

**SAMPLE QUESTION PAPER**  
**XII – (2024-25)**  
**ENGINEERING GRAPHICS (046)**

*Time Allowed: 3 hours*

*Maximum Marks: 70*

Note:

- (i) Attempt all the questions.
- (ii) Use both sides of the drawing sheet, if necessary.
- (iii) All dimensions are in millimetres.
- (iv) Missing and mismatching dimensions, if any, may be suitably assumed.
- (v) Follow the SP: 46 – 2003 revised codes. (with 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.

**SECTION – A**

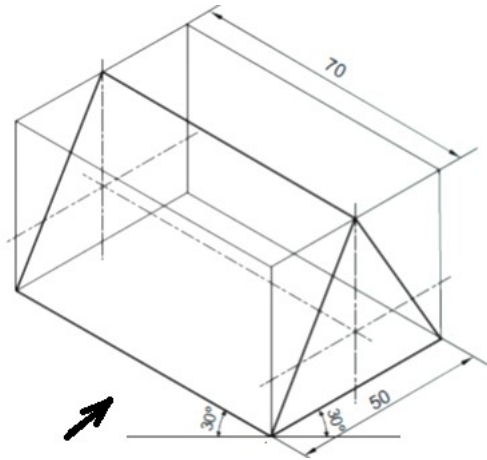
**Q.1 to Q.14 :** Answer the following Multiple Choice Questions. Print the correct choice on your drawing sheet.

14 X 1 = 14

1. An isometric projection of a square is drawn as
- A. a square having foreshortened length
  - B. a square having true length
  - C. a rhombus of true length
  - D. a rhombus of foreshortened length



2. Choose the correct statements for the given figure:



- (i) The triangular ends are perpendicular to VP
  - (ii) The triangular ends are parallel to VP
  - (iii) The axis of the prism is parallel to VP
  - (iv) The axis of the pyramid is perpendicular to VP
- A. (i) & (ii)  
B. (ii) & (iii)  
C. (i) & (iii)  
D. (i), (ii) & (iii)
3. In first-angle projection method, we assume the object to be situated \_\_\_\_\_ V.P. and \_\_\_\_\_ H.P.
- A. In front of, below  
B. behind, below  
C. in front of, above  
D. behind, above
4. How is non-isometric lines located and drawn?
- A. They are drawn parallel to the isometric axis  
B. They are measured using the angle from the orthographic/ helping view  
C. They are located by determining its endpoints  
D. They are measured directly using the given angle

5. Which type of thread profile is used in feed mechanism of machine tools?
- BSW
  - Metric
  - Square
  - Knuckle

6. The designation M20 x 2 square bolt means
- the major diameter is 20mm and pitch is 2mm
  - two bolts of major diameter 20mm
  - two bolts of pitch 20mm
  - the metric screw thread of diameter 40mm

7. Match the **LIST - I** with **LIST - II** :

<b>LIST - I (MACHINE PARTS)</b>	<b>LIST - II (FEATURES)</b>
a. Plain Stud	(i) Permanent fastener
b. CSK Head rivet	(ii) Headless bolt
c. Grub screw	(iii) Counter sunk head temporary fastener
d. CSK Head screw	(iv) Headless screw

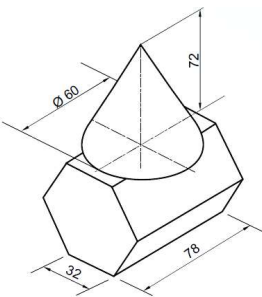
A. a-(i) b-(ii) c-(iii) d-(iv)

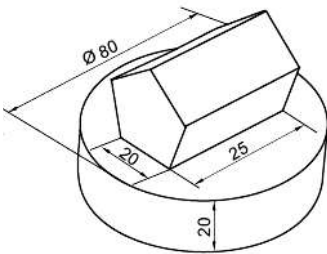
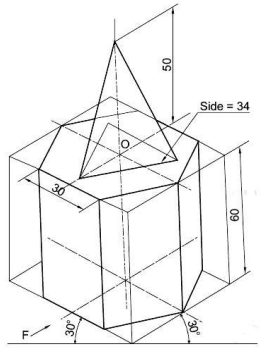
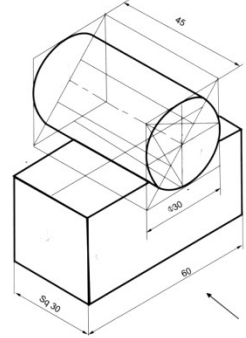
B. a-(ii) b-(i) c-(iv) d-(iii)

