COMMON PRE-BOARD EXAMINATION

ENGINEERING GRAPHICS-Code No. 046

Class-XII-(2025-26)

SET: 1

Time allowed: 3 Hrs. **Maximum Marks: 70**

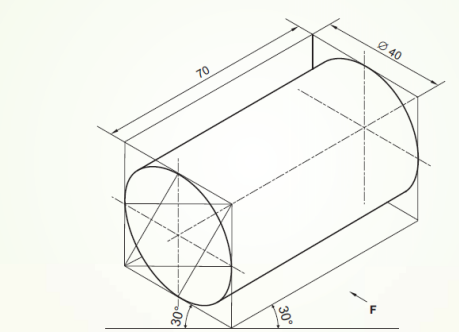
General Instructions:

(i) Attempt all the questions.
(ii) Use both sides of the drawing sheet, if necessary.
(iii) All dimensions are in millimeters.
(iv) Missing and mismatching dimensions, if any, may be suitably assumed.
(v) Follow the SP: 46 – 2003 revised codes. (with the first angle method of projection)
(vi) In question 23, hidden edges or lines are to be shown in views without section.
(vii) In question 24, no hidden edges or lines are required.

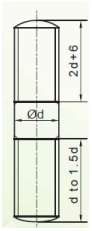
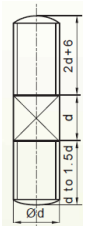
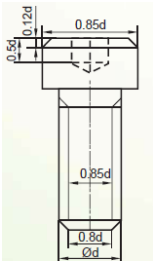
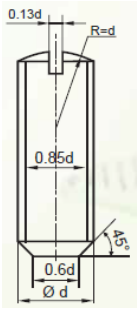
SECTION – A

Q.1 to Q.14: Answer the following multiple-choice questions. Print the correct choice on your drawing sheet. **14 × 1 = 14**

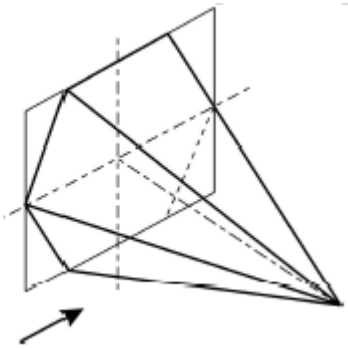
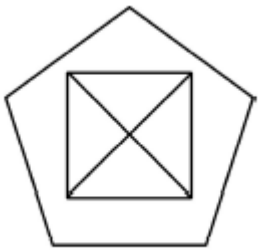
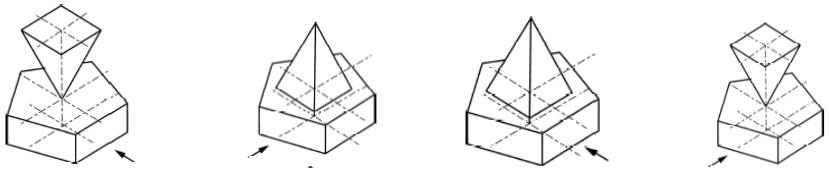
Q. No	Questions	Marks
1.	In isometric projection, the scale used along each axis is----------. (a) Full scale (b) Isometric scale (c) Reduced scale by 50% (d) Enlarged scale	1
2.	Which type of lines has precedence over all other kinds of lines? (a) Centre lines (b) Hidden lines (c) Visible lines (d) Hatching lines	1
3.	A square plate with a side length of 40 mm is placed so that one edge lies on the horizontal plane and the surface is vertical. In its isometric projection, the visible shape of the plate will appear as: (a) Square of 40 mm side (b) Rectangle of 40 mm × 32.6 mm (c) Rhombus of 40 mm sides (d) Parallelogram of 32.6 mm sides	1

