.I.S recommends the following unit for all dimensions in any one drawing**

- (a) m**
- (b) cm**
- (c) mm.**

**(iii) A line consisting of short dashes throughout its length, represents the following**

- (a) invisible edge of a solid**
- (b) axis of a solid**
- (c) trace of a cutting plane.**

**(iv) Locus of a point which moves around a centre and simultaneously moves either towards or away from the centre, is called**

- (a) cycloid**

- (b) helix
  - (c) spiral.
- (v) The plan and elevation of a point are 40 mm and 60 mm below the XY line, respectively. The point as per third angle projection rules, lies in
- (a) second quadrant
  - (b) third quadrant
  - (c) fourth quadrant.
- (vi) A tetrahedron has
- (a) 4 equal edges and 4 isosceles triangular faces
  - (b) 6 equal edges and 4 equilateral triangular faces
  - (c) 6 equal edges and 4 square faces.
- (vii) When a cone is cut by a section plane parallel to its axis, the outline of the cut section is
- (a) parabola
  - (b) hyperbola
  - (c) rectangular hyperbola.
- (viii) Isometric projection of a sphere is
- (a) an ellipse of major axis equal to the diameter of the sphere

(b) a circle of diameter equal to the diameter of the sphere

(c) a circle of radius less than the radius of the sphere.

(ix) In case of orthographic projections, of a line inclined to both the principal planes

(a) neither the top view nor the front view has the actual length of line

(b) either the top view or the front view has the actual length of the line

(c) each of the top view and front view has the actual length of line.

(x) The length of any line, parallel to any isometric axis, is foreshortened to

(a)  $\sqrt{\frac{2}{3}}$  times the actual length

(b)  $\sqrt{\frac{3}{2}}$  times the actual length

(c)  $\frac{1}{\sqrt{2}}$  times the actual length.

(B) Choose the *correct* answer among the three answers suggested for each question: 1 x 10

(i) Joystick is

(a) an output device in a computer

(b) a storage device in a computer

(c) an input device in a computer.

(ii) Digitizer is

(a) used to plot a drawing

(b) used to store the drawing files

(c) a graphic input device.

(iii) Operating system is

(a) a computer with peripherals, which do not become obsolete

(b) a set of computer programs which coordinate the operation of the computer

(c) a software, exclusively used in biomedical engineering.

(iv) Centre, radius : 5, 12; R; 20 is the command used in AutoCAD to draw

(a) an ellipse

(b) a circle

(c) an arc.

(v) SNAD is a command used in AutoCAD to

(a) set increments for cursor movement

(b) set the grid spacing

(c) set the precision of the decimal place.



- (vi) The command VPOINT is used in AutoCAD, to
- (a) move an object on the screen
  - (b) split the screen into more than one view
  - (c) view a 3-dimensional object in the screen.
- (vii) To join several solids to create a single solid, the command option in AutoCAD is
- (a) UNION
  - (b) SUBTRACT
  - (c) INTERSECTION.
- (viii) The following command option is used to select a group of objects lying within a window region and passing through the window
- (a) Last
  - (b) Window
  - (c) Crossing.
- (ix) The drawing prepared in AutoCAD can be permanently stored in
- (a) ROM
  - (b) RAM
  - (c) Auxiliary memory.

**(x) Tolerance on dimensions, are indicated in**

**(a) Machine drawing**

**(b) Isometric projection drawing**

**(c) Orthographic projection drawing.**



**W'05 : 4 FN : AN 207 (1407)**

**ENGINEERING DRAWING AND GRAPHICS**

*Time : Three hours*

*Maximum marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A,  
ANY TWO from Group B and ALL from Group C.*

*All parts of a question (a, b, etc) should be  
answered at one place.*

*Answer should be brief and to-the-point and be supple-  
mented with neat sketches. Unnecessary long answers  
may result in loss of marks.*

*Any missing data or wrong data may be assumed suitably  
giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

**Group A**

1. A pentagonal pyramid of 30 mm side of base and height 60 mm rests on its base such that two of its base edges makes equal inclinations with V.P and nearer to the observer. Draw its views as per the following projection principles:
  - (i) orthographic 8
  - (ii) isometric 6
  - (iii) oblique projection by the Cavalier method when the receding axis is inclined at  $45^\circ$ . 6

2. (a) Define: 6
- (i) Reducing scale
  - (ii) Enlarging scale
  - (iii) Representative fraction.
- (b) The distance between two cities is 250 kilometers. On inspection of the Railway map, its equivalent distance measures only 5 cm. What is the R.F. of the scale? Draw a diagonal scale showing to a single kilometre and indicate on it the following distances: 14
- (i) 725 km
  - (ii) 512 km
  - (iii) 268 km.
3. (a) One end of a line of length 60 mm lies at a distance of 20 mm in front of V.P. and 10 mm above H.P. The line makes  $30^\circ$  with H.P. and the side view measures 45 mm. Draw the projections of the line and determine the inclination with V.P. 10
- (b) A circular plate of 60 mm diameter has a hexagonal hole of 20 mm sides centrally punched. Draw the projections of the circular plate resting on H.P. with its surface inclined at  $30^\circ$  to the H.P. and the diameter through the point on which the lamina rests on H.P. is inclined at  $50^\circ$  to V.P. The parallel sides of hexagonal hole are perpendicular to the diameter of the circular plate passing through the point on which it rests. 10
4. A rectangular pyramid of base 30 mm  $\times$  20 mm and height 35 mm rests in V.P. such that the front view of the base is a square of sides 20 mm. Front view of the axis makes  $30^\circ$  with H.P. The apex lies to the right and 30 mm from H.P. Draw the projections. 20

**Group B**

5. A pentagonal pyramid of 30 mm edge of base and 55 mm high vertically rests with one of its base edges parallel to V.P. and nearer to it. It is cut by two section planes, both being perpendicular to V.P. One of the section planes is horizontal and cuts the portion of the pyramid on the left of the axis at a height of 20 mm above the base of the pyramid. The other section plane inclined at  $45^\circ$  to H.P. cuts the portion of the pyramid to the right of the axis passing through a point on it 20 mm above the base and leans upwards. Draw the development of the lateral surfaces of the lower portion of the pyramid. 20
6. Orthographic views of a simple machine part are shown in the Fig. 1. Draw the isometric projection of the part, using isometric scale. 20

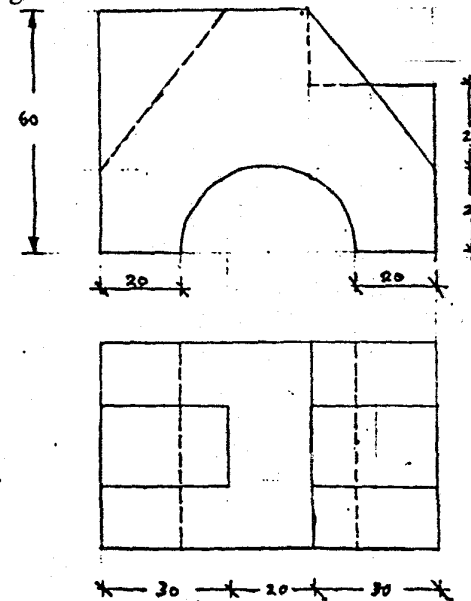


Fig. 1

All dimensions are in mm.

7. A cylinder of 50 mm diameter and 70 mm long is lying with one of its generators on H.P. such that its axis is parallel to both H.P. and V.P. A section plane perpendicular to V.P. and inclined at 30° to H.P. passes through a point on the axis 30 mm from one of its ends. Draw the sectional top view and true shape of section. 20

8. Draw the following orthographic views of the machine part shown in Fig. 2 :

(i) Front view, looking along the direction of the arrowhead. 8

(ii) Top view. 6

(iii) Left end view. 6

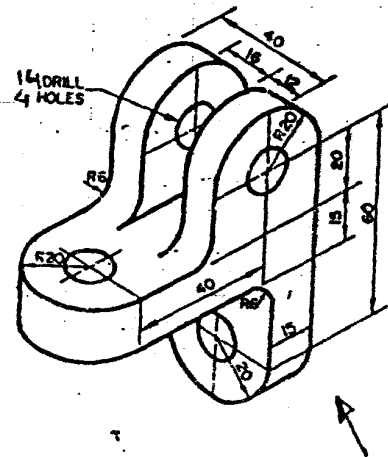


Fig. 2

All dimensions are in mm.

**Group C**

9. (A) Choose the correct answer among the three answers suggested for each question : 1 × 10

(i) When a point lies in the H.P. its view from the front will lie

(a) on *xy*

(b) below *xy*

(c) above *xy*

(ii) The distance of a point from the H.P. is marked from *xy* to the

(a) view from above

(b) view from the front

(c) side view

(iii) When both the views coincide with *xy*, the line is lying

(a) in the H.P.

(b) in the V.P.

(c) both in the H.P. and V.P.

(iv) When a plane is perpendicular to both the reference planes, its traces are

(a) inclined to *xy*

- (b) perpendicular to  $xy$
- (c) parallel to  $xy$
- (v) When the axis of a solid is perpendicular to the H.P. its relation with the V.P. is
- (a) parallel
- (b) perpendicular
- (c) inclined
- (vi) When a sphere is cut by a section plane, the true shape of the section is
- (a) ellipse
- (b) circle
- (c) parabola
- (vii) The angle between the isometric axes is
- (a)  $90^\circ$
- (b)  $120^\circ$
- (c)  $60^\circ$
- (viii) Compass is used for
- (a) transferring dimensions
- (b) measuring length
- (c) drawing circles and arcs
- (ix) When a line is parallel to both the H.P. and V.P. it has
- (a) only H.T.
- (b) both H.T. and V.T.
- (c) no H.T. and V.T.
- (x) When both the projection of a point lie below  $xy$ , the point is situated in the
- (a) first quadrant
- (b) second quadrant
- (c) fourth quadrant
- (B) Choose the *correct* answer among the three answers suggested for each question:  $1 \times 10$
- (i) 1 Kilobyte means
- (a) 1024 Bytes
- (b) 1024 KB
- (c) 1024 MB
- (ii) Hardware of a computer consists of
- (a) only input unit
- (b) only input and output unit
- (c) input, processor and output unit

**W'06 : 4 FN : AN 207 (1407)****ENGINEERING DRAWING AND GRAPHICS**

*Time : Three hours*

*Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A ,  
ANY TWO from Group B and ALL from Group C.*

*All parts of a question ( a, b, etc. ) should  
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented  
with neat sketches. Unnecessary long answers may  
result in loss of marks.*

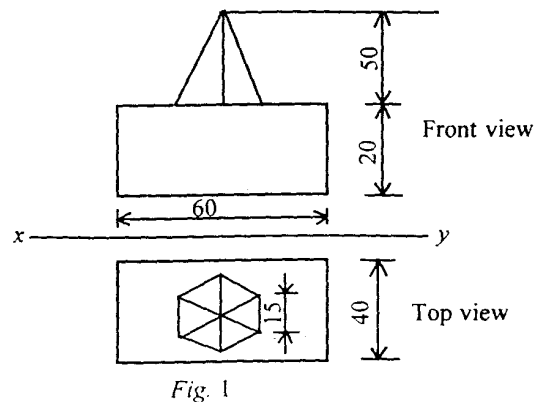
*Any missing data or wrong data may be assumed suitably giving  
proper justification.*

*Figures on the right-hand side margin indicate full marks .*

**Group A**

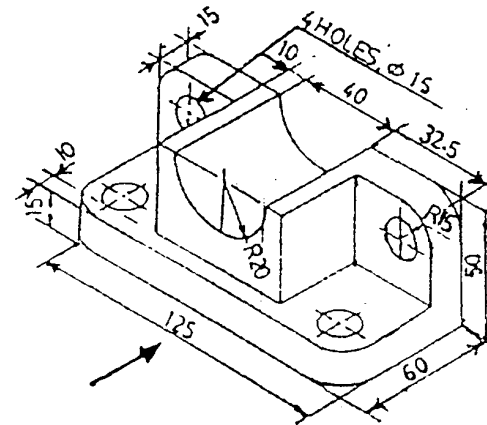
1. (a) What is the principle of construction of vernier scale ? 5
  
- (b) On a building plan a line 22 cm long represents a distance of 440 metres. Construct a diagonal scale for the plan to read up to 300 metres showing single metre by diagonal division. Calculate its R.F. Indicate clearly on the scale the lengths of 157, 143 and 8 metres. 15

2. (a) A line  $AB$ , 60 mm long and inclined at  $30^\circ$  to the ground, has its end  $A$  on the ground at 15 mm behind V.P. Its front view measures 45 mm. Draw the top view of the line  $AB$  and determine its inclination with the V.P. The H.P is 45 mm above the ground. 10
- (b) A rectangle  $ABCD$  of 50 mm x 20 mm has its corner  $A$ , 10 mm below the H.P and 25 mm behind V.P. Its plane is inclined at  $45^\circ$  to the H.P and the diagonal  $AC$  is parallel to the V.P. Draw its projections. 10
3. A triangular pyramid, base 25 mm side, axis 60 mm long is resting on H.P on one of its triangular faces. A plane contained by the axis is perpendicular to the H.P and inclined at  $30^\circ$  at the V.P. Draw the projection of the pyramid when the apex is away from the V.P. 20
4. (a) Show that the isometric length is 0.815 times of the true length. 5
- (b) Draw the isometric view of the arrangement of the composite solid as shown in Fig. 1. 15



**Group B**

5. A pentagonal prism, base 25 mm side, axis 50 mm long is resting on its base on horizontal plane, having an edge of the base parallel to V.P. It is cut by a plane inclined at  $45^\circ$  to H.P. and perpendicular to V.P and passing through the centre of the axis. Draw the true shape of the section and also the development of the lateral surface of the truncated prism. 20
6. Draw the following orthographic projection of the machine part shown in Fig. 2 using first angle projection:
- (i) Front view, looking along the direction of arrow. 8
- (ii) Top view and 6
- (iii) Left side view. 6



7. A cylinder of 50 mm diameter and length 75 mm is standing on the ground. It is completely penetrated by another horizontal cylinder of 30 mm diameter and 70 mm long, the axis of which is parallel to V.P. The axes of two cylinders bisect each other at right angles. Draw their projection showing the curve of penetration. 20



8. Draw the orthographic views of double riveted zigzag lap joint. The snap head rivet dia is 20 mm and the plate thickness is 10 mm. 20

### Group C

9. (A) Choose the correct answer for the following questions: 1 x 10

(i) When a line lies in the V.P., the true length will be

- (a) Top view
- (b) Front view
- (c) End view.