C. a-(ii) b-(iii) c-(i) d-(iv)

D. a-(i) b-(iv) c-(ii) d-(iii)

8. Match the **LIST - I** with **LIST - II** :

<b>LIST - I (ISOMETRIC PROJECTION)</b>	<b>LIST - II (ORIENTATION OF AXIS)</b>
(a) 	(i) Axis of top solid is vertical & axis of bottom solid is horizontal

<p>(b)</p> 	<p>(ii) Axes of both solids are vertical</p>
<p>(c)</p> 	<p>(iii) Axis of top solid is horizontal &amp; axis of bottom solid is also horizontal</p>
<p>(d)</p> 	<p>(iv) Axis of top solid is horizontal &amp; axis of bottom solid is vertical</p>

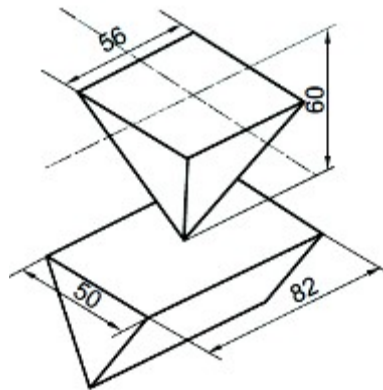
- A. (a)-(i) (b)-(ii) (c)-(iii) (d)-(iv)  
 B. (a)-(iii) (b)-(iv) (c)-(i) (d)-(ii)

- C. (a)-(ii) (b)-(iii) (c)-(i) (d)-(iv)  
 D. (a)-(i) (b)-(iv) (c)-(ii) (d)-(iii)

9. What will be the threaded length of the nut end, if the nominal diameter of a collar stud is 10 mm?

- A. 26 mm  
 B. 20 mm  
 C. 10 mm  
 D. 15 mm

10. Choose the correct statements for the given figure:

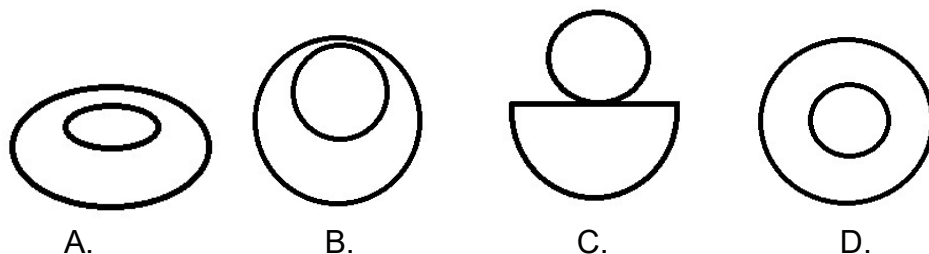
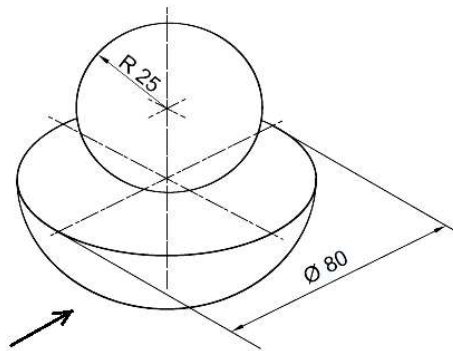


- (i) The square pyramid is resting on its apex on a triangular pyramid.
- (ii) An inverted square pyramid is centrally placed on the rectangular face of a prism.
- (iii) The triangular prism is lying on its long edge on HP
- (iv) The triangular pyramid is lying on its rectangular face on HP

- A. (i) & (iii)
- B. (ii) & (iv)

- C. (i) & (iv)
- D. (ii) & (iii)

11. The isometric projection of combination of solids is shown. Choose the correct top view in orthographic projection for this combination.



12. Strap is a part of which of the following machine joint?

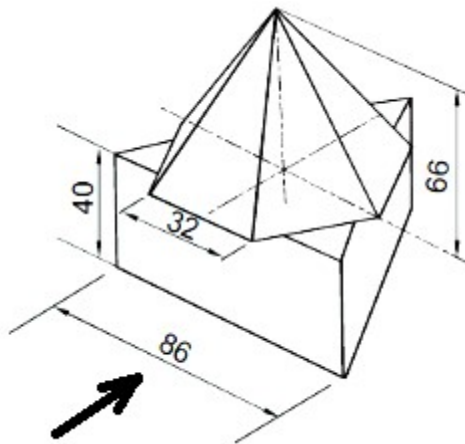
- A. Flange pipe Joint
- B. Gib and cotter joint
- C. Tie rod joint
- D. Sleeve and cotter joint

13. Which statements are correct for a 'Cotter'?

- (i) It is tapered on both sides.
- (ii) Two cotters are used in a Gib and Cotter Joint.
- (iii) The taper helps in easy insertion & withdrawal.
- (iv) It has uniform thickness.

