

**SAMPLE QUESTION PAPER**  
**XII – (2023-24)**  
**ENGINEERING GRAPHICS (046)**

*Time Allowed: 3 hours*

*Maximum Marks: 70*

Note:

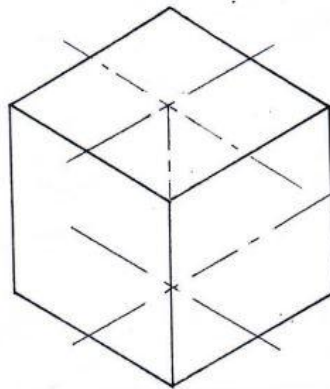
- (i) Attempt all the questions.
- (ii) Use both sides of the drawing sheet, if necessary.
- (iii) All dimensions are in millimetres.
- (iv) Missing and mismatching dimensions, if any, may be suitably assumed.
- (v) Follow the SP: 46 – 2003 revised codes. (with first angle method of projection)
- (vi) In no view of question 21, are hidden edges or lines required.
- (vii) In question 23, hidden edges or lines are to be shown in views without section.

**SECTION – A**

1. What is the angle between main scale and Isometric scale in the construction of isometric scale?
  - (a) 15°
  - (b) 30°
  - (c) 45°
  - (d) 60°
  
2. In first angle method of orthographic projection, the right side view is placed
  - (a) on the right side of front view
  - (b) on the left side of front view
  - (c) below the front view
  - (d) above the front view

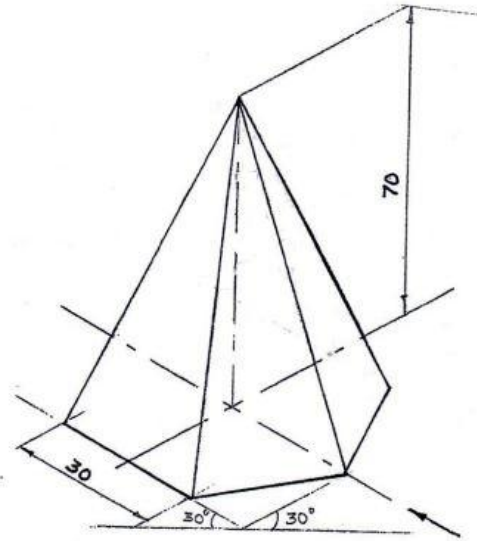


3. \_\_\_\_\_ is the projection in which the projectors are parallel to each other and perpendicular to the plane of projection
- (a) Perspective projection.
  - (b) Oblique projection
  - (c) Isometric projection,
  - (d) Orthographic projection
4. The angle between the three axes for a solid, in isometric projection is
- (a)  $30^\circ$
  - (b)  $60^\circ$
  - (c)  $90^\circ$
  - (d)  $120^\circ$
5. Select the correct statement/s for the given figure



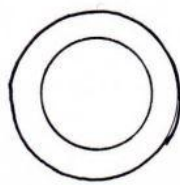
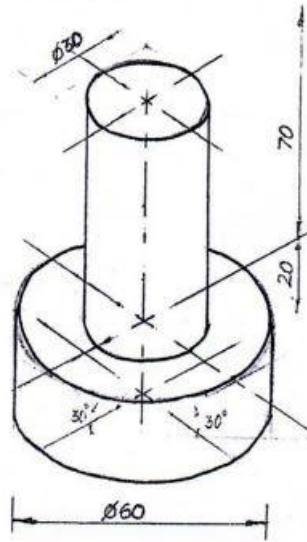
- A. All the edges are non-Isometric lines.
  - B. All the edges are isometric lines.
  - C. All the faces are seen as foreshortened.
  - D. All the faces are seen as triangles.
- (a) A & C only
  - (b) B & D only.
  - (c) B & C only
  - (d) A & D only

6. Select the correct statement/s for the given figure

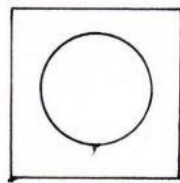


- A. Two of the base edges which are parallel to each other are parallel to VP.
  - B. The solid is resting on HP with its axis parallel to VP
  - C. Two of the base edges which are parallel to each other are perpendicular to VP
  - D. The solid is resting on HP with its axis perpendicular to VP
- (a) A and B only.
  - (b) B and C only
  - (c) C and D only
  - (d) D and A only

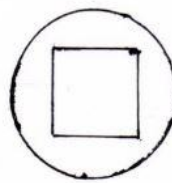
7. Select the top view of the given combination of solids.  
(NOTE: Top views are not drawn to scale.)