(ii) A curve traced out by an end of a rope unwound from a circle is

- (a) Cycloid
- (b) Involute
- (c) Epicycloid.

(iii) A line lies in 2nd quadrant, the top view will be

- (a) above the reference line,  $xy$
- (b) below the reference line,  $xy$
- (c) coincide with the reference line,  $xy$ .

(iv) A line  $AB$  has its end  $B$  in both H.P and V.P Its horizontal trace will

- (a) coincide with horizontal projection of point  $B$
- (b) coincide with the reference line,  $xy$
- (c) both (a) and (b).

(v) A plane perpendicular to V.P and parallel to H.P

- (a) It has horizontal trace
- (b) It has no horizontal trace
- (c) Its horizontal trace coincides with vertical projection.

(vi) The solid formed by revolution of rectangle is

- (a) Cone
- (b) Prism
- (c) Cylinder.

(vii) If one of the edge of pyramid lying on the ground, then in initial position

- (a) one of the side of base is parallel to reference line
- (b) sides of base containing the edge are equally inclined with the reference line
- (c) the edge of pyramid is perpendicular to reference line.

(viii) Isometric projection of a sphere is

- (a) circle with isometric length of radius
- (b) ellipse
- (c) circle with actual length of radius.

(ix) The method of development of lateral surface of pyramid

- (a) Parallel line development
- (b) Triangular development
- (c) Radial line development.

(x) When two solids bounded by plane surfaces intersect, the lines of intersection is

- (a) tortuous curve
- (b) curve line
- (c) straight line.

(B) Fill in the blanks for the following questions: 1 × 10

(i) The angle of thread of Acme thread is \_\_\_\_\_.

(ii) For load lifting screw jack, the suitable thread profile is \_\_\_\_\_.

(iii) For double start thread, lead is \_\_\_\_\_ pitch.

(iv) For Woodruff key the relation between thickness ( $T$ ) of key and diameter ( $D$ ) of shaft

(v) For gear, the module is the ratio of \_\_\_\_\_ to \_\_\_\_\_.

(vi) The number points to be specified on conics in computer graphics is \_\_\_\_\_.

(vii) The full form of CSG for solid modelling is \_\_\_\_\_.

(viii) The full form of GUI in computer graphics \_\_\_\_\_.

(ix) The symbol of positional tolerance is \_\_\_\_\_.

(x) For defining circle in computer graphics, the minimum number of points is \_\_\_\_\_.

**S'07 : 4 FN : AN 207 (1407)**

**ENGINEERING DRAWING AND GRAPHICS**

*Time : Three hours*

*Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A ,  
ANY TWO from Group B and ALL from Group C .*

*All parts of a question ( a, b, etc. ) should  
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented  
with neat sketches. Unnecessary long answers may  
result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving  
proper justification.*

*Figures on the right-hand side margin indicate full marks .*

*Neatness of drawing carry due importance .*

**Group A**

1. (a) Compare the isometric and oblique projections with necessary sketches. 5
  
- (b) A line *AB* has its end *A* 10 mm above H.P. and 15 mm in front of V.P. The line, 80 mm long, is inclined at 30° to V.P. The distance between the projectors drawn through the end points in top and front views is 55 mm. Draw the projections of the line.

Determine inclination with H.P. How far the point *B* is from the principal planes of projection? Draw its traces and find the distance between the traces measured along *xy*. 15

2. (a) Define the following: (i) Ellipse, (ii) Parabola, (iii) Hyperbola, (iv) Focus, (v) Eccentricity. 1 x 5

(b) A pentagonal lamina of edges 25 mm is resting on H.P. with one of its corners such that the plane surface makes an angle of 50° with H.P. The two base edges containing the corner on which it rests make equal inclination with H.P. If the edge opposite to this corner makes an angle of 40° with V.P., draw projections of the lamina. 15

3. (a) Construct a Vernier scale to show readings of 1/10th of a metre, when 3 cm represents 10 m. Construct the scale to read up to 60 cm and mark distances of 35.3 m and 47.3 m on the scale. 10

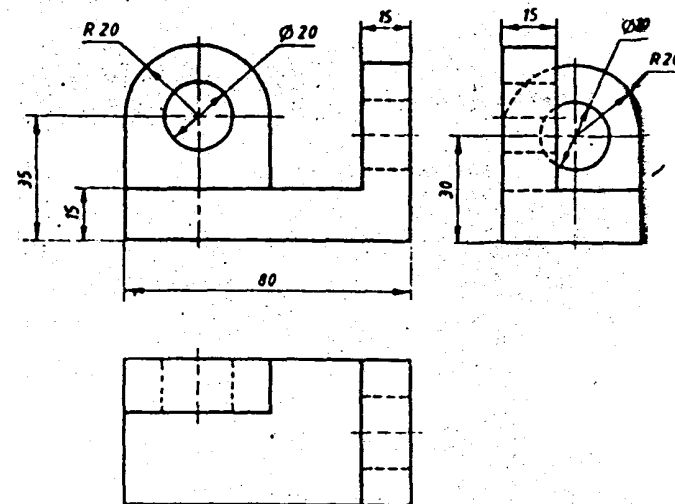
(b) A ball thrown from the ground level reaches a maximum height of 5 m and travels a horizontal distance of 11 m from the point of projection. Trace the path of the ball and name the curve traced. 10

4. Draw the projections of a cylinder, base 30 mm diameter and axis 40 mm long, rests with a point of its base circle on H.P. such that the axis is making an angle of 30° with H.P. and its top view is perpendicular to V.P. 20

**Group B**

5. Draw the development of a transition piece used to connect a circular section of 35 mm diameter to a square section of 50 mm side. Both the sections are co-axial and 50 mm apart. 20

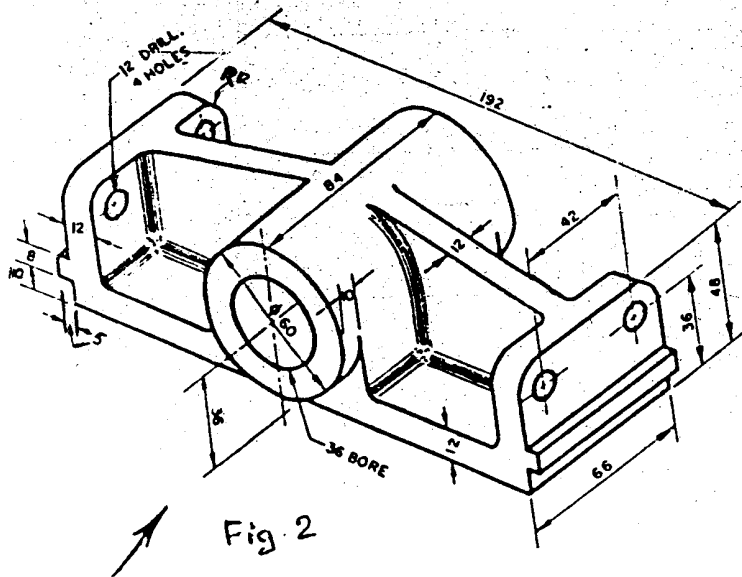
6. Orthographic views of a simple machine part are shown in Fig. 1. Draw the isometric projection of the part using isometric scale. 20



All dimensions in mm

Fig-1

7. A pentagonal prism, with side of base 35 mm and length of the axis 60 mm, rests on one of its rectangular faces on H.P. The axis of the prism is parallel to both H.P and V.P. The prism is cut by an auxiliary inclined plane making an angle of 30° with H.P. The cutting plane bisects the axis of the prism. Draw the apparent and true shape of section. 20
8. Draw the following orthographic views of the machine part shown in Fig. 2:
- (i) Front view, looking along the direction of the arrowhead; 6
  - (ii) Top view; and 8
  - (iii) Right hand side view. 6



**Group C**

9. Choose the *correct* answer for the following: 1 × 20
- (i) Four equal spheres are resting in such a manner that each sphere touching the other three. A solid can be imagined if the four centres are joined by straight lines. The solid is
    - (a) triangular pyramid
    - (b) square pyramid
    - (c) tetrahedron.
  - (ii) If  $D$  is the diameter of a sphere, in isometric projection, its value will be equal to
    - (a)  $\sqrt{3/2} D$
    - (b)  $\sqrt{2/3} D$
    - (c)  $D$ .
  - (iii) A vertical cone is cut by a plane inclined to H.P. at an angle greater than the base angle of the cone passing through the apex. The true shape of the section is
    - (a) ellipse
    - (b) parabola
    - (c) triangle.

- (iv) The eccentricity of a hyperbola is
- (a) less than 1
  - (b) equal to 1
  - (c) greater than 1.
- (v) A curve generated by a point on the circumference of a circle, which rolls on the outside of another circle without sliding, is called
- (a) cycloid
  - (b) epicycloid
  - (c) hypocycloid.
- (vi) Temporary fastenings is
- (a) bolt and nut
  - (b) rivet
  - (c) journal bearing.
- (vii) When a point lies in the H. P. , its view from the front will be
- (a) on  $xy$
  - (b) below  $xy$
  - (c) above  $xy$ .
- (viii) When a line is parallel to both the H. P. and V. P. , it has
- (a) only the H. T.
  - (b) only the V. T.
  - (c) No H. T. and V. T.
- (ix) When a plane is perpendicular to both the reference planes, its traces are
- (a) inclined to  $xy$
  - (b) perpendicular to  $xy$
  - (c) parallel to  $xy$ .
- (x) When the axis of a solid is perpendicular to the H. P. , its relation with the V. P. is
- (a) parallel
  - (b) perpendicular
  - (c) inclined.
- (xi) In computer, 1 kilo byte is equal to
- (a) 1024 bytes
  - (b) 1024 KB
  - (c) 1024 MB.
- (xii) Mouse is
- (a) an output device in a computer
  - (b) a storage device in a computer
  - (c) an input device in a computer.

- (xiii) To draw either horizontal or vertical lines, the command used in autocad is
- (a) SNAP
  - (b) GRID
  - (c) ORTHO.
- (xiv) To enlarge or reduce the apparent size of objects, the command used in autocad is
- (a) SNAP
  - (b) ZOOM
  - (c) UNDO.
- (xv) Tolerance on dimensions are indicated in
- (a) machine drawing
  - (b) isometric projection drawing
  - (c) orthographic projection drawing.
- (xvi) If the top view and front view of a point are respectively 60 mm above and 50 mm below the  $xy$  line, the point will be located in
- (a) first quadrant
  - (b) fourth quadrant
  - (c) third quadrant.
- (xvii) The command VPOINT is used in autocad to
- (a) move an object on the screen
  - (b) split the screen into more than one view
  - (c) view a three-dimensional object on the screen.
- (xviii) The input device used in the computer is
- (a) plotter
  - (b) joy stick
  - (c) light pen.
- (xix) Centre, radius : 5, 12, R; 20 is the command used in autocad to draw
- (a) an ellipse
  - (b) a circle
  - (c) an arc.
- (xx) When the axis of a solid is parallel to both H.P and V.P, the true shape of the base is shown by
- (a) front view
  - (b) top view
  - (c) side view.

**ENGINEERING DRAWING AND GRAPHICS***Time : Three hours**Maximum Marks : 100*

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*All parts of a question ( a, b, etc. ) should  
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented  
with neat sketches. Unnecessary long answers may  
result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving  
proper justification.*

*Figures on the right-hand side margin indicate full marks .*

**Group A**

1. (a) Write about scales and their significance. 5  
(b) Construct a vernier scale of 1 : 50 , showing metres ,  
decimetres , and centimetres and long enough to  
measure 5 m. Mark on the scale the distances of  
2.435 m and 3.275 m on the scale. 15
2. (a) A line *AB* of 70 mm long has its end *A* at 10 mm  
above H.P. and 15 mm in front of V.P. Its front view  
and top view measure 50 mm and 60 mm ,  
respectively. Draw the projections of the line and  
determine its true inclinations with H.P. and V.P. 10  
(b) A rhombus has its diagonals 100 mm and 60 mm long.  
Draw the projections of the rhombus , when it is so  
placed that its top view appears to be a square of  
diagonal 60 mm long and the vertical plane through  
the longer diagonal makes 30° with V.P. 10



3. A pentagonal pyramid of edge of base 25 mm and height 60 mm, is resting on a corner of its base on H.P. and the slant edge containing that corner is inclined at  $45^\circ$  with H.P. Draw the projections of the solid when it makes an angle  $30^\circ$  with V.P. Follow auxiliary plane method. 20
4. (a) State different types of lines with illustration and give their general applications as specified by Bureau of Indian Standards. 5
- (b) Figure 1 shows three views of a machine block. Draw its isometric projection. 15

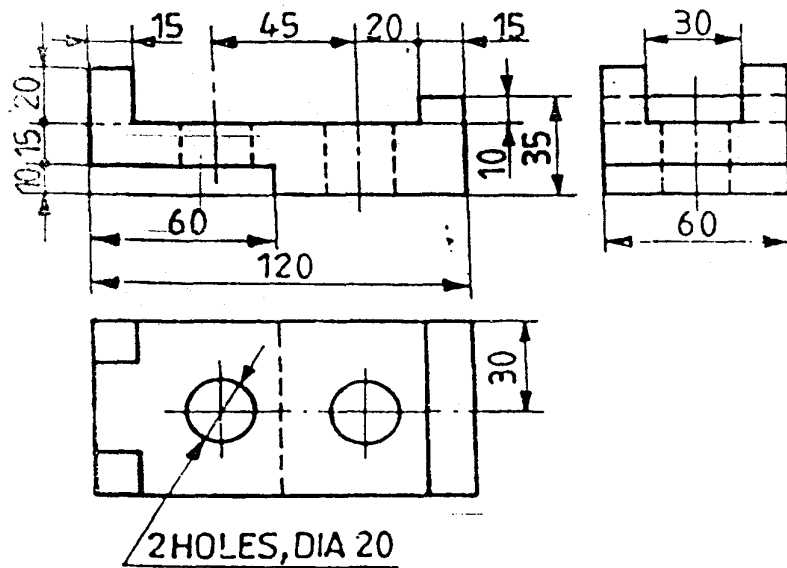


Fig. 1

**Group B**

5. A square pyramid of base 40 mm side and axis 70 mm long rests with its base on H.P. with all the edges of the base equally inclined to V.P. It is cut by a section plane inclined at  $60^\circ$  to H.P. and passing through a point on the axis at 30 mm from the apex. Draw three views of the cut solid. 20
6. Figure 2 shows the isometric projection of a machine component. Draw three orthographic views of the object. Draw the front view looking in the direction of the arrow. 20

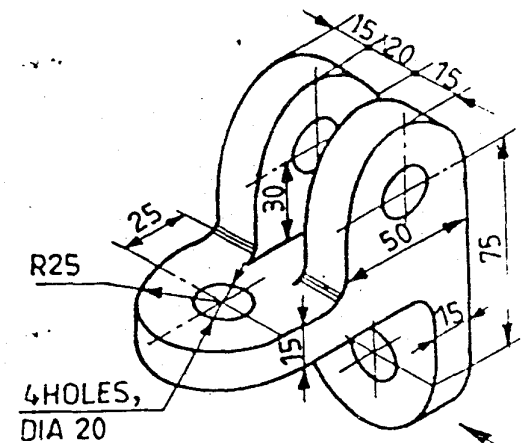


Fig. 2.