- A. (i) & (iii)
- B. (iii) & (iv)
- C. (ii) & (iv)
- D. (ii) & (iii)

14. Match **LIST – I** with **LIST – II**, for the given isometric projection of combination of solids:



LIST I	LIST II
a. No. of triangular faces	(i) three
b. No. of apex	(ii) four



c. No. of base edges parallel to VP	(iii) eight
d. No. of rectangular faces	(iv) one

A. a-(i) b-(ii) c-(iii) d-(iv)

B. a-(iii) b-(iv) c-(ii) d-(i)

C. a-(iii) b-(ii) c-(i) d-(iv)

D. a-(i) b-(iv) c-(ii) d-(iii)

## **SECTION – B**

**Q.15 to Q.18 :** Read the following paragraph and answer the questions given below:  
4 X 1 = 4

Isometric projection is a powerful tool used in design and engineering to represent three-dimensional objects on a two-dimensional surface with accuracy. In a recent project, an architecture firm employed isometric projection to design a modern office space. By utilizing isometric drawings, they were able to create precise representations of the office layout, including furniture placement and spatial arrangements.

The firm presented the isometric drawings to their client, who was impressed by the clarity and detail provided. This visualization helped the client to better understand the proposed design, leading to quicker decision-making and ultimately a smoother project development process.



15. What is isometric projection primarily used for?
- A. Representing two-dimensional objects
  - B. Representing three-dimensional objects
  - C. Creating abstract art
  - D. Creating animations
16. Which industry commonly utilizes isometric projection?
- A. Fashion
  - B. Agriculture
  - C. Engineering and design
  - D. Healthcare
17. Why is isometric projection valuable in architectural design?
- A. It simplifies and helps in better visualization of complex parts of the project
  - B. It provides two-dimensional multiple views
  - C. It maintains accurate measurements of all dimensions
  - D. It helps in cutting the cost by reducing the size
18. For drawing isometric projection of the project, the isometric dimensions will be
- A. Equal to true dimensions
  - B. More than true dimensions
  - C. Half of the true dimensions
  - D. Equally foreshortened true dimensions

**Q.19 to Q.22 :** Read the following paragraph and answer the questions given below: 4 X 1 = 4

“If you have ever looked out of a plane window at the surface of the wing, you might have noticed that all the panels are held together with a series of small round joiners along with their edges. These are rivets and believe it or not, these small and inconspicuous little fasteners are actually one of the key ingredients in the history and success of the aerospace industry. The design and flexibility of the rivet is a fundamental part of what lets aero-planes do what they do. But just what is it about rivets that make them so special – they evenly distribute the load and stress on the components which make them much stronger than welded joints.”

[Excerpt from Taking Flight: The Critical Role Rivets play in Aerospace Engineering ([www.rivetwise.co.uk](http://www.rivetwise.co.uk))]







19. What makes rivets so special in the aerospace industry?
- A. Rivets are temporary fasteners
  - B. Even distribution of load
  - C. They have external screw threads
  - D. Their hexagonal design
20. Where else are rivets used among following?
- A. To join square rods
  - B. To join steel structures of bridges
  - C. With a square nut
  - D. In Tie-rod joint
21. Which among the following is not a type of fastening?
- A. Sectioning
  - B. Welding
  - C. Riveting
  - D. Screw pair
22. In the top view of a vertical flat head rivet of diameter  $d$ , the diameter of the outer circle is
- A.  $d$
  - B.  $2d$
  - C.  $1.6d$
  - D.  $0.7d$



23. (A) Figure 1 shows the details of parts of a **Flange Pipe Joint**. Assemble all these parts correctly and then draw to scale 1:1; it's following views:

(a) Front View, upper half in section

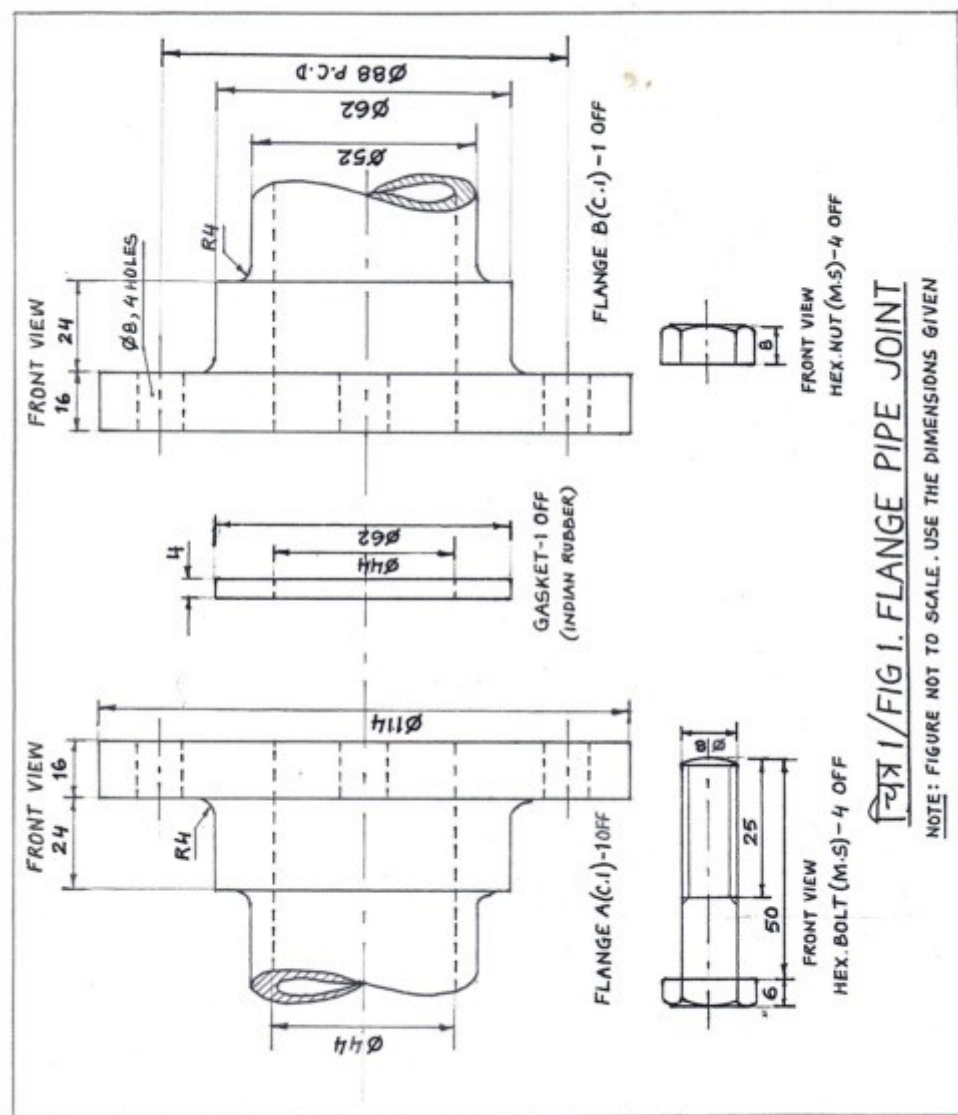
13

(b) Right Side View

8

Print the title and scale used. Draw projection symbol. Give six important dimensions.

6



OR

23. (B) Figure 2 shows the assembly of an **Open Bearing**. Disassemble the parts correctly and then draw to scale 1:1 its following views of the following components. Keeping the same position of both body 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

