Indian School Al Wadi Al Kabir
Second Rehearsal Examination (2025-2026)

Class: XII | Subject: Engineering Graphics (046) | Max. Marks: 70
Date: 25/01/2026 | Set – I | Time: 3 hours

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 required.

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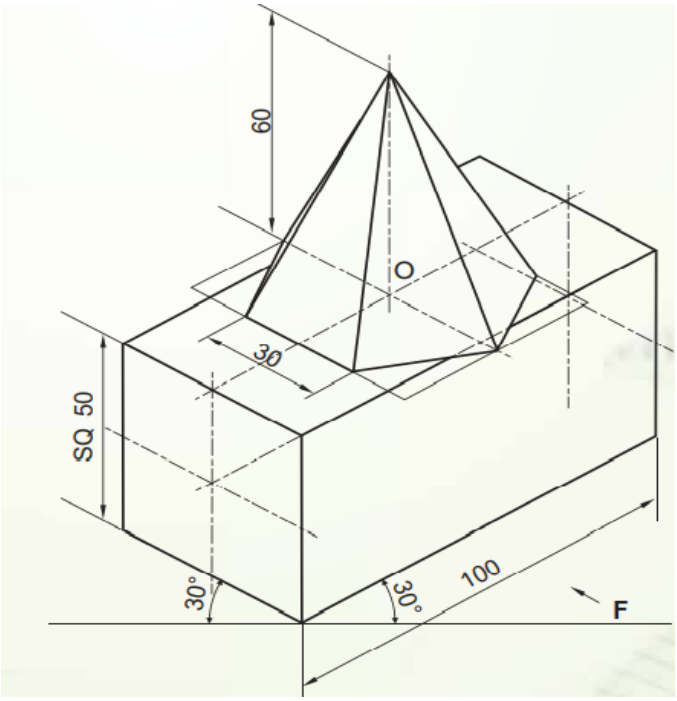
Q.1 to Q.14: Answer the following multiple-choice questions. Print the correct choice on your drawing sheet.

14 × 1 = 14

1. Isometric lines are defined as the lines that are:
(a) Inclined at 45° to the horizontal plane
(b) Parallel to the isometric axes
(c) Not parallel to the isometric axes
(d) Equal in length to the true length

2. Which type of projection is extensively used in mechanical engineering to show the blocks machine parts, assemblies, etc.
(a) Perspective projection
(b) Axonometric projection
(c) Orthographic projection
(d) Oblique projection

3. Select the correct option corresponding to the orientation of the given Isometric Projection:



(a) A vertical pentagonal pyramid with one of its base edges parallel to VP is placed centrally on a horizontal square prism with its square ends parallel to VP.
(b) A vertical pentagonal pyramid with one of its base edges perpendicular to VP is placed centrally on a horizontal square prism with its square ends perpendicular to VP.
(c) A vertical hexagonal pyramid with two of its base edges perpendicular to VP is placed centrally on a horizontal square prism with its square ends parallel to VP.
(d) A vertical hexagonal pyramid with two of its base edges parallel to VP is placed centrally on a horizontal square prism with its square ends perpendicular to VP.

4. For a triple-start thread, the relationship between Lead (L) and Pitch (P) is:
   (a) L = P
   (b) L = 2P
   (c) L = 3P
   (d) L = 0.5P

5. The standard nominal thickness (height) of a hexagonal nut is generally taken equal to:
   (a) 0.8d
   (b) 1.5d
   (c) 2d
   (d) d

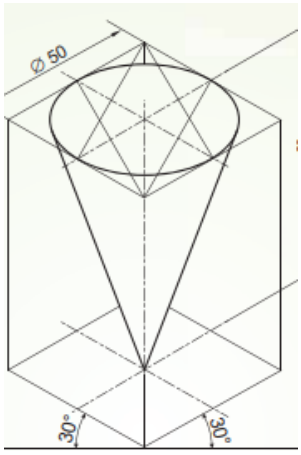
6. Square threads are primarily used in mechanical assemblies for:
   (a) Temporary fastening
   (b) High friction resistance
   (c) Power transmission
   (d) Decorative purposes

7. Match the LIST I with LIST II according to your understanding of a ‘Sleeve and Cotter joint’.

LIST 1	**LIST II**
1. Cotter	i. Ensures easy removal and locking
2. Sleeve	ii. Wedge-shaped locking element
3. Cotter slot	iii. Outer cylindrical connector
4. Taper of cotter	iv. Tapered rectangular slot for cotter