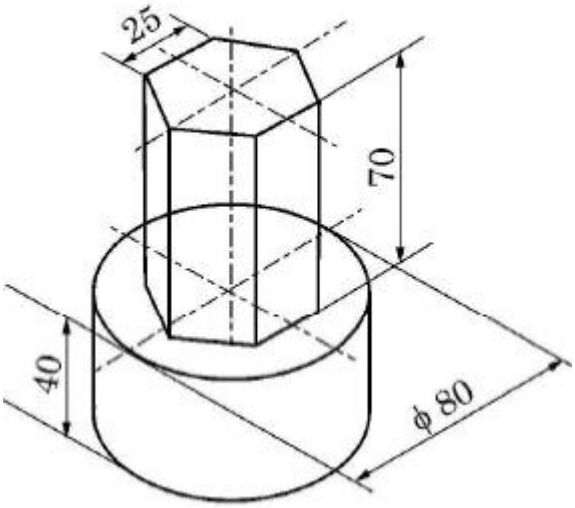
4.	The lead of a single-start thread is equal to----------. (a) One-half of the pitch (b) Pitch (c) Twice the pitch (d) Thrice the pitch	1
5.	Choose the correct statements for the given cylinder as seen from the given arrow:  (i) The axis is perpendicular to HP. (ii)The axis is parallel to both HP and VP. (iii)The axis is perpendicular to VP. (iv) All the sides and the circular faces will appear foreshortened in the projection. (a) (i) and (iv) only (b) (ii) and (iv) only (c) (i) and (iii) only (d) (ii) and (iii) only	1
6.	Match the LIST I with LIST II. **LIST I (DESCRIPTIONS)** / **LIST II (FEATURES)** 1. True length — (i) Lines not parallel to the isometric axes. 2. Isometric lines — (ii) Actual length before foreshortening. 3. Isometric projection — (iii) Lines parallel to the isometric axes. 4. Non-isometric lines — (iv) Equal foreshortening along three axes. (a) 1-(iv), 2-(i), 3-(ii), 4-(iii) (b) 1-(iii), 2-(iv), 3-(i), 4-(ii) (c) 1- (ii), 2-(iii), 3-(iv), 4-(i) (d) 1-(i), 2-(ii), 3-(iii), 4-(iv)	1
7.	Which of the following statements are correct for a BSW thread? (i) The thread angle is 55°. (ii) The crest and root are both rounded. (iii) The thread is used mainly in British standards. (iv) The flanks are inclined at 30° each to the horizontal. (a) (i) & (ii) (b) (i), (ii) & (iii) (c) (ii), (iii) & (iv)	1

	(d) (i) & (iv)	
8.	In a Collar Stud with a nominal diameter of 15 mm, the thickness of the collar is: (a) 5 mm (b) 6 mm (c) 4 mm (d) 3 mm	1
9.	Match the LIST I with LIST II.	1

LIST 1: (FRONT VIEW)	**LIST II: (NAME)**
1. 	(i) Socket head machine screw
2. 	(ii) Plain stud
3. 	(iii) Grub screw
4. 	(iv) Stud with a square neck

(a) 1-(iv), 2-(iii), 3-(ii), 4-(i)
(b) 1-(iii), 2-(i), 3-(iv), 4-(ii)
(c) 1-(i), 2-(ii), 3-(iii), 4-(iv)
(d) 1-(ii), 2-(iv), 3-(i), 4-(iii)

10.	Select the correct statements for the given figure.  (i) A horizontal pyramid is placed with its axis parallel to both HP and (ii) The solid has a total of three triangular faces. (iii) A horizontal pyramid is placed with its axis perpendicular to VP. (iv) It is an example of a polyhedron. (a) (i) and (iv) only (b) (ii) and (iv) only (c) (i) and (iii) only (d) (ii) and (iii) only	1
11.	The strap is a part of which of the following machine joints? (a) Flange pipe Joint (b) Gib and Cotter joint (c) Tie rod joint (d) Sleeve and cotter joint	1
12.	 Top View The above given top view corresponds to:  (a) (b) (c) (d)	1
13.	Identify the correct statement as per the orientation of the axis of the given combination of solids.	1



(a) The axis of the top solid is horizontal.
(b) The axis of the bottom solid is horizontal.
(c) The common axis is vertical.
(d) The common axis is horizontal.