7. A vertical cylinder of 60 mm diameter has a square hole of 30 mm side, cut through it. The axis of the hole is horizontal and 8 mm away from the axis of the cylinder. The edges of the square hole are equally inclined to H.P. Draw the projections of the cylinder showing the curves of intersection. 20

8. (a) What is the difference between a lap and a butt riveted joint and state the need for beveling of overlapping plates. 5
- (b) Draw, to a full size scale, a double riveted butt joint with double cover plates, showing the zig-zag arrangement of rivets in the rows. Take the thickness of the butting plates as 12 mm and the nominal diameter of the rivet as 20 mm. Fully dimension the drawing very clearly, indicating also the dimensions of the cover plates. 15

### Group C

9. (A) Choose the *correct* answer for the following: 1 × 10

- (i) In a tripple riveted butt joint, the total number of row of rivets for the whole joint is
- (a) 3
- (b) 4
- (c) 6.
- (ii) A curve generated by a point moving on the surface of a cylinder in circumferential direction, at a constant angular speed, and with a simultaneous uniform rate of advance in an axial direction is called
- (a) ellipse
- (b) cycloid
- (c) helix.

- (iii) If a quick acting thread is required, the lead must be
- (a) small
- (b) very small
- (c) large.
- (iv) For a gear, the product of circular pitch and diametral pitch is
- (a)  $\pi$
- (b) module
- (c) addendum
- (v) The locus of a point which moves such that the sum of its distances from two fixed points remains constant is called
- (a) parabola
- (b) hyperbola
- (c) ellipse.
- (vi) The true shape of the section surface obtained by cutting a cone parallel to one of its end generators is
- (a) ellipse
- (b) parabola
- (c) hyperbola

- (vii) A point is 20 mm in front of V.P. and 15 mm above H.P. Its shortest distance from the reference line is
- (a) 25 mm  
(b) 35 mm  
(c) 5 mm
- (viii) A straight line is parallel to V.P. and 50 mm in front of it. End of the line nearest to H.P. is 30 mm from it. Which trace of the line can be located on the reference planes?
- (a) H.T.  
(b) V.T.  
(c) Both H.T and V.T.
- (ix) An elliptical lamina of major axis 100 mm and minor axis 50 mm is inclined to H.P. such that the top view appears as a circle. The inclination of the lamina with H.P. is
- (a) 30°  
(b) 45°  
(c) 60°
- (x) A hexagonal pyramid is resting on one of its corners on H.P. such that the plane passing through the axis of the pyramid and the slant edge passing through this corner, makes an angle of 30° with V.P. Its inclination with H.P. is
- (a) 45°  
(b) 60°  
(c) 90°

(B) Fill in the blanks for the following: 1 × 10

- (i) The isometric view of an object with irregular curved edges is most easily drawn by \_\_\_\_\_ method in combination with offset measurement method.
- (ii) When a solid completely penetrates another solid, there will be \_\_\_\_\_ lines of intersection.
- (iii) Every line on the development of surfaces must be the \_\_\_\_\_ length of the corresponding edge \_\_\_\_\_ on the surface.
- (iv) A solid generated by the revolution of a rectangle about one of its sides which remains fixed is known as \_\_\_\_\_.
- (v) When a straight line is inclined to one reference plane and parallel to the other, its projection on the plane to which it is inclined is a line shorter than its true length but \_\_\_\_\_ to the reference line.
- (vi) The curve traced out by a moving point along the line continuously in one direction as the line rotates in a plane about one of its ends is called \_\_\_\_\_.
- (vii) Square threads are ideal for power transmission as they offer \_\_\_\_\_.

- (viii) Control unit in a computer is a \_\_\_\_\_ component.
- (ix) \_\_\_\_\_ is an external memory device used through USB port of a computer.
- (x) The process of combined transformation employed on a graphic model during the editing process is called \_\_\_\_\_ .

**S'08:4FN : AN207 (1407)****ENGINEERING DRAWING AND GRAPHICS***Time : Three hours**Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A,  
ANY TWO from Group B and ALL from Group C.*

*All parts of a question (a, b, etc.) should  
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented  
with neat sketches. Unnecessary long answer may  
result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving  
proper justification.*

*Figures on the right-hand side margin indicate full marks.*

**Group A**

1. (a) Compare first angle projection and third angle projection methods with sketches. 6  
(b) A line *AB*, inclined at  $30^\circ$  to the H.P., has its ends *A* and *B*, 25 mm and 60 mm in front of the V.P., respectively. The length of the view from above is 65 mm and its V.T. is 15 mm above the H.P. Draw the projection of the line *AB* and locate its H.T. 14
2. (a) Explain the principle of construction of isometric scale with a neat sketch. 5  
(b) A rectangle of 500 cm  $\times$  50 cm represents an area of 6250 square kilometre. Construct a diagonal scale to measure kilometre, hectametre and decametre. Indicate a distance of 3.47 km on this scale. 15

- 3 (a) A regular pentagon of 30 mm side is resting on one of its edges on the H.P., which is inclined at  $45^\circ$  to the V.P. Its surface is inclined at  $30^\circ$  to the H.P. Draw its projections. 10
- (b) Draw the projection of a circle of 40 mm diameter resting on the H.P. on a point on the circumference. Its plane is inclined at  $30^\circ$  to the H.P. and perpendicular to the V.P. Its centre is 35 mm in front of the V.P. Also, show its traces. 10
4. A right regular hexagonal pyramid, side of base 25 mm and height 50 mm, lies on one of its triangular faces on H.P. and the edge of the base contained by the triangular face makes an angle of  $30^\circ$  to V.P. Draw its projections. 20

**Group B**

5. Draw the front view, top view and right-hand side view of the object as shown in Fig. 1. Use the third angle method of projection. 20

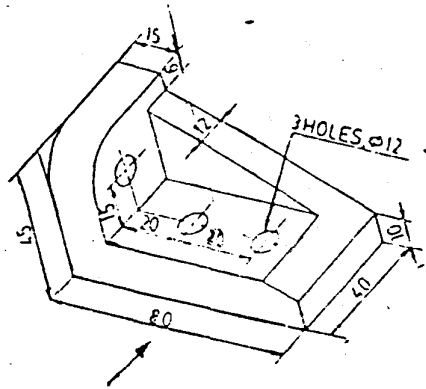


Fig 1.

6. (a) Draw the isometric projection of a cone of base circle radius, 25 mm, and axis is 50 mm long and horizontal. 6
- (b) A sphere of 60 mm diameter is placed centrally on the top of a frustum of a square pyramid. The sides of base and top face are 60 mm and 40 mm, respectively. The height of the frustum is 50 mm. Draw the projection of the arrangement. 14
7. A pentagonal pyramid, with edge of base 25 mm and axis 65 mm long, is resting on H.P. on its base, with an edge of it parallel to V.P. It is cut by a section plane inclined at  $60^\circ$  to the V.P. and at a distance 5 mm from the axis. Draw the sectional front view and true shape of the section. 20
8. A cone of 70 mm diameter base and axis length 100 mm rests on the HP on its base. Draw the projection of the cone and show on it the shortest path traced by a point starting from a point on the circumference of the base of the cone moving around it and reaching the same point. 20

**Group C**

9. Choose the correct answer for the following : 1 x 20
- (i) In third angle projection, the left side view is drawn on the
- (a) left side of front view
  - (b) right side of front view
  - (c) left side of top view
  - (d) right side of top view.

(ii) According to unidirectional system of dimensioning, the values of dimensions are so placed that these can be read from

- (a) bottom edge of drawing
- (b) top edge of drawing
- (c) both from bottom and right hand edge of drawing
- (d) both bottom and left edge of drawing.

(iii) In isometric drawing, the ratio of isometric length and actual length is

- (a) 0.72
- (b) 0.82
- (c) 1.0
- (d) 0.92.

(iv) A basic hole has

- (a) zero lower deviation
- (b) zero upper deviation
- (c) lower deviation is equal to upper deviation
- (d) zero tolerance.

(v) Symbol  $\oplus$  represents

- (a) circularity tolerance
- (b) cylindricity tolerance
- (c) position tolerance
- (d) concentricity tolerance.

(vi) When a plane is perpendicular to both the reference planes, its traces are

- (a) inclined to  $x - y$  .
- (b) perpendicular to  $x - y$
- (c) parallel to  $xy$
- (d) None of the above.

(vii) When a line is parallel to both the H.P. and V.P., it has

- (a) only H.T.
- (b) only V.T.
- (c) both H.T. and V.T.
- (d) no H.T. and V.T.

(viii) When a line is contained by a profile plane, the sum of the angles of the inclination with H.P. and V.P. is

- (a) equal to  $90^\circ$
- (b) less than  $90^\circ$

- (c) greater than  $90^\circ$
- (d) None of the above.
- (ix) Tetrahedron is a regular solid which has
- (a) four equal faces, each has equilateral triangle
- (b) six equal faces, each a square
- (c) eight equal faces, each an equilateral triangle
- (d) twelve equal faces, each an equilateral triangle.
- (x) When the axis of a right regular solid is perpendicular to H.P., the true shape of the base is exactly
- (a) front view
- (b) top view
- (c) side view
- (d) None of the above.
- (xi) When a sphere is cut by a section plane, the true shape of section is
- (a) ellipse
- (b) circle
- (c) parabola
- (d) hyperbola.

(xii) The intersection between a polyhedron and a section plane consists of

- (a) straight lines
- (b) curved lines
- (c) both straight and curved lines
- (d) ellipse.

(xiii) The name of method of development of lateral surfaces of a cone is

- (a) Gore and zone method
- (b) parallel line development
- (c) radial line development
- (d) triangulation method.

(xiv) The helix angle ( $\alpha$ ) of multistart screw thread is expressed as

- (a)  $\tan^{-1}(\text{lead}/\text{circumferential length})$
- (b)  $\tan^{-1}(\text{lead}/\text{diameter})$
- (c)  $\tan^{-1}(\text{pitch}/\text{circumferential length})$
- (d)  $\tan^{-1}(\text{pitch}/\text{diameter})$ .



(xv) Input-output device of the computer is

- (a) CPU
- (b) CRT
- (c) LCD
- (d) pen drive.

(xvi) The computer screen is specified by the length of

- (a) diagonal of screen
- (b) pixel
- (c) height of screen
- (d) width of screen.

(xvii) Software used for drawing is

- (a) Auto CAD
- (b) FORTRAN
- (c) BASIC
- (d) C++.

(xviii) When drawing polygon, the last side can be drawn by using

- (a) LINE command
- (b) CLOSE command
- (c) SIDE command
- (d) CIRCLE command.

(xix) An arc can be drawn using

- (a) three points on arc
- (b) start point, centre and end point
- (c) start point, end point and radius
- (d) All of the above.

(xx) If a section plane parallel to the axis passes through the cone such that the apex is contained by the plane, the section is

- (a) a right angled triangle
- (b) an isosceles triangle
- (c) parabola
- (d) circle.