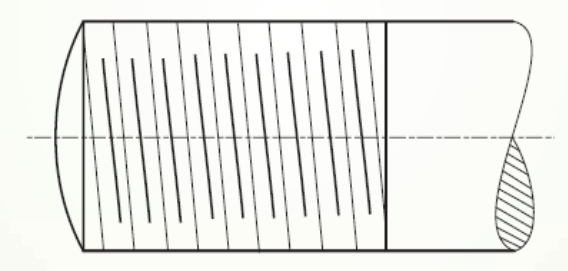
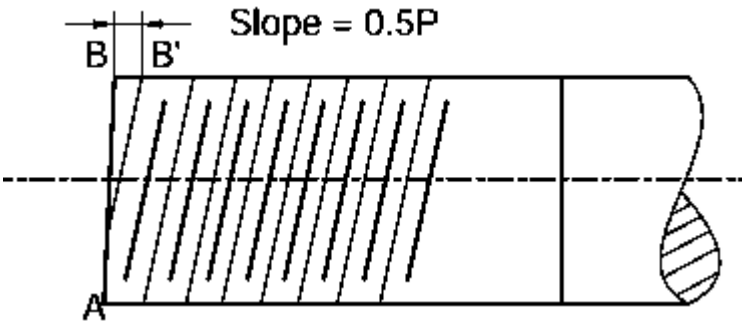
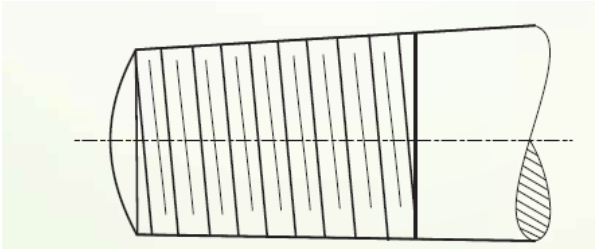
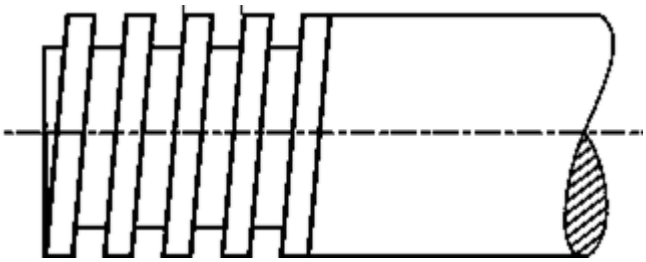
(a) 1-i, 2-iii, 3-ii, 4-iv
(b) 1-iii, 2-iv, 3-i, 4-ii
(c) 1-iv, 2-ii, 3-iii, 4-i
(d) 1-ii, 2-iii, 3-iv, 4-i

8. Select the correct option corresponding to the orientation of the given Isometric Projection:



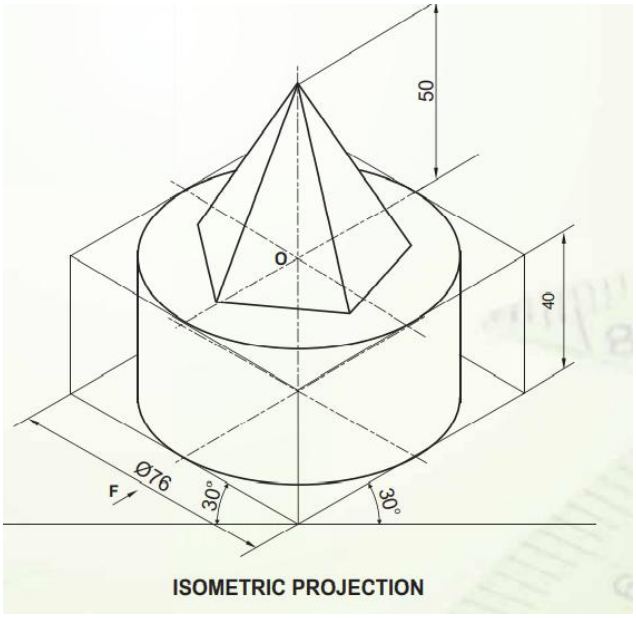
(a) The solid is straight with its axis parallel to HP and perpendicular to VP.
(b) The solid is inverted with its axis parallel to HP and perpendicular to VP.
(c) The solid is straight with its axis perpendicular to HP and parallel to VP.
(d) The solid is inverted with its axis perpendicular to HP and parallel to VP.