14. Match LIST – I with LIST – II, according to your understanding of a 'Flanged pipe joint'. — 1

LIST I (COMPONENTS)	LIST II (FEATURES)
1. Flanges	(i) Allows the flow of fluid through the joint.
2. Bolts and Nuts	(ii) Used to connect two pipe ends together securely.
3. Pipe	(iii) Used to prevent leakage between the joint surfaces.
4. Gasket	(iv) Provides the tightening force to hold flanges together.

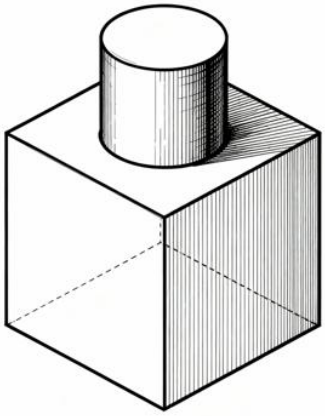
(a) 1-(i), 2-(ii), 3-(iii), 4-(iv)
(b) 1-(iv), 2-(iii), 3-(ii), 4-(i)
(c) 1-(iii), 2-(i), 3-(iv), 4-(ii)
(d) 1-(ii), 2-(iv), 3-(i), 4-(iii)

SECTION B

Q.15 to Q.18: Read the following paragraph and answer the questions given below:

4 × 1 = 4

Q. No	Questions	Marks
15.	A mechanical designer is preparing an isometric drawing of a machine component consisting of a **cube (side 40 mm)**, on top of which a **cylinder (diameter 30 mm, height 25 mm)** is placed. The object needs to be represented in a **single isometric projection** to clearly visualise all three dimensions.	1

	To make the drawing, the designer follows these steps: 1. Draws **three isometric axes** at **120°** to each other. 2. Uses the **isometric scale** to measure the dimensions accurately (foreshortened). 3. Ensures that the **edges of the cube** are drawn parallel to the isometric axes. 4. The **circular top** of the cylinder is represented as an **ellipse**. 5. Finally, all lines that are **not visible** are omitted, as isometric projection represents only visible edges. This type of isometric representation is often used in **assembly drawings, mechanical parts visualisation, and architectural modelling** because it provides a realistic 3D appearance without requiring perspective rules.  The designer chooses isometric projection because it: (a) Gives a realistic 3D effect with perspective shortening. (b) Maintains true proportions along all three axes. (c) Allows all dimensions to appear in equal measure. (d) It is easier to draw than orthographic projections.	
16.	If the true edge of the cube is 40 mm, what will be the **isometric length** when drawn using an isometric scale? (a) 32.6 mm (b) 34.6 mm (c) 35.6 mm (d) 36.6 mm	1
17.	The top circular face of the cylinder appears as an ellipse in isometric projection because: (a) Circles become ellipses when inclined to all three axes. (b) Circles remain circles in any projection. (c) The cylinder is not aligned with the isometric plane. (d) The circle lies on the vertical plane only.	1
18.	The use of isometric projection in mechanical design helps primarily in---------. (a) Showing hidden internal details. (b) Visualising objects in 3D for assembly and presentation. (c) Calculating stress and strain in materials. (d) Producing photorealistic renderings.	1

	Q.19 to Q.22: Read the following paragraph and answer the questions given below:	
19.	In the **Mechanical Assembly Lab**, students observe a display board showing **enlarged isometric models of various fasteners**. The display includes: • A **pan head rivet**, • A **hexagonal bolt with a nut**, • A **collar stud**, and • A **countersunk screw**. The workshop guide explains that **fasteners are selected based on assembly requirements**: • **Permanent vs Non-permanent:** Permanent fasteners (e.g., rivets) cannot be easily disassembled, whereas bolts and screws can be removed. • **Threaded vs Non-threaded:** Threaded fasteners (e.g., bolts, studs) allow torque application and precise assembly. Students are asked to identify **the types of fasteners, threaded features, and dimensional relationships** from the display. Which of the displayed fasteners is non-permanent and threaded? (a) Pan head rivet (b) Hexagonal bolt with nut (c) Snap head rivet (d) Countersunk rivet	1
20.	A pan head rivet has which feature? (a) Threaded body (b) Smooth cylindrical shaft and rounded head (c) Hexagonal head for wrench grip (d) Square neck for torque resistance	1
21.	Which fastener would be safest for joining two metal plates that cannot be disassembled? (a) Hexagonal bolt with nut (b) Countersunk screw (c) Pan head rivet (d) Collar stud	1
22.	The hexagonal bolt and nut combination allows:	1