**ENGINEERING DRAWING AND GRAPHICS**

*Time : Three hours*

*Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A ,  
ANY TWO from Group B and ALL from Group C.*

*All parts of a question ( a, b, etc. ) should  
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented  
with neat sketches. Unnecessary long answers may  
result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving  
proper justification.*

*Figures on the right-hand side margin indicate full marks.*

**Group A**

1. (a) Divide a line  $AB$  of 12.66 cm into five equal parts. 5
  
- (b) An area of  $144 \text{ cm}^2$  on a map represents an area of  $36 \text{ km}^2$  on a field. Find the R.F. of the scale for this map. Use this R.F. to construct a diagonal scale up to 10 km and mark on this scale 7.56 km. 15

2. (a) The top view of a circular lamina standing on a point on its rim appears as an ellipse of major axis 50 mm and minor axis 30 mm. Draw the projection of the circular lamina when its minor axis is inclined at 30° to XY. 10

(b) The left profile view of a line AB, 80 mm long, makes an angle of 40° to the XY line. Draw the top and front views of the line when length of the left profile view is 50 mm. Take the point A to be 15 mm above H.P. and 60 mm in front of V.P. and the point B being nearer to V.P. 10

3. A right circular cone, with base diameter of 50 mm and axis 80 mm long, is resting on the H.P. with its axis inclined to the H.P. in such a way that the apex of the cone is 70 mm above H.P. If the axis of the cone is parallel to the profile plane, draw its projections by auxiliary plane method. 20

4. A vertical cylinder of 50 mm diameter and 75 mm long is completely penetrated by a horizontal cylinder of 40 mm diameter and 75 mm long such that their axis bisect each other at right angles. The axis of both the cylinders are parallel to V.P. Draw the intersection curve. 20

**Group B**

5. A cylinder, base 40 mm diameter and axis 58 mm long, rests with a point of its base circle on H.P. Its axis is inclined at 45° to H.P. and parallel to V.P. A section plane, perpendicular to both the H.P. and the V.P., bisects the axis of the cylinder. Draw its front view, top view and sectional side view. 20

6. Draw the development of the tray shown in Fig.1 by triangulation method. 20

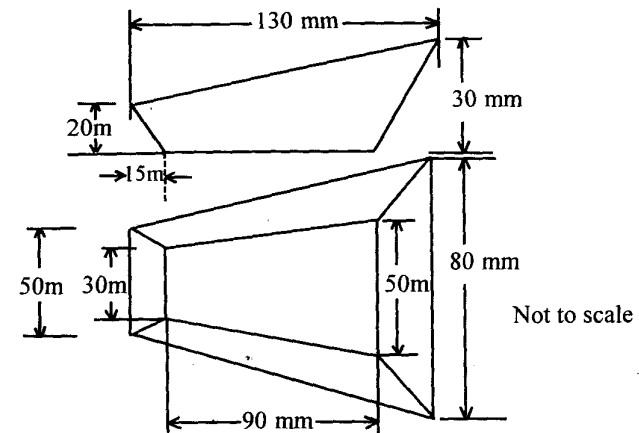


Fig. 1

7. Draw the isometric projection of the component whose plan and elevations are shown in Fig. 2 : 20

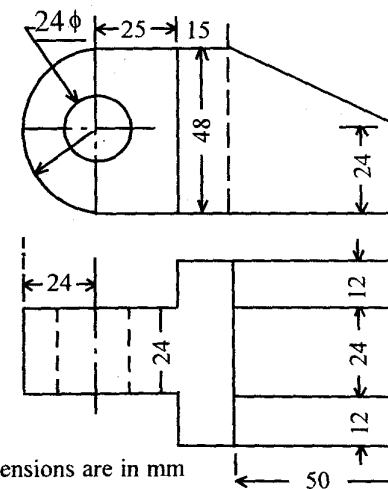


Fig. 2

All dimensions are in mm

8. Draw the orthographic views of the part shown in Fig.3: 20

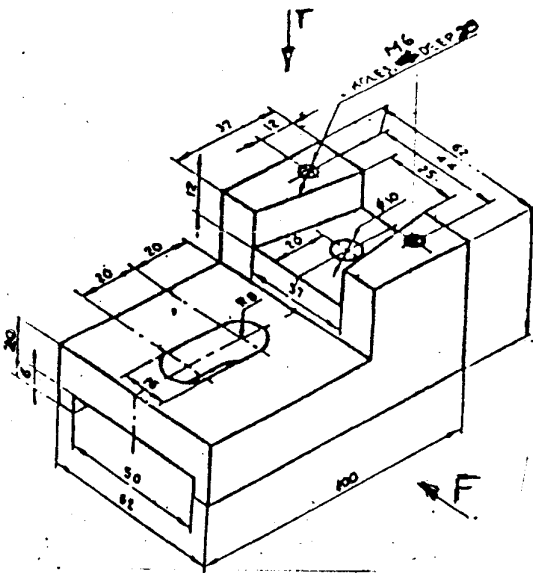


Fig. 3 All dimensions in mm

- (i) Front view in the direction of arrow *F*; and
- (ii) Top view in the direction of arrow *T*.

**Group C**

9. Choose the *correct* answer for the following : 1 x 20

- (i) A curve, generated by a point on the circumference of a circle, which rolls on the outside of another circle without sliding is called
  - (a) cycloid

(b) epicycloid

(c) hypocycloid.

(ii) The eccentricity of a hyperbola is

(a) less than 1

(b) equal to 1

(c) greater than 1.

(iii) A round rod threaded on both ends is called

(a) bolt

(b) stud

(c) screw.

(iv) Sphere in isometric view appears as

(a) ellipse

(b) circle

(c) sphere.

(v) The base of an oblique cylinder is

(a) circle

(b) an ellipse

(c) parabola.

- (vi) Universal coupling is used to connect shafts whose axis are
- (a) parallel
  - (b) co-axial
  - (c) intersecting.
- (vii) Motion can be transmitted from one shaft to another by means of
- (a) journal bearing
  - (b) gear
  - (c) flange coupling.
- (viii) The command VPOINT is used in auto CAD to
- (a) move an object on the screen
  - (b) split the screen into more than one view
  - (c) view a three-dimensional object in the screen.
- (ix) Tolerance on dimensions are indicated in
- (a) machine drawing
  - (b) isometric projection drawing
  - (c) orthographic projection drawing.
- (x) The angle between the isometric axis is
- (a)  $90^\circ$
  - (b)  $120^\circ$
  - (c)  $60^\circ$ .
- (xi) The ratio between the isometric and true lengths is
- (a)  $2/\sqrt{3}$
  - (b)  $\sqrt{2}/3$
  - (c)  $\sqrt{2/3}$ .
- (xii) When both views coincide with  $xy$ , the line is lying
- (a) in the H.P.
  - (b) in the V.P.
  - (c) both in the H.P. and V.P.
- (xiii) In computer, 1 kilo byte equals to
- (a) 1024 bytes
  - (b) 1024 KB
  - (c) 1024 MB.

- (a) an output device
- (b) a storage device
- (c) an input device.

(xv) The major input device used in the computer is

- (a) plotter
- (b) joystick
- (c) light pen.

(xvi) To enlarge or reduce the apparent size of objects, the command used in autocad is

- (a) SNAP
- (b) ZOOM
- (c) UNDO.

(xvii) Temporary fastenings is

- (a) rivet
- (b) bolt and nut
- (c) journal bearing.

(xviii) A line consisting of short dashes throughout its length represents

- (a) invisible edge of a solid
- (b) axis of a solid
- (c) trace of a cutting plane.

(xix) When a plane is perpendicular to both the reference planes, its traces are

- (a) inclined to  $xy$
- (b) perpendicular to  $xy$
- (c) parallel to  $xy$ .

(xx) If a quick acting thread is required, the lead must be

- (a) small
- (b) very small
- (c) large.

**S'09 : 4 FN : AN 207 (1407)****ENGINEERING DRAWING AND GRAPHICS***Time : Three hours**Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A ,  
ANY TWO from Group B and ALL from Group C.*

*All parts of a question ( a, b, etc. ) should  
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented  
with neat sketches. Unnecessary long answers may  
result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving  
proper justification.*

*Figures on the right-hand side margin indicate full marks .*

**Group A**

1. (a) Explain the principle of construction of diagonal scale with a neat sketch. 5
  
- (b) The distance between two stations is 600 km. It is represented on a railway map by a line 15 cm long. Construct a diagonal scale to measure up to 1 km and find its R.F. Indicate a distance of 346 km on the scale. 15

*( Turn Over )*

2. (a) A room measures 8 m long, 5 m wide and 4 m high. An electric bulb hangs in the centre of the ceiling and 1 m below it. A thin straight wire connects the bulb to a switch kept in one of the corners of the room and 1.25 m above the floor. Draw the projections of the wire and determine its true length and slope with the floor. 10

- (b) A line PQ, 100 mm long, is inclined at 30° to the HP and 45° to the VP. Its mid-point M is in the VP and 20 mm above HP. Draw its projections when its end P is in the first quadrant and Q in the third quadrant. 10

3. (a) A right regular hexagonal thin plate of 40 mm side has a circular hole of 40 mm diameter in its centre. It is resting on one of its corners in HP. Draw the projections when the plate surface is vertical and inclined at 30° to VP. 10

- (b) Draw the isometric projection of the arrangement of solids when a sphere of 40 mm diameter rests centrally on the top of a cube of 40 mm side. 10

4. A right regular pentagonal prism, side of base 25 mm and axis 50 mm long, lies on HP on one of its rectangular faces, such that its axis is parallel to HP and inclined at 30° to VP. Draw the projections of the solid. 20

S'09: 4FN: AN 207 (1407)

( 2 )

(Continued)

**Group B**

5. Draw the necessary views (including sectional views) to show the details of any two joints : 10 x 2

(i) A single riveted double strap butt joint to connect two plates of 25 mm thickness.

(ii) A stud joint to connect a 25 mm plate to a casting block, if the major diameter of stud is 25 mm.

(iii) A parallel rectangular sunk key fitted on to a shaft of 50 mm diameter with the hub of a pulley.

6. Draw the front view, top view and right-hand side view of the object as shown in Fig.1. Use the first angle projection method. 20

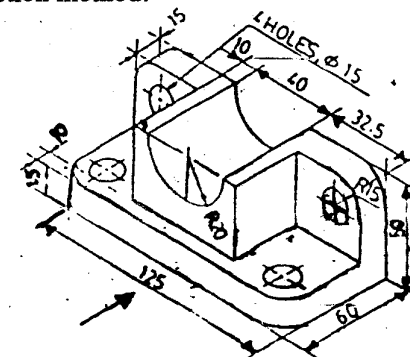


Fig. 1

7. A right regular cone of 40 mm base diameter and 50 mm height rests on its base on HP. A section plane, perpendicular to VP and inclined to HP at 45°, cuts the cone bisecting its axis. Draw the projections of the truncated cone and develop its lateral surface. Also, draw the true shape of the section. 20

S'09: 4FN: AN 207 (1407)

( 3 )

( Turn Over )



8. A square prism, edge of base 30 mm and height 60 mm, resting on its base on HP is completely penetrated by another square prism of 20 mm base edge and 60 mm length such that the axis of the penetrating prism is perpendicular to and 5 mm in front of the axis of vertical prism. The rectangular faces of two prisms are equally inclined to VP. Draw the projections of the solids showing the lines of intersections. 20

### Group C

9. Choose the *correct* answer for the following : 1 × 20

(i) A curve generated by a point on the circumference of a circle, which rolls along a straight line without slipping, is called

- (a) cycloid
- (b) involute
- (c) epicycloid
- (d) hypocycloid.

(ii) The helix angle ( $\alpha$ ) of multistart thread is expressed as

- (a)  $\tan \alpha = \text{Lead} / (\pi \times \text{major dia})$
- (b)  $\tan \alpha = \text{Pitch} / (\pi \times \text{major dia})$
- (c)  $\tan \alpha = (\pi \times \text{major dia}) / \text{Lead}$
- (d)  $\tan \alpha = (\pi \times \text{major dia}) / \text{Pitch}$ .

(iii) The relation between the diameter ( $d$ ) of rivet (in mm) and the thickness ( $t$  in mm) of plate to be joined is

- (a)  $d = 6\sqrt{t}$
- (b)  $d = 1.9\sqrt{t}$
- (c)  $t = 6\sqrt{d}$
- (d)  $t = 1.9\sqrt{d}$ .

(iv) In isometric drawing, the ratio of isometric length and actual length is

- (a) 0.72
- (b) 0.82
- (c) 1.0
- (d) 0.92.

(v) Temporary joint is

- (a) rivetted joint
- (b) welded joint
- (c) nut and bolt joint
- (d) lap joint.

(vi) Symbol  $\oplus$  represents

- (a) circularity tolerance
- (b) cylindricity tolerance
- (c) positional tolerance
- (d) concentricity tolerance.

(vii) A basic shaft has

- (a) zero lower deviation
- (b) zero upper deviation
- (c) zero tolerance
- (d) lower deviation is equal to upper deviation.

(viii) The name of method of development of lateral surface of a pyramid is

- (a) Gore and Zone method
- (b) parallel line method
- (c) radial line method
- (d) triangulation method.

(ix) If  $D$  is the diameter of a sphere, in isometric projection, its value will be equal to

- (a)  $\sqrt{3/2} D$
- (b)  $\sqrt{2/3} D$
- (c)  $D$
- (d)  $(3/2) D$ .

(x) The thread angle for BSW thread is

- (a)  $60^\circ$
- (b)  $45^\circ$
- (c)  $55^\circ$
- (d)  $30^\circ$ .

(xi) When a right regular cone is cut by a section plane containing the axis of the cone and perpendicular to the base, then the true shape of the section is

- (a) triangle
- (b) ellipse
- (c) parabola
- (d) circle.

(xii) To enlarge or reduce the size of objects, the command used in autocad is

- (a) SNAP
- (b) ZOOM
- (c) UNDO
- (d) GRID.

(xiii) The input device used in the computer for drawing

- (a) mouse
- (b) plotter
- (c) printer
- (d) monitor.

(xiv) When the axis of a solid is parallel to both HP and VP, the true shape of the base is shown by

- (a) front view
- (b) top view
- (c) side view
- (d) bottom view.

(xv) When a line is perpendicular to HP and parallel to

VP, it has

(a) only H.T.

(b) only V.T.

(c) no H.T.

(d) no H.T. and V.T.

(xvi) In first angle projection, left side view is drawn on

(a) left side of front view

(b) right side of front view

(c) left side of top view

(d) right side of top view.

(xvii) The line of intersection between prism and pyramid

is

(a) straight line

(b) curve line

(c) dotted line

(d) broken line.

(xviii) In isometric projection, isometric axes are equally

inclined at

(a)  $60^\circ$

(b)  $90^\circ$

(c)  $120^\circ$

(d)  $30^\circ$ .

In third angle projection method, the object is placed

a) between the projection plane and observer

b) below the projection plane

c) above the projection plane.

When a point lies in the VP, its view from top will

be

a) on  $xy$

b) below  $xy$

c) above  $xy$ .

**ENGINEERING DRAWING AND GRAPHICS**

*Time : Three hours*

*Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A,  
ANY TWO from Group B and ALL from Group C.*

*All parts of a question ( a,b,etc.) should  
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented  
with neat sketches. Unnecessary long answers may  
result in loss of marks.*

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proper justification.*

*Figures on the right-hand side margin indicate full marks.*

**Group A**

1. (a) Classify different types of scales. 1
  
- (b) Define the following : 2 × 2
  - (i) Representative fraction of a scale
  - (ii) Least count of a scale.
  