9. Match the LIST I with LIST II.

LIST 1	**LIST II**
1. 	i. LH – V- Thread (External)
2. 	ii. Parallel thread
3. 	iii. LH Square Thread (External)
4. 	iv. Taper thread

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

10. Select the correct option corresponding to the orientation of the given Isometric Projection:



ISOMETRIC PROJECTION

(a) The size of the common axis is true 90mm.
(b) The size of the common axis is less than true 90mm.
(c) The size of the common axis is more than true 90mm.
(d) The size of the common axis is true 100mm.

11. In a Flanged Pipe Joint, the thin circular packing ring is placed between the two flanges is called a:
(a) Pipe
(b) Dowel pin
(c) Gasket
(d) Collar

12. In a cotter joint, the cotter is inserted perpendicular to the axes of the shafts, which are subjected to:
(a) Shearing forces
(b) Tensile forces
(c) Torsional forces
(d) Bending moments

13. Plain Journal Bearings are designed to support primarily:
(a) Axial loads
(b) Oscillating loads
(c) Radial loads at right angles to the shaft axis
(d) Linear motions only

14. The thread designation M20 x 1.5 indicates that the nominal size (major diameter) of the metric thread is:
(a) 1.5 mm
(b) 20 mm
(c) 30 mm
(d) 25 mm

SECTION B

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

4 × 1 = 4

You are designing a **portable cylindrical Bluetooth speaker** for a tech company.
The speaker has:

- **Diameter:** 90 mm
- **Height:** 180 mm
- **Top surface:** A circular grill
- **Base:** Flat
- **Goal:** Prepare the **isometric projection** to showcase the speaker's size and confirm it fits inside a standard travel case.

15. In the isometric projection, the top grill of the speaker will appear as _____.

(a) Circle

(b) Ellipse

(c) Parabola

(d) Hexagon

16. Which method is used to construct the ellipse representing the circular top in isometric view?
(a) Four-centre method
(b) Box method
(c) Offset/Co-ordinate method
(d) Trapezoid method

17. The isometric height of the speaker (180 mm) will be represented as _____.
(a) Less than 180 mm
(b) More than 180 mm
(c) Exactly 180 mm
(d) Equal to 90 mm

18. The scale used to construct the isometric projection of the speaker is called _____.
(a) Full scale
(b) True scale
(c) Isometric scale
(d) Enlarged scale

Q.19 to Q.22: Read the following paragraph and answer the questions given below:

4 × 1 = 4

Selecting Fasteners for Structural Integrity

A mechanical workshop receives two separate tasks involving metal plate assembly.
Task A: Two heavy steel plates forming part of a boiler structure must be rigidly joined together. The joint must be permanent, requiring special tools for removal, and needs a strong, simple fastening element that is a simple round rod having a head at one end.

Task B: Two parts of a household appliance require a connection that allows for easy assembly and disassembly for routine cleaning and maintenance.

19. Which category of fastener must be chosen for Task A, based on the requirement that it cannot be separated without breaking the fastening?

(a) Machine screw
(b) Rivet heads
(c) Studs
(d) Bolts

20. Task B primarily requires a threaded connection. Which common fastener pair is typically chosen for this temporary joint?

(a) Bolts & Nuts
(b) Rivets & studs
(c) Rivets & nuts
(d) Welds & bolts

21. Which is a non-threaded fastener?

(a) Hexagonal bolt
(b) Square stud
(c) Taper pin
(d) Countersunk screw

22. If a hexagonal-headed bolt has a nominal diameter (d) of 20 mm, what is the standard approximate thickness (height) of its head?