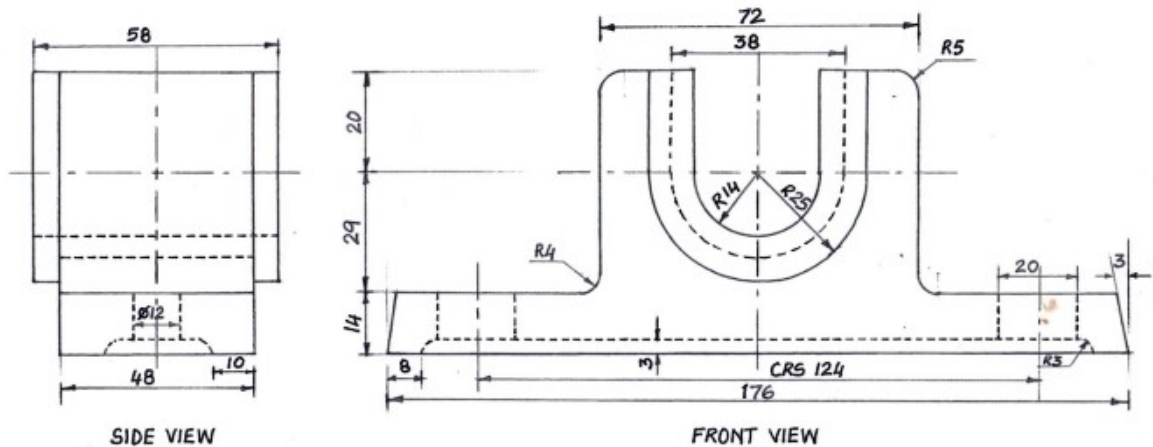
4

(ii) Top View

3

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

6



चित्र 2 / FIG 2. OPEN BEARING

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

## **SECTION – C**

24. I.) Construct an isometric scale. 4
- II.) 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 the **Metric thread internal** with the enlarged pitch as 40mm. 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



**SAMPLE QUESTION PAPER**  
**MARKING SCHEME**  
**XII – (2024-25)**  
**ENGINEERING GRAPHICS (046)**

*Time Allowed: 3 hours*

*Maximum Marks: 70*

**SECTION – A**

**Value Points**

- |   |   |
|---|---|
| 1. (D) or a rhombus of foreshortened length             | 1 |
| 2. (C) or (i) & (iii)                                   | 1 |
| 3. (C) or in front of, above                            | 1 |
| 4. (C) or They are located by determining its endpoints | 1 |
| 5. (C) or Square  | 1 |
| 6. (A) or the major diameter is 20mm and pitch is 2mm   | 1 |
| 7. (B) or a-(ii) b-(i) c-(iv) d-(iii)                   | 1 |
| 8. (D) or (a)-(i) (b)-(iv) (c)-(ii) (d)-(iii)           | 1 |
| 9. (A) or 26 mm   | 1 |
| 10. (D) or (ii) & (iii)                                 | 1 |
| 11. (D)   | 1 |
| 12. (B) or Gib and Cotter Joint                         | 1 |
| 13. (B) or (iii) & (iv)                                 | 1 |
| 14. (B) or a-(iii) b-(iv) c-(ii) d-(i)                  | 1 |