- (c) Construct a forward vernier scale to read distances correct to a decimetre on a map in which the actual

distances are reduced in the ratio of 1 : 40000. The scale should be long enough to measure 6 km. Mark on the scale the length of 3.34 km and 0.57 km. 15

2. (a) The top view of a line is 75 mm long and inclined to XY at 45°. One end is 20 mm above H.P. and 10 mm in front of V.P. The other end is 65 mm above H.P. and is in front of V.P. What is the true length of the line and its inclination with H.P. and V.P. ? Also, show its traces. 10

(b) A circular plate of 60 mm diameter has a hexagonal hole of 20 mm sides centrally punched. Draw the projections of the circular plate resting on H.P. with its surface inclined at 30° to the H.P. and the diameter through the point on which the circular plate rests on H.P. is inclined at 50° to V.P. Any two parallel sides of the hexagonal hole are perpendicular to the diameter of the circular plate passing through the point on which it rests. Draw the projection. 10

3. Draw the top and front views of a right circular cylinder of base 45 mm diameter and axis 60 mm long when it lies on H.P. such that its axis is inclined at 30° to H.P. and the axis appears to be perpendicular to the V.P. in the top view. Follow auxiliary plane method. 20

4. Figure 1 shows the front view and top view of a casting. Draw the isometric projection using the isometric scale. All dimensions are in mm. 20

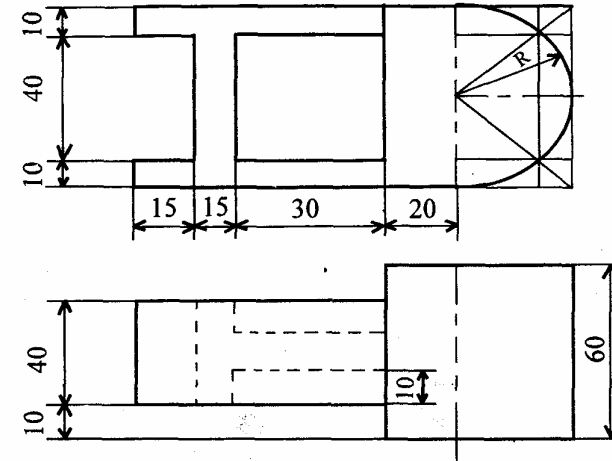


Fig. 1

**Group B**

5. A cone, base 60 mm diameter and axis 70 mm long, is resting on H.P. on its base. It is cut by a section plane perpendicular to V.P. and inclined at 75° to H.P. so as to cut the axis of the cone at a point 20 mm above the base. Draw its front view, sectional top view and the true shape of section. Name the shape of the curve. 20

6. Draw the front view, top view and right-hand side view of the object as shown in Fig. 2. Draw the front view

looking in the direction of the arrow. Use the first angle projection method. All dimensions are in mm.

20

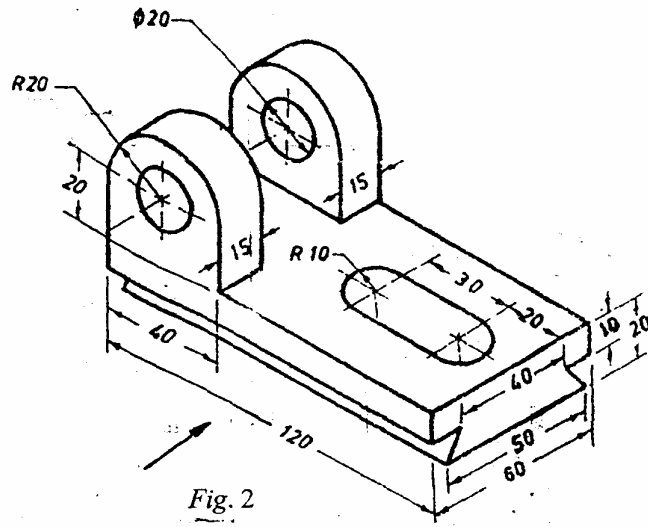


Fig. 2

Draw the development of the lateral surface of the object shown in Fig 3. Take a suitable scale. All dimensions are in mm.

20

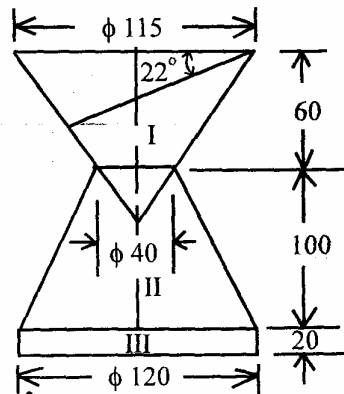


Fig. 3

8.

A vertical cylinder of 60 mm diameter is penetrated by a horizontal cylinder of 40 mm diameter. The axis of penetrating cylinder is parallel to V.P. and 6 mm in front of the axis of vertical cylinder. Draw the projections and show the intersection curves.

20

### Group C

9. Choose the *correct* answer for the following : 1 × 20

(i) The eccentricity of a hyperbola is

- (a) less than 1
- (b) equal to 1
- (c) greater than 1.

(ii) A spiral, in which the ratio of the length of successive vectors enclosing equal angles is constant, is called

- (a) Archimedian spiral
- (b) Logarithmic spiral
- (c) None of the above.

(iii) The ratio of the true length to the isometric is given by

- (a) 1/1.224
- (b) 1/2
- (c) 1/3.

(iv) When both the views coincide with *xy*, the line is lying

- (a) in the H.P.
- (b) in the V.P.
- (c) both in H.P. and V.P.

- (v) When a point lies in the H.P., its view from the front will lie
- (a) below  $xy$
  - (b) above  $xy$
  - (c) on  $xy$ .
- (vi) In computer, 1 kilobyte equals to
- (a) 1024 Bytes
  - (b) 1024 kB
  - (c) 1024 MB.
- (vii) When axis of a solid is perpendicular to the H.P., its relation with the V.P. is
- (a) parallel
  - (b) perpendicular
  - (c) inclined.
- (viii) The major input device used in the computer is
- (a) plotter
  - (b) joystick
  - (c) light pen.
- (ix) Mouse in a computer is
- (a) an output device
  - (b) a storage device
  - (c) an input device.
- (x) When a line is parallel to both the H.P. and V.P., it has
- (a) only the H.T.
  - (b) only the V.T.
  - (c) neither H.T. nor V.T.

(xi) Temporary fastenings is

- (a) rivet
- (b) journal bearing
- (c) bolt and nut.

(xii) To draw either horizontal or vertical lines, the command used in Autocad is

- (a) SNAP
- (b) GRID
- (c) ORTHO.

(xiii) When a plane perpendicular to both the reference planes, its traces are

- (a) inclined to  $xy$
- (b) perpendicular to  $xy$
- (c) parallel to  $xy$ .

(xiv) The line of intersection between prism and pyramid is a

- (a) straight line
- (b) curve
- (c) dotted line.

(xv) When a sphere is cut by a section plane, the true shape of the section is

- (a) ellipse
- (b) circle
- (c) parabola.

- (xvi) To enlarge or reduce the apparent size of objects, the command used in Autocad is
- (a) SNAP
  - (b) ZOOM
  - (c) UNDO.
- (xvii) If the top view and front view of a point are respectively 60 mm above and 50 mm below the  $xy$  line, the point will be located in
- (a) first quadrant
  - (b) fourth quadrant
  - (c) third quadrant.
- (xviii) Motion can be transmitted from one shaft to another by means of
- (a) journal bearing
  - (b) gear
  - (c) key.
- (xix) Following views are generally drawn to give sufficient information about the building :
- (a) Plan
  - (b) Isometric view
  - (c) Section.
- (xx) When two planes intersect each other, their intersection is a
- (a) point
  - (b) line
  - (c) curve.



**S'10:4FN:AN 207(1407)****ENGINEERING DRAWING AND GRAPHICS**

*Time : Three hours*

*Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A,  
ANY TWO from Group B and ALL from Group C.*

*All parts of a question ( a,b,etc.) should  
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented  
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**Group A**

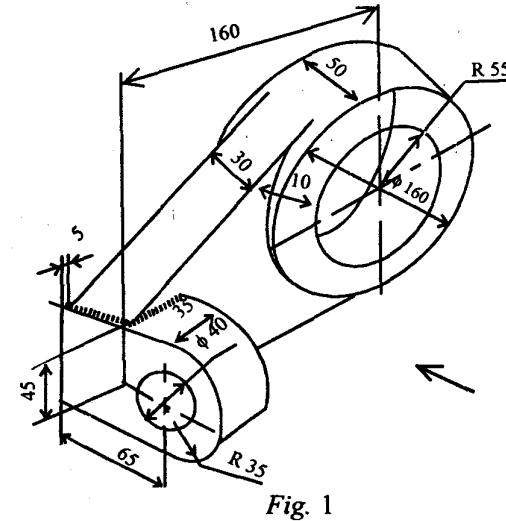
1. (a) Explain the principle of construction of vernier scale  
with a neat sketch. 5
- (b) An area of 144 cm<sup>2</sup> on a map represents an area of  
36 km<sup>2</sup> on a field. Find the scale factor for this map  
and draw a diagonal scale and mark on it a distance  
of 7.56 km. 15
2. (a) A regular pentagon of 30 mm side is resting on one of  
its edges on the HP which is inclined at 45° to the VP.  
Its surface is inclined at 30° to the HP. Draw its  
projections. 10

- (b) The view from above of a line, *AB*, inclined at  $60^\circ$  to *xy* line, measures 85 mm while the length of the view from the front is 65 mm. Its one end *A* is in the HP and 15 mm in front of the VP. Draw the projections of line *AB* and determine its true length and true inclinations of it with HP and VP. Find the shortest distance of the mid-point of the line *AB* from *xy* line. 10
3. A right regular pentagonal pyramid base, 35 mm side and axis 80 mm long, has a triangular face on HP and vertical plane containing the axis makes an angle of  $45^\circ$  with VP. Draw its projections. 20
4. Draw the isometric scale and isometric projection of the arrangement of solids when a hemisphere of 60 mm diameter is placed centrally touching the flat face on the top of a frustum of a square pyramid. The base of frustum is 60 mm square, top 40 mm square and its height 50 mm. 20

**Group B**


5. Draw the necessary views (including sectional views) to show the details of the following joints :
- (i) A double riveted zig-zag lap joint to connect two plates of 25 mm thickness; 7
- (ii) A Woodruff key fitted on to a shaft of diameter 40 mm; 5
- (iii) A hexagonal headed nut bolt and washer assembly to connect two blocks of each thickness 20 mm, if the major dia of bolt is 25 mm. 8

6. Draw the front view, top view and left-hand side view of the object shown in Fig. 1. Use third angle projection method. 20



7. A cone of base diameter 60 mm and axis 90 mm is resting on HP on its base. A horizontal triangular prism, with its edge of base 25 mm, penetrates the cone such that the axes of both the solids intersect each other at a height of 40 mm from the base on the cone. The axis of the prism is also parallel to VP and one of its rectangular faces makes  $30^\circ$  with HP. Draw the projections of the solids, showing the lines of intersection. 20
8. Draw the surface development of a cylinder of 50 mm diameter and 75 mm height containing a square hole of 25 mm side. The sides of the hole are equally inclined to base and the axis of the hole bisects the axis of the cylinder. Also, draw the projection of solid. 20

**Group C****9. Answer the following :****1 × 20**

- (i) Name two most commonly used curves for tooth profile of gears.
- (ii) Write relation of isometric length and actual length of an object in isometric scale.
- (iii) What is the scale factor while 10 cm drawing length represents 10 km actual length ?
- (iv) Write two examples of temporary joints.
- (v) Write two examples of permanent joints.
- (vi) What is the relation of margin and rivet dia for riveted joint ?
- (vii) What is the value of thread angle for BSW thread ?
- (viii) What is the symbolic representation of flatness tolerance ?
- (ix) What do you understand by symbol  ?
- (x) Name the method of surface development of a cone.
- (xi) Name two softwares for drawing.
- (xii) Name the command used for scaling the object.
- (xiii) What do you understand by basic hole, H ?
- (xiv) How many points are required to draw a circle, if radius is not known ?
- (xv) What is the position of right side view to be drawn according to first angle projection method ?
- (xvi) When a line is perpendicular to VP, which view will be the true length of the line ?
- (xvii) When a right regular cone is completely cut by an inclined plane, which is inclined to HP and perpendicular to VP, then what will be true shape of the section ?
- (xviii) When a line is parallel to HP and perpendicular to VP, then which trace will be obtained ?
- (xix) Name two solids generated by method of revolution.
- (xx) Name two methods of dimensioning.