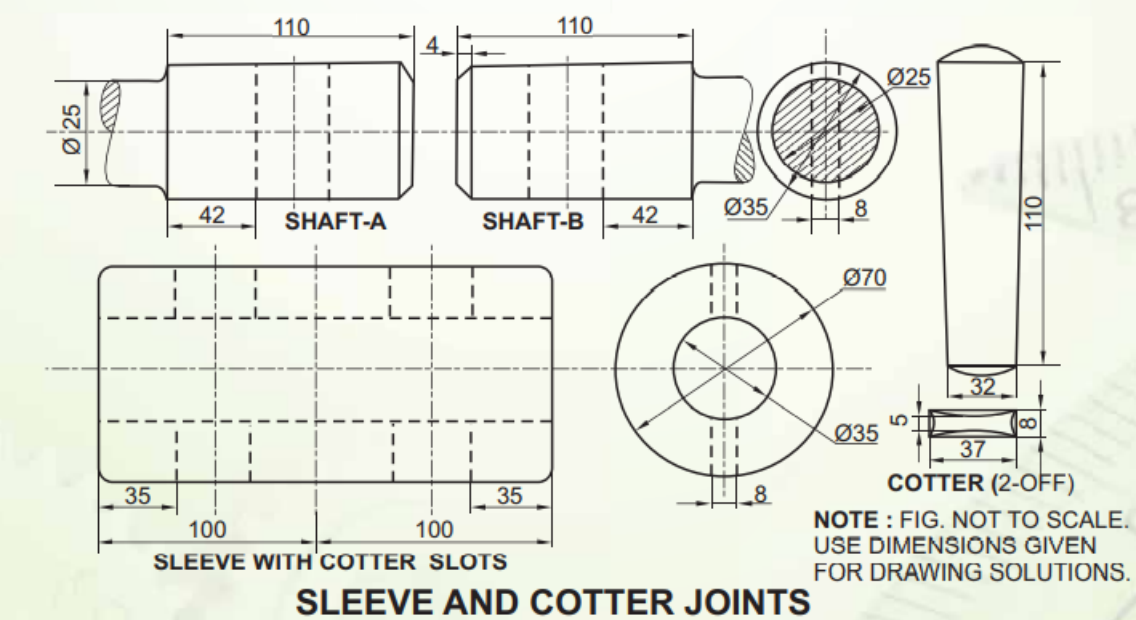
(a) 20 mm
(b) 16 mm
(c) 30 mm
(d) 40 mm

23.(A) The Figure given below shows the parts of a Sleeve and Cotter Joint. Assemble the parts correctly and then draw the following views to a scale 1: 1

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

(b) Side view, viewing from the left. (8**)**

(c)Print title and scale used. Draw the projection symbol. Give '8' important dimensions. (6**)**



OR

23.(B) The figure given below shows the assembly of a 'Turnbuckle'. Disassemble the parts correctly and then draw to scale 1:1 its following views of the following components. Keeping the same position with respect to H.P and V.P. as given:

(a) BODY

(i) Front View, Upper half in section. (8)

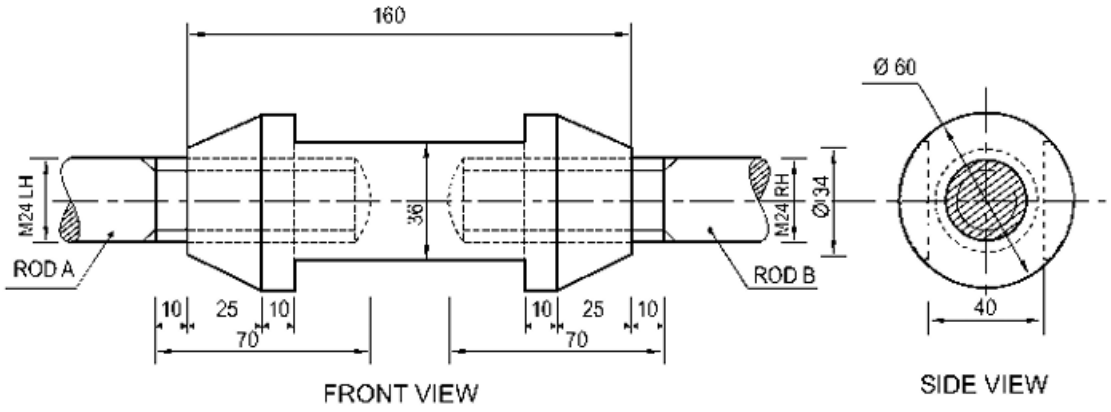
(ii) Top View. (7)

(b) ROD A

(i) Front View. (4)

(ii) Right Side View. (2)

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



SECTION C

24.(a) Construct an isometric scale $1 \times 4 = 4$

(b) A hexagonal prism of base side 30 mm and height of 70 mm resting on its face on H.P. with two of its bases are parallel to V.P. Draw its isometric projection, and indicate the direction of viewing and give all the dimensions. $1 \times 9 = 9$

$1 \times 8 = 8$

25.(a) Draw to scale 1:1, the standard profile of Metric thread (Internal) with enlarged pitch as 50 mm. Give standard dimensions.

OR

25. (b) Draw to scale 1:1 the elevation and plan of a square head bolt when its axis is perpendicular to H.P. Take the diameter of the bolt as 24mm, and length as 110 mm.