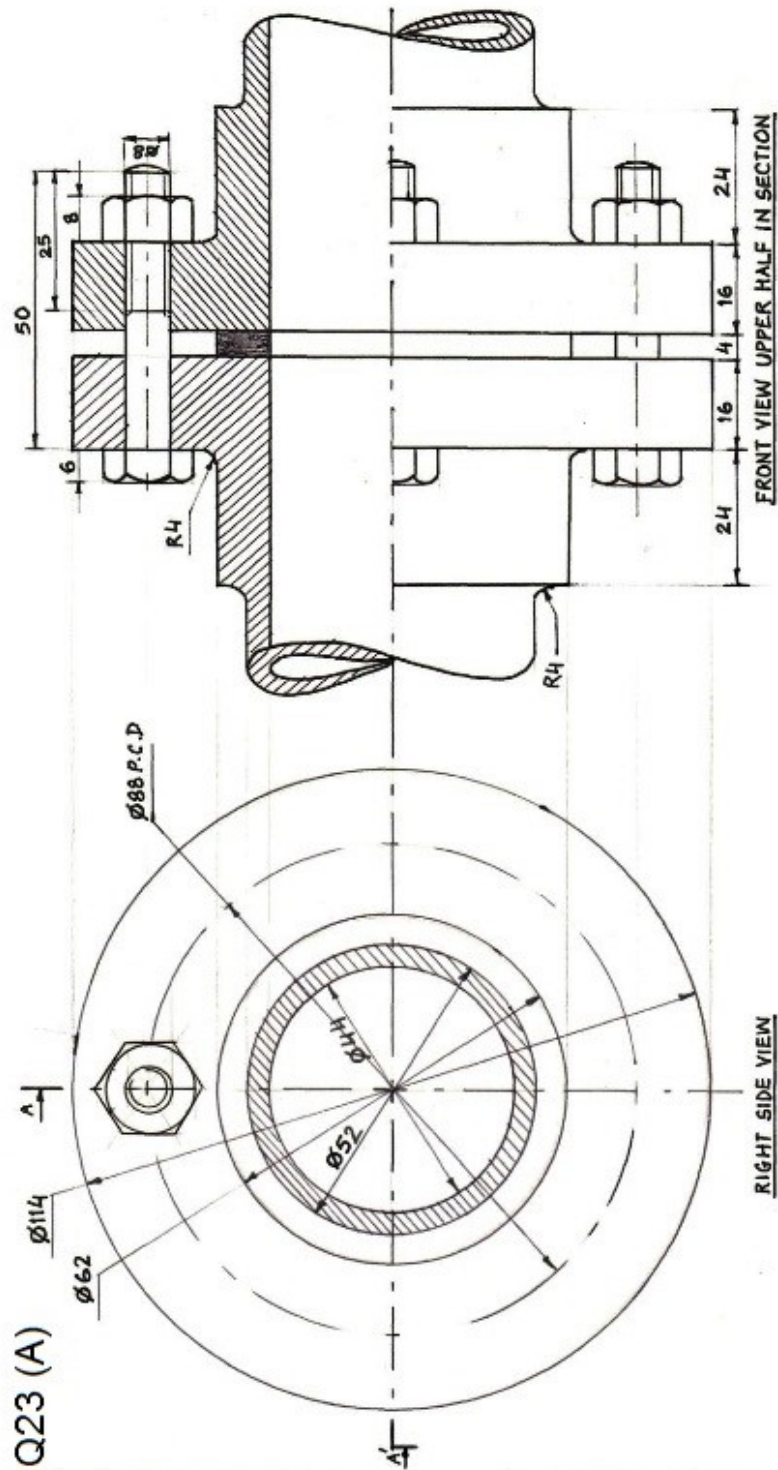
**SECTION – B**

- |  |   |
|--|---|
| 15. (B) or Representing three-dimensional objects  | 1 |
| 16. (C) or Engineering and design  | 1 |
| 17. (A) or It simplifies and helps in better visualization of complex parts of the project | 1 |
| 18. (D) or Equally foreshortened the true dimensions                                       | 1 |



19. (B) or Even distribution of load	1
20. (B) or To join steel structures of bridges	1
21. (A) or Sectioning	1
22. (B) or 2d	1
 23. (A) <b>ASSEMBLY OF FLANGE PIPE JOINT</b>	
<b>(a) FRONT VIEW UPPER HALF IN SECTION</b>	<b>13</b>
(i) Drawing the upper half correctly	8
(ii) Drawing the lower half correctly	5
<b>(b) RIGHT SIDE VIEW</b>	<b>8</b>
(i) Drawing circles	5
(ii) Drawing bolt-nut, hatching and cutting plane	3
<b>(c) OTHERS</b>	<b>6</b>
(i) Six Important Dimensions	3
(ii) Printing title, Projection symbol and Scale used	3





ASSEMBLY OF FLANGE PIPE JOINT

OR

### 23.(B) DIS-ASSEMBLY OF OPEN BEARING

#### (a) BODY

- |   |    |
|---|----|
| (i) Full sectional front View   | 8  |
| a. Drawing the outline of the body, drawing two bolt holes indicating CRS, recess | 7  |
| b. Hatching lines   | 1  |
| <br>(ii) Top View.  | 6  |
| a. Drawing the outline of the body  | 3  |
| b. Holes and recess   | 2½ |
| c. Cutting plane  | ½  |