**W'10:4FN: AN 207(1407)****ENGINEERING DRAWING AND GRAPHICS**

*Time : Three hours*

*Maximum Marks : 100*

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proper justification.*

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**Group A**

1. (a) Explain the principle of construction of diagonal scale with a neat sketch. 5
- (b) Construct a backward vernier scale having a least count of 0.005 cm and long enough to measure 5 cm. Show the following distances on the scale :  
(i) 3.15 cm, and (ii) 1.95 cm. Select a scale of 2 : 1. 15
2. (a) A pentagonal plane lamina of edges 20 mm is resting on H.P. with one of its corners touching it such that the plane surface makes an angle of  $60^\circ$  with H.P. Two of the base edges, containing the corner, on which the lamina rests, make equal

inclinations with H.P. If the edge opposite to this corner makes an angle of  $45^\circ$  with V.P., draw the top and front views of the lamina in this position. 10

(b) A line PQ has its end, P, 15 mm above H.P. and 10 mm in front of V.P. The end Q is 55 mm above H.P. and the line is inclined at  $30^\circ$  to H.P. The distance between the end projectors of the line when measured parallel to the line of intersection of H.P. and V.P. is 50 mm. Draw the projections of the line and find its inclination with V.P. 10

3. A hexagonal pyramid, base 30 mm side and axis 60 mm long, has one of its slant edges on H.P. such that two of its triangular faces containing the slant edge on which it rests are equally inclined to H.P. The top view of the axis appears to be inclined at  $45^\circ$  to V.P. Draw its projections when its base is nearer to the observer than its apex. 20

4. Figure 1 shows the orthographic views of an object. Draw the isometric projection of the object. 20

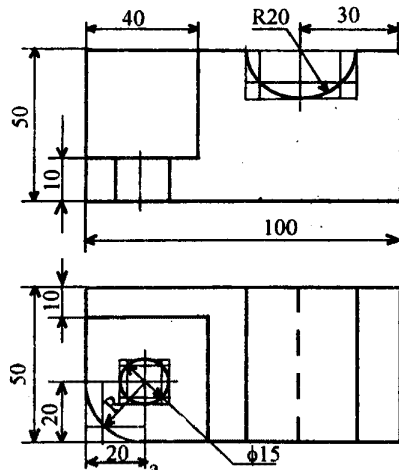


Fig. 1

**Group B**

5. Draw the necessary views (including sectional views) to show the details of following joints :

(i) A single rivetted double cover plate butt joint to connect two plates of 20 mm thickness. Indicate dimensions as simple top view and sectional front view. 7

(ii) A jib head key fitted on to a shaft of 50 mm. 5

(iii) A square headed nut, bolt and washer assembly to connect two plates of 20 mm thickness, if diameter of the bolt is 20 mm. 8

6. Draw the front view, top view and left-hand side view of the object shown in Fig. 2. Consider view from arrow F as front view. 20

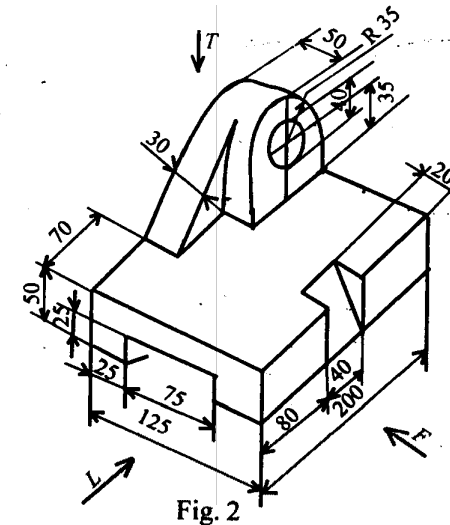


Fig. 2

7. A vertical cone, 80 mm diameter and axis 100 mm long, is penetrated by a horizontal cylinder of 60 mm

diameter and 90 mm long such that its axis is 5 mm behind the axis of the cone at a height of 40 mm above its base. The axes of both the solids are parallel to V.P. Show the intersection curves in the top and front views. 20

8. A cone diameter of base 80 mm and height 80 mm stands vertically with its base on H.P. A semi-circular hole of radius 25 mm is cut through the cone. The axis of the hole is perpendicular to V.P. and parallel to H.P. and intersects the axis of the cone 30 mm above the base. The flat surface of the hole contains the axis of the cone and perpendicular to V.P. and H.P. Draw the complete development of the cone showing the shape of the hole on it. 20

### Group C

9. Choose the *correct* answer for the following : 20 × 1

(i) The size of the drawing drawn to a scale of 2 : 1 will be ..... the actual size of the object.

- (a) same as
- (b) twice of
- (c) half of
- (d) cannot be predicted

(ii) The information needed to construct any scale (except the scale of chords) is

- (a) R.F. of the scale.
- (b) unit of measurement.
- (c) maximum distance to be represented.
- (d) All of the above.

(iii) Which one of the following is *not* a reduction scale ?

- (a) 1 : 200
- (b) 5 : 6
- (c) 1 : 1
- (d) 3/250

(iv) Which one of the following is *not* a principal plane of projection ?

- (a) H.P.
- (b) V.P.
- (c) P.P.
- (d) Auxiliary plane.

(v) In the first angle projection method, the view seen from the left is placed on

- (a) left of front view.
- (b) right of front view.
- (c) above front view.
- (d) below front view.

(vi) If an object is cut by an AVP, then it will show

- (a) sectional front view.
- (b) sectional top view.
- (c) sectional front view and side view.
- (d) sectional side view.

(vii) To obtain the point view of a line, the auxiliary plane is set

- (a) perpendicular to true length.
- (b) parallel to true length.

- (c) inclined at an angle  $\phi^\circ$  to true length.  
(d) inclined at an angle  $\theta^\circ$  to true length.
- (viii) If  $\theta + \phi = 90^\circ$ , then which one of the following statement is correct ?  
(a)  $\alpha = \beta = 90^\circ$   
(b) side view = true length  
(c) Front view is perpendicular to XY.  
(d) All of the above.
- (ix) If a line is parallel to both the reference planes, then which one of the following statement is wrong ?  
(a) True length = Plan length  
(b) True length = Elevation length  
(c) True length > Elevation length  
(d)  $\alpha = \beta$
- (x) Which one of the following is *not* a section of a tetrahedron ?  
(a) Isosceles triangle  
(b) Equilateral triangle  
(c) Trapezium  
(d) Pentagon
- (xi) If the cutting plane includes the axis of a cylinder, then the section obtained is a  
(a) rectangle.  
(b) circle.  
(c) ellipse.  
(d) any one of the above.
- (xii) Parallel line development method is *not* suitable for the development of a  
(a) tetrahedron  
(b) hexahedron  
(c) pentagonal prism  
(d) cylinder.
- (xiii) If a thread is wound around a cone starting from a point on the base and brought back to the same point, then the shortest possible length of thread is equal to the  
(a) slant height of the cone.  
(b) diameter of the base of cone.  
(c) longest chord of the development sector.  
(d) length of the perpendicular from a corner of the development sector to the opposite edge.
- (xiv) Whenever a prism and pyramid intersect, the curve seen at their intersection is a  
(a) smooth curve.  
(b) segmented-line curve.  
(c) either smooth curve or segmented line curve.  
(d) None of the above.
- (xv) The theory of development is used in the manufacturing of  
(a) plastic moulded parts.  
(b) cast iron parts.  
(c) sheet metal parts.  
(d) electronic components.

- (xvi) Which one of the following is *not* an output device ?
- (a) Printer
  - (b) Plotter
  - (c) Joystick
  - (d) Monitor.
- (xvii) A free-hand vertical line should always be drawn from
- (a) bottom to top.
  - (b) top to bottom.
  - (c) mid-point to top.
  - (d) mid-point to bottom.
- (xviii) The command used to erase the object partly is
- (a) ERASE
  - (b) EXPLODE
  - (c) TRIM
  - (d) EXTEND
- (xix) The most effective command used to draw symmetrical objects is
- (a) copy
  - (b) array
  - (c) lengthen
  - (d) mirror.
- (xx) A hexahedron consists of
- (a) four equal square faces.
  - (b) six equal square faces.
  - (c) four equal triangular faces.
  - (d) six equal triangular faces.



**S'11:4FN:AN207 (1407)****ENGINEERING DRAWING AND GRAPHICS***Time : Three hours**Maximum Marks : 100*

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proper justification.*

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**Group A**

1. (a) Explain the principle of vernier scale with a neat sketch. 5
- (b) The distance between two points on a map is 2.1 cm. The points are actually 1 km apart. Construct a diagonal scale to measure up to 7 km and read in kilometer, hectameter and decameter. Show it on a length of 4.37 km. 15
2. (a) The top view 'abc' of a triangle ABC is an equilateral triangle of side 50 mm, 'ab' being inclined at 45° to xy. The point A is in the VP and 35 mm above the ground and the points B and C are on the ground. Draw the projections of the triangle and determine the true shape. 10

- (b) Two mangoes on a tree are 5 m and 3 m above the ground and 1.5 m and 2.5 m from the central plane of a wall, but on opposite sides of the wall, respectively. The distance between the mangoes measured along the ground and parallel to the wall is 2.5 m. Determine the true distance between the mangoes and the angle of inclination of the line joining the mangoes with the ground and also with the wall. 10
3. A pentagonal pyramid of base, 40 mm side and height 75 mm, stands with its base on the ground such that one of the base edges is parallel to VP. It is cut by a section plane perpendicular to the VP and inclined at 30° to the HP bisecting its axis. Draw the true shape of the cut section. Also, draw the development of the lateral surface of the remaining solid containing base. 20
4. (a) Show that dimension in the isometric projection is  $\sqrt{2/3}$  times the true size along isometric axes. 5
- (b) A hemisphere is resting on the top of a hexagonal prism of side 35 mm and axis 70 mm long. Draw the isometric scale and isometric projection of the arrangement when the hemisphere is touching all the edges of the top base. 15

**Group B**

5. Draw the necessary views (including necessary sectional views) to show details of the following :
- (i) A double riveted zig-zag lap joint to connect to plates of 18 mm thickness. 7
- (ii) A woodruff key fitted on to a shaft of 40 mm diameter. 5

- (iii) A stud bolt assembly to connect two blocks of 50 mm thickness, if the major dia of stud bolt is 20 mm. 8
6. (a) Distinguish between third angle projection and first angle projection with the aid of proper presentation. 5
- (b) Draw the front view, top view and left-hand end view of the object as shown in Fig. 1 using third angle method of projection. 15

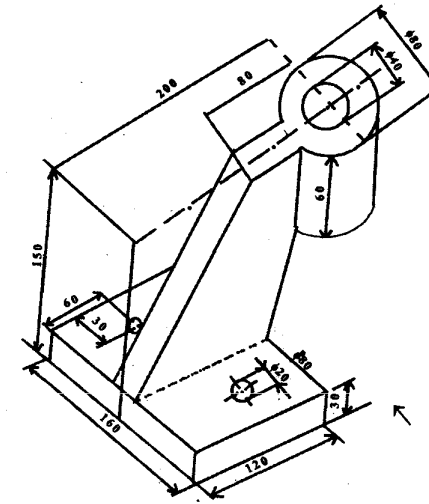


Fig. 1

7. A vertical square prism, with base side 50 mm, has one of its vertical faces inclined at 30° to the VP. It is completely penetrated by a cylinder of diameter 30 mm, the axis of which is parallel to both HP and VP and is 8 mm away from the axis of the prism. Draw the projections of solids showing the lines of intersection. Take the length of each solid as 70 mm. 20

8. A cone of 70 mm diameter base and axis length 90 mm rests on HP on its base. Draw the projection of the cone and show on it the shortest path traced by a point starting from a point on the circumference of the base of the cone, moving around it and reaching the same point. 20

### Group C

9. Answer the following in brief: 10 × 2
- (i) An area of 144 cm<sup>2</sup> on a map represents an area of 36 km<sup>2</sup> on a field. Find the scale factor for the map.
  - (ii) What is the name of method of surface development of a cylinder ?
  - (iii) What is the symbol of run out tolerance ?
  - (iv) What is the relation between dia of rivet and plate thickness when both are in mm.
  - (v) What is the type of thread profile used in screw jack ?
  - (vi) How do you represent an enlarged scale ?
  - (vii) What do you understand by basic shaft,  $h$  ?
  - (viii) Name the method of drawing isometric projection of a circle.
  - (ix) What is the relation between helix angle, lead and major diameter in a multistart lead screw ?
  - (x) Name *two* software for drawing.

**W'11:4FN:AN207 (1407)****ENGINEERING DRAWING AND GRAPHICS**

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**Group A**

1. (a) Explain the principle of construction of Vernier scale with a neat sketch. 5
- (b) Draw a full-size diagonal scale to show 0.1 mm and long enough to measure up to 5 cm. Show on this scale the following distances : (i) 0.1 mm; (ii) 2.35 cm; and (iii) 4.89 cm. 15
2. (a) A pentagon of 40 mm side is resting on one of its corners on the V.P. The edge opposite to the corner makes an angle of  $30^\circ$  to the H.P. The surface of the pentagon is inclined at  $45^\circ$  to the V.P. Draw the projections. 10
- (b) A line CD, inclined at  $25^\circ$  to the H.P., measures 80 mm in T.V. The end C is in the first quadrant and 24 mm and 14 mm from the H.P. and the V.P.,

- respectively. The end *D* is at equal distances from both the reference planes. Draw the projections and find the true length and true inclination of the line with V.P. Locate the traces. 10
3. A pentagonal pyramid of edge of base 30 mm and length of axis 65 mm is resting on a corner of the base on the H.P. The triangular face opposite to the corner on the H.P. is inclined to the H.P. at an angle of 45° with its shorter edge inclined to the V.P. at 60°. Draw its projections. 20
4. Figure 1 shows the orthographic views of an object. Draw the isometric projection of the object. 20

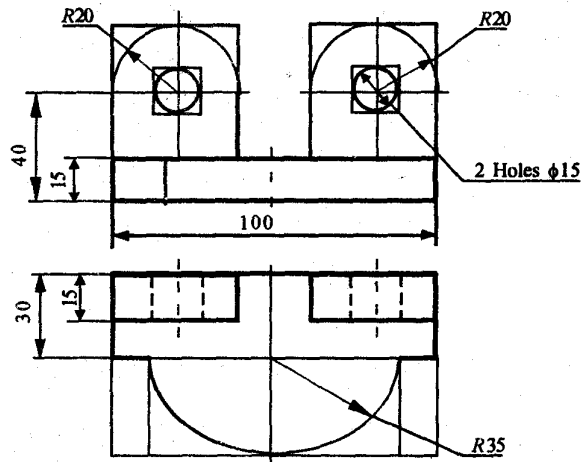


Fig. 1

**Group B**

5. (a) Draw the necessary views (including sectional views) to show the details of the following joints : 7
- (i) A double rivetted zig-zag type lap joint to connect two plates of 18 mm thickness. Indicate dimensions on simple top view and sectional front view.