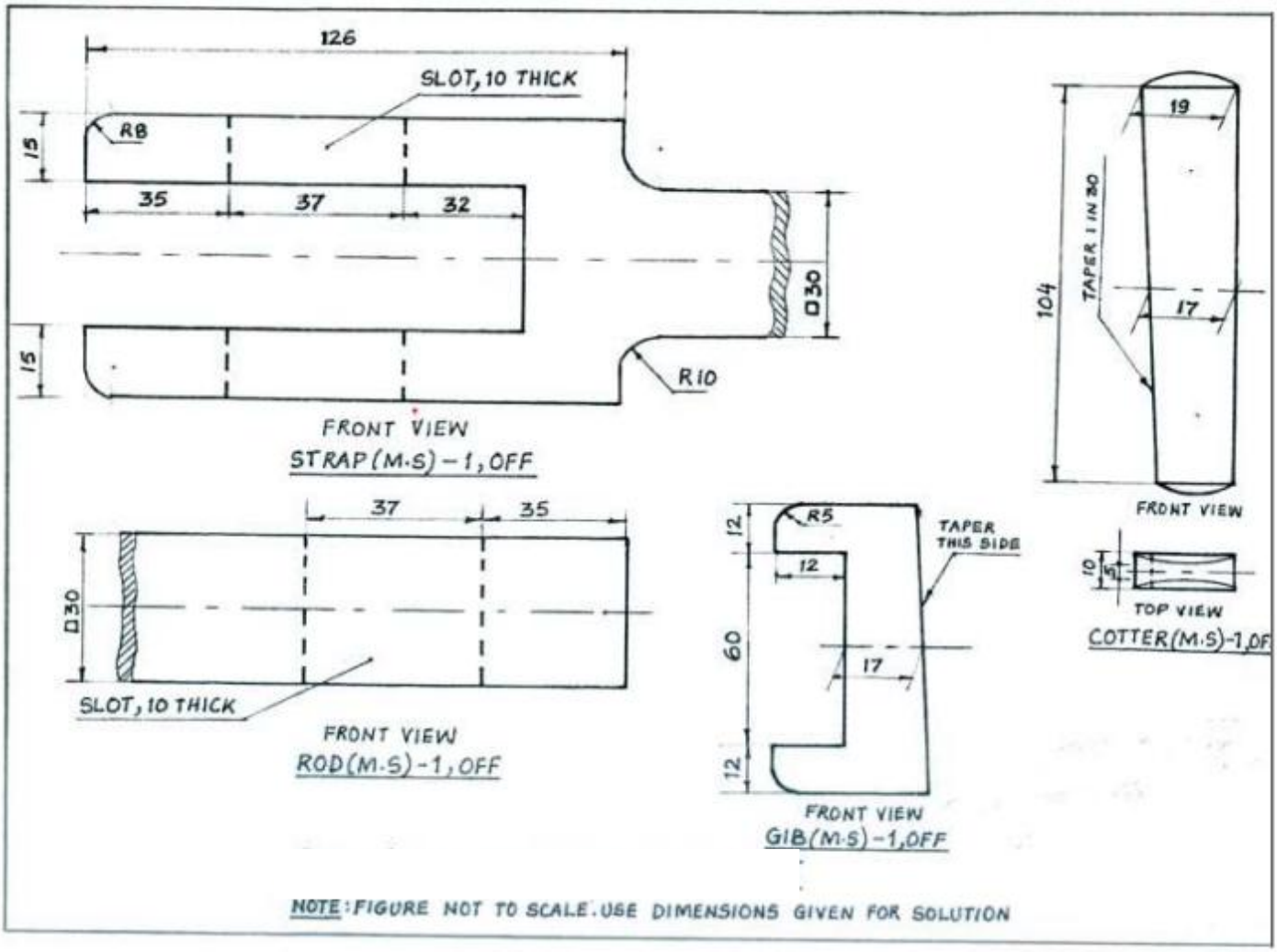
	(a) Permanent joint (b) Easy assembly and disassembly (c) Non-threaded connection (d) Use only in wood assemblies	

23. (A) The figure shows the details of the parts of a Gib and Cotter Joint. Assemble these parts correctly and then draw the following views to scale 1:1.