#### (b) BUSH

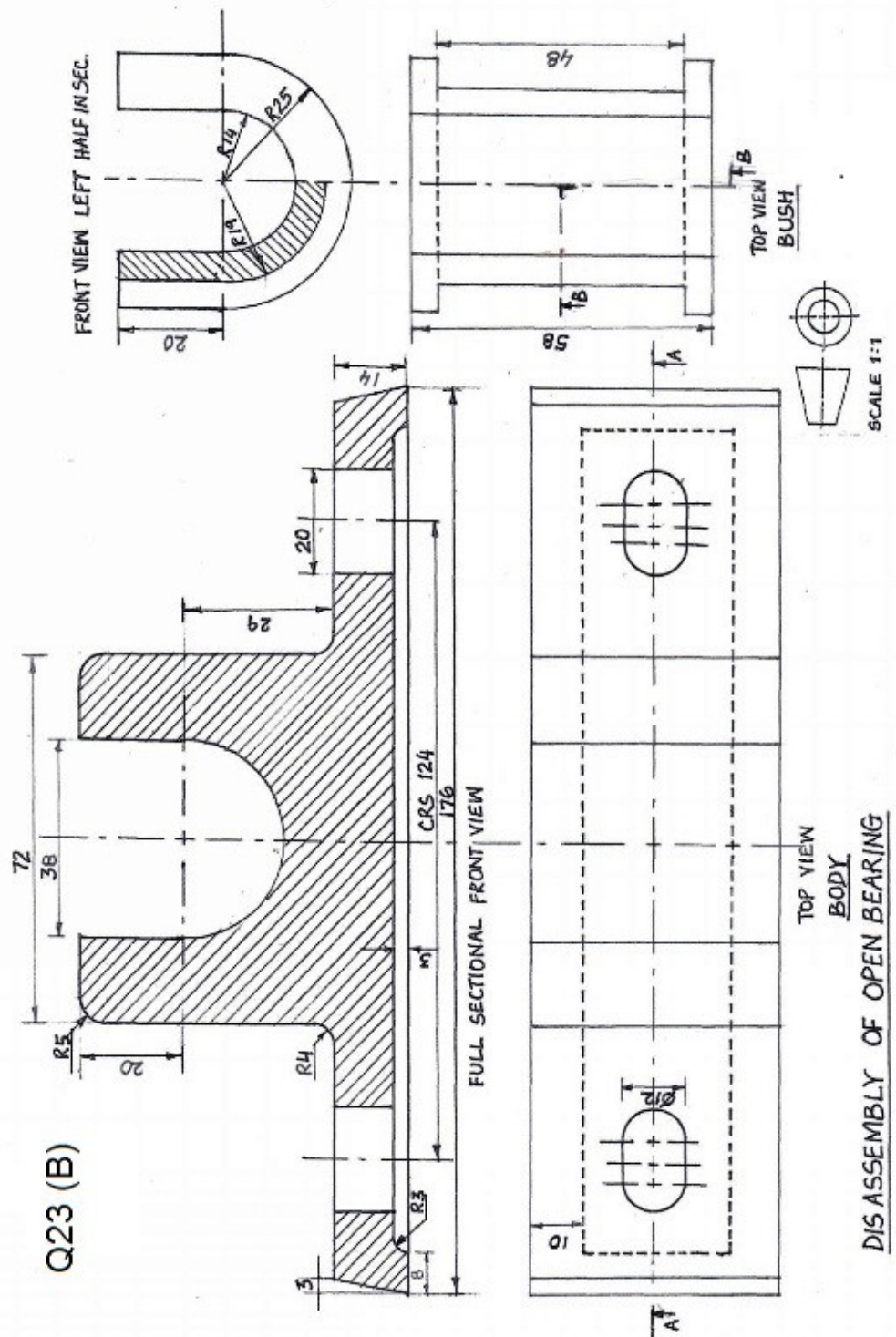
- |                                     |   |
|-------------------------------------|---|
| (i) Front view left half in section | 4 |
| <br>(ii) Top View                   | 3 |

#### (c) OTHERS

- |  |   |
|--|---|
| (i) 6 Important Dimensions.                                | 3 |
| (ii) Printing titles, Symbol of Projection and Scale used. | 3 |