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( 2 )

(Continued)

- (ii) Flat saddle key fitted on a shaft of 50 mm. 5
- (iii) A hexagonal headed nut, bolt and washer assembly to connect two plates of 24 mm thickness, if the diameter of the bolt is 16 mm. 8
6. A horizontal cylinder of 45 mm diameter and 90 mm long penetrates centrally a vertical hexagonal prism of 30 mm side and 90 mm long. The axis of the cylinder is parallel to V.P. Draw the top view and front view of the intersecting solids showing the curves of intersection. 20
7. Draw the front view, top view and the left-hand side view of the object shown in Fig. 2. Consider the view from the arrow X as front view. 20

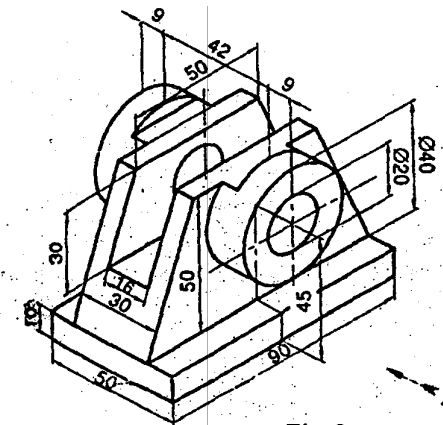


Fig. 2

8. A cylinder is standing on its base on the H.P. A pentagonal hole is cut through the cylinder. The axis of the hole is perpendicular to the V.P. and bisects the axis of the cylinder. The base diameter and the height of cylinder are 70 mm and 90 mm, respectively. The hole has a face width of 30 mm. Draw the development of cylinder. Assume a flat surface of hole perpendicular to H.P. 20

**Group C**

9. Fill-in the blank appropriate word(s)/choose the correct answer/answer the following as applicable :  $20 \times 1$

- (i) For drawing small instruments, watch parts, \_\_\_\_\_ scale is used.
- (ii) The main scale of a vernier scale is a \_\_\_\_\_ scale.
- (iii) The surface of an object appears in its true shape when it is \_\_\_\_\_ to the plane of projection.
- (iv) The side view of an object is obtained as a projection on the \_\_\_\_\_ plane by looking the object \_\_\_\_\_ to its \_\_\_\_\_ surface.
- (v) When a line is inclined to V.P. and parallel to H.P., its front view is \_\_\_\_\_ to  $xy$ .
- (vi) When a line is parallel to both H.P. and V.P., it has  
 (a) only H.T.  
 (b) only V.T.  
 (c) both H.T. and V.T.  
 (d) No HT and VT.
- (vii) When will the traces of an oblique plane will be parallel to  $xy$  ?
- (viii) When a plane is perpendicular to both the reference planes, its traces are  
 (a) inclined to  $xy$ .  
 (b) perpendicular to  $xy$ .  
 (c) parallel to  $xy$ .
- (ix) The true shape of the section produced is \_\_\_\_\_, when a cone is cut by a plane parallel to the axis, but not passing through the apex.

- (x) The intersection between a section plane and the lateral surface of any \_\_\_\_\_ is a smooth curve.
- (xi) Solids having similar end bases will be developed by \_\_\_\_\_ method.
- (xii) The intersection between a solid resting on H.P. and a plane inclined to H.P. and perpendicular to V.P. is a \_\_\_\_\_ in the front view.
- (xiii) What is the difference between isometric projection and isometric drawing ?
- (xiv) If in a scale, 1 cm represents 1 metre, the R.F. of scale is  
 (a) 1/1000  
 (b) 1/100  
 (c) 1/10  
 (d) 1/10,000
- (xv) To draw a small gear in wrist watch, the R.F. would be  
 (a) 1 : 20  
 (b) 20 : 1  
 (c) 1 : 1  
 (d) None of the above.
- (xvi) The information needed to construct any scale (except the scale of chords) is  
 (a) R.F. of the scale.  
 (b) unit of measurement.  
 (c) maximum distance to be shown.  
 (d) All of the above.

- (xvii) If an edge of an oblique pentagonal plane is parallel to both H.P. and V.P., then which one of the following sentences is wrong ?
- (a) F.V. will show the T.L. of the edge.
  - (b) T.V. will show the T.L. of the edge.
  - (c) F.V. will show the T.L. of the plane.
  - (d) Side view will show the edge view.
- (xviii) If a horizontal cylinder penetrates a vertical cylinder, the curves of intersection will be seen in \_\_\_\_\_.
- (xix) Whenever a prism and a pyramid intersect, the curve seen at their intersection is a
- (a) smooth curve.
  - (b) segmented-line curve.
  - (c) either smooth curve or segmented line curve.
  - (d) None of the above.
- (xx) Compared to the actual diameter, the isometric diameter of a sphere is
- (a) equal.
  - (b) smaller.
  - (c) greater.
  - (d) None of the above.

**S'12: 6FN: AN 207 (1407)**

**ENGINEERING DRAWING AND GRAPHICS**

*Time : Three hours*

*Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A,  
ANY TWO from Group B and ALL from Group C.*

*All parts of a question (a,b,etc.) should  
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented  
with neat sketches. Unnecessary long answers may  
result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving  
proper justification.*

*Figures on the right-hand side margin indicate full marks.*

**Group A**

1. (a) Classify different types of scales. Define  
(i) representative fraction of a scale, and (ii) least  
count of a scale. 1 + 4  
  
(b) Construct a vernier scale to give readings of one-tenth  
of a mm up to 100 mm and mark off on it the following :  
(i) 81.3 mm, (ii) 20.9 mm. Select a scale 15 : 1. 15
  
2. (a) A line AB has its ends A and B, 45 mm and 20 mm  
in front of the VP, respectively. The end projectors of  
the line AB, when measured parallel to the line of inter-  
section of HP and VP, are 50 mm apart. The HT of the  
line is 10 mm in front of VP. The line AB is inclined at  
35° to the HP. Draw the projections of the line AB and  
locate the VT. Find the distance of the VT of the  
line from the HP and the inclination of the line with the  
VP. 10

*( Turn Over )*





**Group C**

9. Choose the *correct* answer/fill-in the blank appropriate word as applicable :  $20 \times 1$

(i) The eccentricity of a hyperbola is

- (a) less than 1.
- (b) equal to 1.
- (c) greater than 1.
- (d) None of the three above.

(ii) If  $D$  is the diameter of a sphere, in isometric projection, its value will be equal to

- (a)  $\sqrt{3/2} D$ .
- (b)  $\sqrt{2/3} D$ .
- (c)  $0.82 D$ .
- (d)  $D$ .

(iii) The drawing board should be placed on the table always with the working edge at

- (a) right side.
- (b) left side.
- (c) any side
- (d) None of the three above.

(iv) When a point lies in the VP, its view from top will be

- (a) on  $xy$ .
- (b) below  $xy$ .
- (c) above  $xy$ .
- (d) None of the three above.

(v) The input device used in the computer for drawing is

- (a) mouse.
- (b) plotter.
- (c) printer.
- (d) monitor.

(vi) Temporary joint is

- (a) rivetted joint.
- (b) welded joint.
- (c) nut and bolt joint.
- (d) lap joint.

(vii) When a line is parallel to both HP and VP, it has

- (a) only HT.
- (b) only VT
- (c) both HT and VT.
- (d) no HT and VT.

(viii) Three-dimensional modelling refers to the modelling of

- (a) solids.
- (b) surfaces.
- (c) circles.
- (d) None of the three above.

(ix) In isometric projection, isometric axes are equally inclined at

- (a)  $60^\circ$
- (b)  $90^\circ$
- (c)  $120^\circ$
- (d)  $30^\circ$

S'12:6FN:AN 207 (1407)

( 4 )

( Continued )

S'12:6FN:AN 207 (1407)

( 5 )

( Turn Over )

- (x) The line of intersection between prism and pyramid is
- (a) straight line.
  - (b) curve line.
  - (c) dotted line.
  - (d) broken line.
- (xi) A scale of chords is used to measure ———.
- (xii) For drawing of small objects, ——— scale is always used.
- (xiii) ——— is a round rod threaded on both ends.
- (xiv) When ——— of a symmetrical object is imagined to be removed, section is called a half section.
- (xv) When a sphere is cut by a plane inclined at  $30^\circ$  to HP, the true shape of section is ———.
- (xvi) The solid, which contains four equilateral triangles, is known as ———.
- (xvii) An ——— solid has its axis inclined to the base.
- (xviii) A byte is made up of ——— bits.
- (xix) A curve generated by a point on the circumference of circle, which rolls on the outside of another circle without sliding, is called
- (a) cycloid.
  - (b) epicycloid.
  - (c) hypocycloid.
  - (d) trochoid.
- (xx) ——— command allows you to draw lines at right angles only.

**W'12: 6 FN: AN 207 (1407)****ENGINEERING DRAWING AND GRAPHICS**

*Time : Three hours*

*Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A, ANY TWO from Group B and ALL from Group C.*

*All parts of a question ( a,b,etc.) should be answered at one place.*

*Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

**Group A**

1. (a) Explain the principle of construction of diagonal scale with a neat sketch. 5
- (b) Construct a retrograde vernier scale to measure up to 4 m. A distance of 1 m is shown by 4 cm long line. Mark a distance of 2.31 m on this scale. 15
2. (a) A line AB inclined at  $30^\circ$  to the HP has its ends A and B, 25 mm and 60 mm behind the VP, respectively. The length of the top view is 65 mm and its VT is 15 mm below the HP. Draw the projections of the line and locate its HT. Also, determine the true length of the line AB and true inclination of the line with VP. 10
- (b) A regular pentagon of 30 mm side is resting on one of its edges on the ground which is inclined at  $45^\circ$  to the VP. Its surface is inclined at  $30^\circ$  to the ground. Draw its projections. 10

*( Turn Over )*

3. A cube of edge 30 mm is resting on the ground on one of its corners with a solid diagonal perpendicular to the VP. Draw the projections. 20
4. A paper-weight consists of three portions. The bottom-most portion is a cylinder of 60 mm diameter and 20 mm high. A frustum of cone, height 20 mm, bottom 60 mm diameter and top 30 mm diameter, is situated in the middle portion. The top-most portion is a hemisphere of 15 mm radius. Draw the isometric projection of the paper-weight. 20

### Group B

5. (a) Draw the top view and sectional front view showing the dimensions of a single riveted double cover butt joint to connect two plates of 9 mm thickness. 8
- (b) Draw the front view and sectional side view showing the dimensions of a woodruff key fitted on a shaft of 50 mm diameter. 5
- (c) Draw the front view and top view of a square headed nut and bolt assembly, if the diameter of the bolt is 16 mm. Indicate the dimensions of it. 7
6. A pentagonal prism of side of base 40 mm and height 80 mm is cut by a section plane inclined at  $30^\circ$  to the ground when a vertical face of the solid is perpendicular to the VP. The section plane passes through the axis at a distance of 60 mm from the base. Draw the true shape of the section. Draw the development of the surfaces of the remaining solid. 20
7. A square pyramid, with edge of base 40 mm and height 80 mm, is resting on the ground such that all of its base edges are equally inclined to the VP. A horizontal cylinder of 30 mm diameter meets the pyramid on one side such

that the axes of both the solids intersect with each other at a height of 45 mm from the base of the pyramid. The axis of the cylinder is also parallel to the VP. Draw the projections of the solids showing the lines of intersection. 20

8. Draw the front view, top view and the right-hand side view of the object as shown in Fig. 1. Construct the view from the arrow X as front view. 20

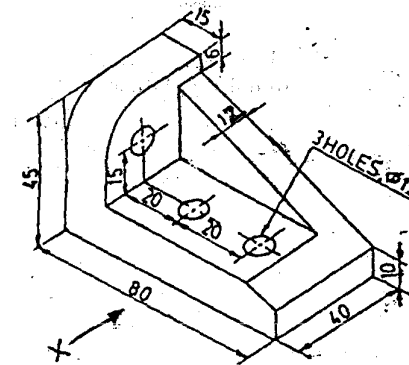


Fig. 1

### Group C

9. Answer the following in brief: 20 × 1
- What is the position of right-side view to be drawn according to first angle projection method?
  - What is the value of thread angle for metric thread?
  - Name two most commonly used curves for tooth profile of gear.
  - What is the relation between diameter of rivet and thickness of plates to be riveted when both are in mm?

- (v) What is the relation between the pitch and lead of a thread ?
- (vi) What is the symbolic representation of positional tolerance ?
- (vii) Name the method of surface development of a pyramid.
- (viii) What is the value of upper deviation of a basic shaft,  $h$  ?
- (ix) When a line is perpendicular to HP, which view will be the true length of the line ?
- (x) When a right regular cylinder is completely cut by an inclined plane, which is inclined to HP at  $30^\circ$  and perpendicular to VP, then what will be true shape of the section ?
- (xi) In a mechanical drawing, a line segment consists of infinite number of \_\_\_\_\_, whereas in computer graphics a segment has a finite number of \_\_\_\_\_.
- (xii) The various interactive techniques in auto CAD are \_\_\_\_\_.
- (xiii) In isometric projection, the isometric axes are equally inclined at \_\_\_\_\_ angle.
- (xiv) For obtaining a sectional view, the part of the object between \_\_\_\_\_ and \_\_\_\_\_ is assumed to be removed.
- (xv) The line of intersection between prism and pyramid is \_\_\_\_\_, whereas the line of intersection between prism and cone is \_\_\_\_\_.
- (xvi) What is the command used in auto CAD to enlarge the size of the drawing of an object ?
- (xvii) What will be the size of isometric projection of a sphere of diameter  $D$ ?
- (xviii) What is nomograph ?
- (xix) How do you represent enlarged scale ?
- (xx) Name the method of drawing isometric projection of a circular plane.