(i) Front view, upper half in section. (13)

(ii) Left-hand side view. (8)

(iii) Print titles and scale used. Draw the projection symbol. Give eight important dimensions. (6)



OR

23. (B) The figure below shows the assembly of an Open Bearing. Disassemble the parts correctly and then draw to scale 1:1 the following views of the following components. Keeping the same position of both bodies and bush with respect to H.P. and V.P. as given:

(a) BODY

(i) Full sectional front View (8)

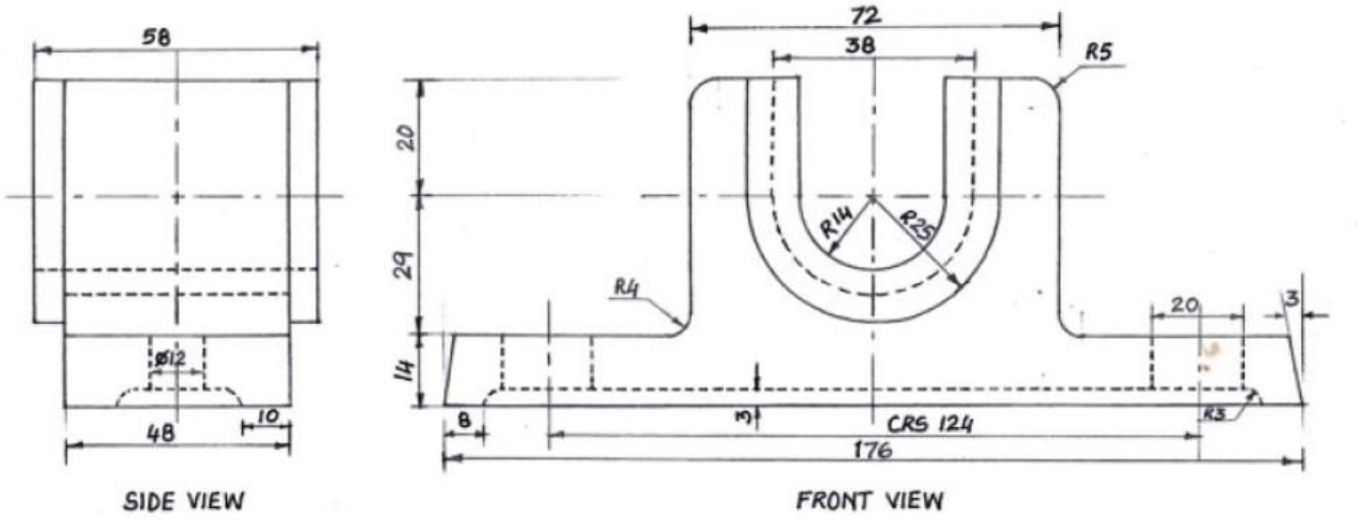
(ii) Top View (6)

(b) BUSH

(i) Front View (4)

(ii) Top View (3)

(c) Print the titles of both and the scale used. Draw the projection symbol. Give six important dimensions. (6)



OPEN BEARING

NOTE: FIGURE NOT TO SCALE. USE DIMENSIONS GIVEN FOR SOLUTION

SECTION C

Q.No	Questions	Marks
24.(a)	Construct an isometric scale.	4
24.(b)	Draw the isometric projection of an inverted hexagonal pyramid (base edge 30 mm, height 70mm) with its axis perpendicular to H.P. and parallel to V.P., keeping a pair of base edges of the hexagon parallel to the V.P. Indicate the direction of viewing. Give all the dimensions.	9
25.(a)	Draw to scale 1:1, the standard profile of Metric thread external with enlarged pitch as 50 mm. Give standard dimensions.	8

OR

25.(b)	Draw to scale 1:1, the front view and top view of a vertical Hexagonal Nut of nominal diameter 25 mm. Give the standard dimensions.	8