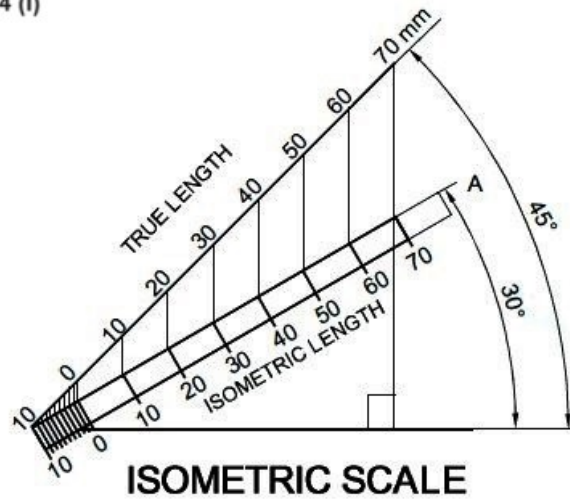


## **SECTION – C**

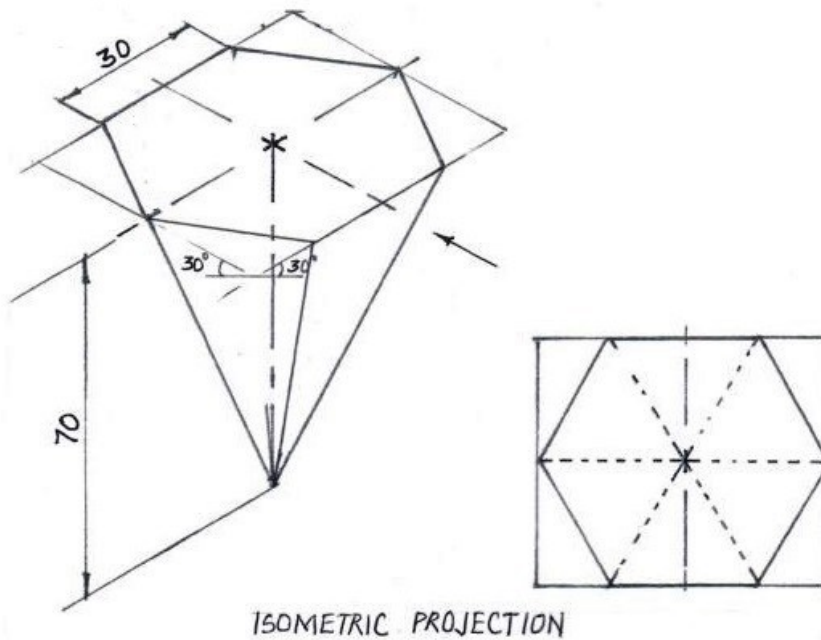
24. I.) ISOMETRIC SCALE	4
a. Drawing 45° inclined line showing true lengths	1
b. Projections on 30° inclined line showing isometric length with 1mm subdivisions in one part	2
c. Writing title, sub titles and angles	1
24. II.) ISOMETRIC PROJECTION OF INVERTED HEXAGONAL PYRAMID	9
a. Helping figure	1
b. Drawing upper isometric hexagon	3
c. Drawing slant edges	3
d. Dimensions	1
e. Indicating the axis and direction of viewing	1



Q24 (I)



Q 24 (II)



25.(A) METRIC THREAD INTERNAL **8**

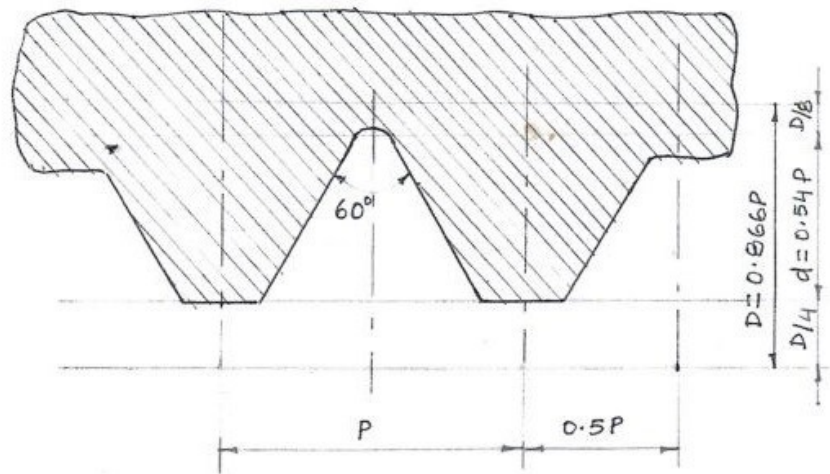
- (i) Distance equal to pitch and other ratios **2**
- (ii) Crest, roots and slant edges **3**
- (iii) Hatching lines with conventional break **1**
- (iv) Standard dimensions **2**

**OR**

25.(B) HEXAGONAL NUT **8**

- (i) Front view **3**
- (ii) Top view **3**
- (iii) Standard dimensions **2**

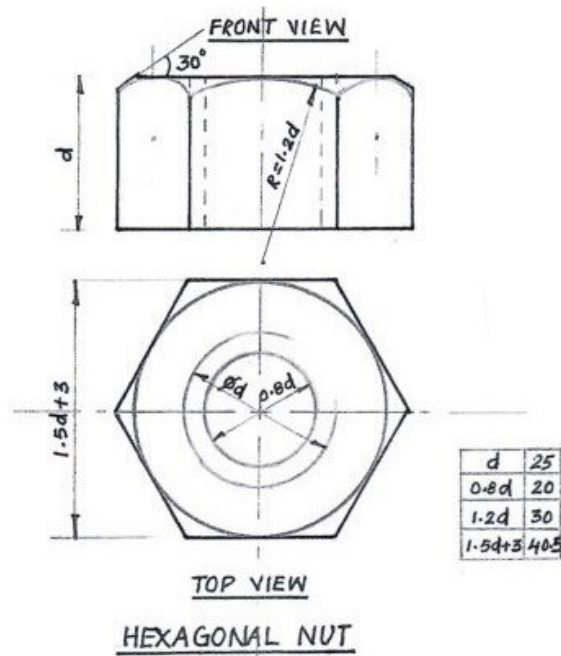
Q25 (A)



P	0.5P	D = 0.866P	D/4	D/8	d = 0.54P
40	20	34.64 = 35	8.66 = 9	4.33 = 4	21.60 = 22

METRIC THREAD INTERNAL  
(OR)

Q25 (B)



d	25
0.8d	20
1.2d	30
1.5d + 3	40.5