**S'13: 6 FN: AN 207 (1407)****ENGINEERING DRAWING AND GRAPHICS**

*Time : Three hours*

*Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A,  
ANY TWO from Group B and ALL from Group C.*

*All parts of a question ( a, b, etc. ) should be  
answered at one place.*

*Answer should be brief and to-the-point and be supple-  
mented with neat sketches. Unnecessary long answer may  
result in loss of marks.*

*Any missing or wrong data may be assumed suitably  
giving proper justification.*

*Figures on the right-hand side margin indicate full marks*

**Group A**

1. (a) Explain the concept and construction of vernier scale with a neat sketch. 5
- (b) Construct a diagonal scale of  $RF = 2/125$  and a least count of 1 cm. Show the length of 5.99 m, 3.31m and 2.7 dm on it. 15
2. (a) The top view of a line AB is 75 mm long and inclined to xy line at  $45^\circ$ . One end A is 20 mm above HP and 10 mm in front of VP. The other end is 65 mm above HP and is in front of VP. What is the true length of line and its inclination with HP and VP? Also, locate its horizontal and vertical traces. 10

(b) A square lamina ABCD of 30 mm side rests on the corner C such that the diagonal AC appears as at  $30^\circ$  to the VP, in the top view. Two sides BC and CD, containing the corner C, make equal inclinations with the HP. The surface of the lamina makes  $45^\circ$  with HP. Draw its top view and front view. 10

3. A pentagonal pyramid, 20 mm side of base and 35 mm altitude, rests with one of its corners on HP such that the two base edges passing through the corner on which it rests make equal inclinations with HP. The axis is inclined at  $45^\circ$  to VP and  $30^\circ$  to HP. Draw the top and front views of the pyramid. 20

4. Figure 1 shows the top view and front view of an object. Draw the isometric projection of the object. 20

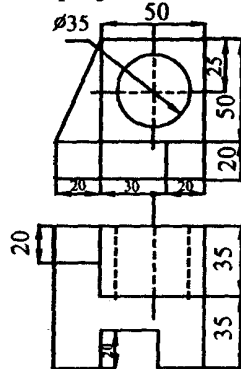


Fig. 1

**Group B**

5. (i) A double riveted chain-type lap joint to connect two plates of 20 mm thickness is to be designed. Calculate the necessary dimension and draw a simple top view and sectional front view of the designed joint. Indicate the dimensions. 7

(ii) It is necessary to connect a flanged hub to a shaft of 50 mm diameter by a flat saddle key. Calculate

necessary proportions of the key and show the two assembled views of the key, shaft and hub. 6

(iii) Draw the front view and left side view of a hexagonal headed bolt and nut assembly, when the diameter of the bolt is 12 mm, when the assembly is viewed from the nut end. 7

6. A pentagonal prism, with side of base 35 mm and length of the axis 60 mm, rests on one of its rectangular faces on HP. The axis of the prism is parallel to both HP and VP. The prism is cut by a section plane making an angle of  $30^\circ$  with HP and perpendicular to VP. The cutting plane bisects the axis of the prism. Draw the sectional top view and true shape of the section. Also, draw the development of the remaining portion of the solid. 20

7. A square prism, 40 mm side of base and 90 mm height, stands vertically with its base on HP with two of its rectangular faces equally inclined to VP. An another horizontal square prism of 30 mm sides and 90 mm long penetrates the vertical prism such that the axes of two prisms bisect each other at right angles. Two rectangular faces of the horizontal prism are equally inclined to HP. Draw the projections showing the lines of intersection. 20

8. Draw the front view, top view and the right-hand side view of the wooden pattern shown in Fig. 2. Consider the view from the arrow X as front view. 20

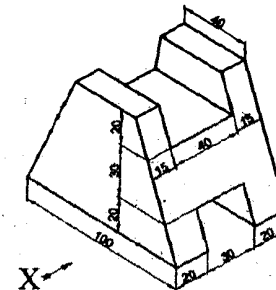


Fig. 2



**Group C**

9. Choose the *correct* answer for the following :  $20 \times 1$

(i) An area of  $36 \text{ km}^2$  is represented by an area of  $144 \text{ cm}^2$  on a map. The R.F. of the scale is

- (a)  $1/4$
- (b)  $1/2$
- (c)  $1/5000$
- (d)  $1/50000$

(ii) Which one of the following scales is used to convert the miles into kilometers ?

- (a) Diagonal scale
- (b) Comparative scale
- (c) Direct vernier scale
- (d) Retrograde vernier scale

(iii) A point, whose plan and elevation are above XY line, is situated in

- (a) first quadrant.
- (b) second quadrant.
- (c) third quadrant.
- (d) fourth quadrant.

(iv) If the front view of a point is 40 mm above  $xy$  line and the top view is 50 mm below  $xy$  line, the position of point is

(a) 40 mm above HP.

(b) 40 mm below HP.

(c) 50 mm in front of VP and 40 mm above HP.

(d) 50 mm below HP.

(v) If a line is parallel to both HP and VP, its true length will be seen in

- (a) front view.
- (b) top view.
- (c) side view.
- (d) both front and top views.

(vi) If a line is inclined at  $45^\circ$  to the HP and  $30^\circ$  to the VP, its front view is inclined at

- (a)  $30^\circ$  to  $xy$  line.
- (b)  $45^\circ$  to  $xy$  line.
- (c) between  $30^\circ$  and  $45^\circ$ .
- (d) greater than  $45^\circ$ .

(vii) If a line is inclined at  $30^\circ$  to HP and  $60^\circ$  to VP, its front view and top view are inclined at an angle of

- (a)  $30^\circ$  and  $60^\circ$  to  $xy$ , respectively.
- (b)  $60^\circ$  and  $30^\circ$  to  $xy$ , respectively.
- (c) both at  $90^\circ$  to  $xy$ .
- (d) both greater than  $30^\circ$  but less than  $90^\circ$ .

(viii) If the front view and top view of a plane are straight lines, then the true shape of the plane will be seen on

- (a) profile plane.
- (b) horizontal plane.
- (c) vertical plane.
- (d) any one of the three above.

(ix) If both the principle views of a plane object are ellipses of the same size, the side view will be

- (a) a horizontal line.
- (b) a vertical line.
- (c) an inclined line.
- (d) an ellipse.

(x) The number of faces in a dodecahedron is

- (a) 4
- (b) 8
- (c) 12
- (d) 20

(xi) If three orthographic views of a sphere containing a circular hole are drawn, the maximum number of circles that may appear altogether is

- (a) 1
- (b) 3

(c) 4

(d) 6

(xii) If a square pyramid is resting on a face in the VP, then the number of dotted lines which will appear in the front view is

(a) 1

(b) 2

(c) 3

(d) 4

(xiii) A cone is cut by a section plane parallel to the profile plane. Its true shape of section is seen in

(a) front view.

(b) top view.

(c) side view.

(d) auxiliary view.

(xiv) A cube is resting on a face in the HP with vertical faces equally inclined to the VP. It is cut by an AIP passing through the solid diagonal. The true shape of section view is a

(a) square.

(b) rectangle.

(c) hexagon.

(d) rhombus.

- (xv) A cylinder, with 60 mm diameter and 80 mm long axis, is lying on its generator in HP. It is cut by a section plane to get an ellipse as true shape of section. The minor axis of the ellipse will be
- (a) 60 mm
  - (b) 80 mm
  - (c) 100 mm
  - (d) None of the three above.
- (xvi) Methods for the development of solids are
- (a) parallel line method.
  - (b) radial line method.
  - (c) triangular method.
  - (d) All of the three above.
- (xvii) A string is wound around a hexagonal prism, having base with 20 mm side and 50 mm long axis, to connect opposite ends of the same longer edge. The minimum length of string required is
- (a) 110 mm.
  - (b) 120 mm.
  - (c) 130 mm.
  - (d) 140 mm.
- (xviii) When two cylinders of equal diameters envelop a common sphere, the curve of intersection is made up of

- (a) parabola.
  - (b) semi-circle.
  - (c) straight line.
  - (d) None of the three above.
- (xix) Isometric drawings fall into the category of
- (a) oblique drawings.
  - (b) axonometric drawings.
  - (c) multiview drawings.
  - (d) perspective drawings.
- (xx) The exact value of R.F. of an isometric scale is
- (a) 9/11
  - (b) 0.815
  - (c) 0.8165
  - (d)  $\sqrt{2} / \sqrt{3}$

**W'13 : 6 FN : AN 207 (1407)****ENGINEERING DRAWING AND GRAPHICS***Time : Three hours**Maximum Marks : 100*

*Answer FIVE questions, taking ANY TWO from Group A,  
ANY TWO from Group B and ALL from Group C.*

*All parts of a question ( a, b, etc. ) should be  
answered at one place.*

*Answer should be brief and to-the-point and be supplemented  
with neat sketches. Unnecessary long answer may result in  
loss of marks.*

*Any missing or wrong data may be assumed suitably  
giving proper justification.*

*Figures on the right-hand side margin indicate full marks.*

Assume all dimensions in mm.

**Group A**

1. (a) What are the general rules for dimensioning ? 10  
(b) Construct a scale of 1:5 to show decimeters and centimeters and to read up to 1m. Show the length of 7.6 dm on it. 10
2. The top view of a 75 mm long line, CD, measures 50 mm. C is 50 mm in front of the V.P. and 15 mm below the H.P., 15 mm in front of the V.P. and is above the H.P. Draw the front view of CD and find its inclinations with H.P. and V.P. Also, show its traces. 20
3. A tetrahedron of 75 mm long edges has one edge

parallel to the H.P. and inclined at  $45^\circ$  to the V.P. while a face containing that edge is vertical. Draw its projections. 20

4. Draw isometric view of a casting, two views of which are shown in Fig.1. 20

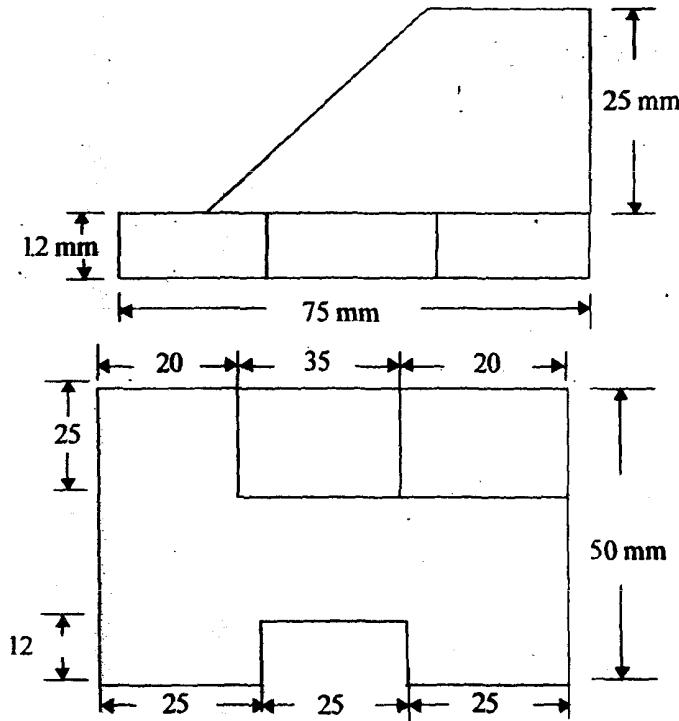


Fig. 1

**Group B**

5. Draw the projections of a regular pentagon of 40 mm side, having its surface inclined at  $30^\circ$  to the ground and a side parallel to the H.P. and inclined at an angle of  $60^\circ$  to the V.P. 20

6. A cube of 50 mm long edges is resting on the ground with a vertical face inclined at  $30^\circ$  to the V.P. It is cut by a section plane, perpendicular to the V.P., inclined at  $30^\circ$  to the H.P. and passing through a point on the axis, 38 mm above the ground. Draw the sectional top view, true shape of the section and development of surfaces of the remaining portion of the cube. 20

7. A vertical square prism, base 50 mm side, has its faces equally inclined to the V.P. It is completely penetrated by another square prism of base 30 mm side, the axis of which is parallel to both the planes and is 6 mm away from the axis of the vertical prism. Also, the faces of the horizontal prism are equally inclined to the V.P. Draw the projections of the solids showing lines of intersection. 20

8. Using third angle projection method, draw (i) front view, (ii) top view, and (iii) both side views. 6 + 6 + 8

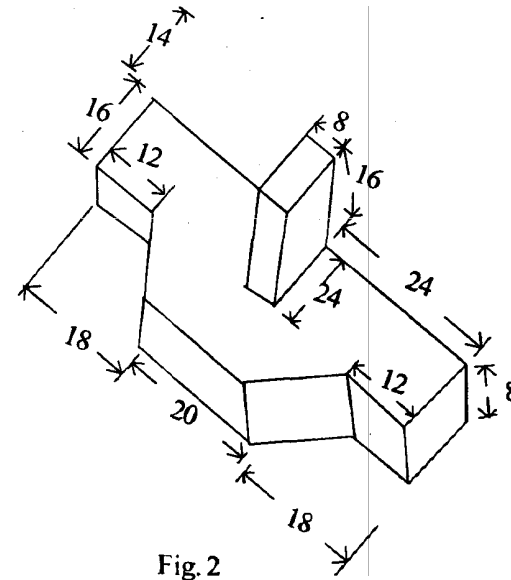


Fig. 2

**Group C**

9. Answer the following in brief: 20 × 1

- (i) State the quadrants in which the following points is situated. A point P, its top view is 40 mm above XY, the front view 20 mm below the top view.
- (ii) What is the trace of a straight line ?
- (iii) What are types of riveted joints ?
- (iv) Define prism.
- (v) Define crest and root of a screw thread.
- (vi) Write the types of solid.
- (vii) What is the method of surface development of prism and cone ?
- (viii) What is the difference between oblique projection and isometric projection ?
- (ix) Define orthographic projection.
- (x) What is nomograph ?
- (xi) What do you mean by the term 'dimensioning' ?
- (xii) When measurements are required in three units, \_\_\_\_\_ scale is used.
- (xiii) The planes, which are inclined to both the reference planes, are called \_\_\_\_\_ planes.
- (xiv) The true shape of the section is \_\_\_\_\_, when a cylinder is cut by a section plane inclined to the axis.
- (xv) In first-angle projection method, the \_\_\_\_\_ - cones are between the observer \_\_\_\_\_ and the \_\_\_\_\_.
- (xvi) The ratio of the length of drawing of the object to the actual length of the object is called \_\_\_\_\_.

- (xvii) The purpose of the sectional view is to show the \_\_\_\_\_ shape of the object.
- (xviii) A solid, having four equal equilateral triangular faces, is called \_\_\_\_\_.
- (xix) CAD/CAM is hardware oriented, but \_\_\_\_\_ gives it life.
- (xx) What are the functions of CAD ?

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