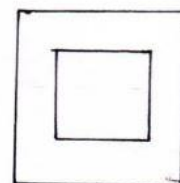
(a)



(b)

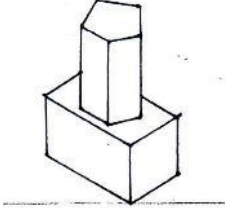
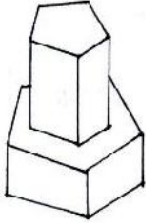
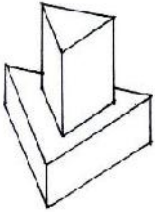
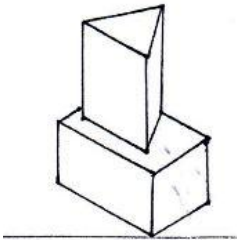


(c)



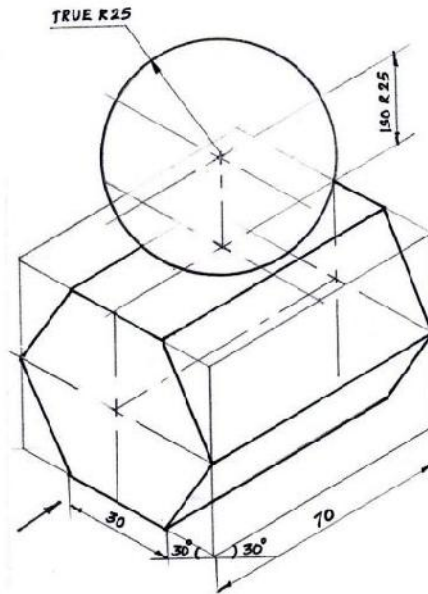
(d)

8. Match the LIST I with LIST II

LIST I: ISOMETRIC PROJECTION OF SOLIDS	LIST II: TOTAL NUMBER OF RECTANGULAR SURFACE(S)
<p>1. Pentagonal prism kept on a square prism</p> 	<p>(i) six</p>
<p>2. pentagonal prism kept on a pentagonal slab</p> 	<p>(ii) seven</p>
<p>3. Triangular prism kept on a triangular slab</p> 	<p>(iii) nine</p>
<p>4. Triangular prism kept on a square prism</p> 	<p>(iv) ten</p>

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

9. Choose the incorrect statement/s for the given figure



- A. A sphere of diameter 50mm is placed on a horizontal hexagonal prism with hexagonal ends II to VP
  - B. A sphere of radius 25mm is placed on a horizontal hexagonal pyramid with hexagonal ends II to VP
  - C. A sphere of radius 25 mm is placed on a horizontal hexagonal prism with its axis perpendicular to VP
  - D. A sphere of diameter 50mm is placed on a horizontal pentagonal prism with its axis perpendicular to VP
- (a) A only
  - (b) C only
  - (c) B and C only
  - (d) B and D only.

10. Match the LIST I with LIST II

LIST I	LIST II
1. GIB & COTTER JOINT	(i) Used for joining two circular rods
2. SLEEVE & COTTER JOINT	(ii) used for supporting horizontal shaft
3. OPEN BEARING	(iii) used for joining two pipes.
4. FLANGE PIPE JOINT	(iv) used for joining two square rods.

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

11. The portion of the shaft which rotates in the sleeve / bush of a bushed bearing is called as

- (a) Journal
- (b) Axle
- (c) Rod
- (d) pipe

12. What is the thread angle of a Metric thread (Internal)?

- (a)  $35^\circ$
- (b)  $40^\circ$
- (c)  $55^\circ$
- (d)  $60^\circ$

13. Which one of the following is not having external thread?

- (a) Stud
- (b) Machine screw
- (c) Nut
- (d) Bolt

14. How many total number of components are used in the assembly of a tie rod joint?
- (a) one
  - (b) two
  - (c) three
  - (d) four
15. Select the correct sequence of drawing the isometric projection of a vertical straight cone placed centrally on top of a vertical triangular prism
- A. Draw three principal axes at  $30^\circ$ ,  $90^\circ$  and  $30^\circ$  to the horizontal base line and copy the length of sides of helping figure's enclosing box on the respective principal axis and height of the prism on the third principal axis to form an enclosing box (cuboid) for triangular prism.
  - B. Draw the direction of viewing and do the dimensioning.
  - C. Draw the helping figure which is the base of vertical triangular prism (using isometric scale) and enclose it in a box, which is a rectangle.
  - D. Copy the coordinates of the center and vertices of triangle from the helping figure to enclosing box of triangular prism. Visible edges of triangular prism are joined by thick lines and axis of prism is drawn with chain line.
  - E. Draw the enclosing box for the base of cone on the top surface of the prism and construct an ellipse (by four center method). Mark the height of the cone (apex) from the center of top surface of prism at  $90^\circ$ . Join the generators of the cone
- (a) B, D, A, C, E
  - (b) C, A, D, E, B
  - (c) A, B, C, D, E
  - (d) D, E, B, A, C



Q16. to 20: Read the following paragraph and answer the questions given below

IMEX is the India's largest International Machine Tool Business Exhibition. INTERNATIONAL MACHINE TOOLS EXPO was being held at Pragati Maidan, New Delhi. Utility based machine tools and engineering products were being displayed in the expo.

One of the Engineering Graphics teachers of a Delhi school has taken his students to the expo. Students were curious and elated to see the various engineering products which made the human life easy and comfortable. Some machine parts like machine screws and rivets caught the attention of students.

16. The basic difference between a machine screw and a rivet is
- (a) The body of a machine screw has octagonal cross section whereas the body of a rivet has pentagonal cross section
  - (b) Machine screws are temporary fasteners whereas rivets are permanent fasteners
  - (c) Machine screws are used for joining only pipes whereas rivets are used for joining shafts
  - (d) Machine screws are useful in all the industrial applications whereas rivets are useful only in boilers.
17. Which among these is not the common shape of rivet head?
- (a) Snap head
  - (b) Collar head
  - (c) Flat head
  - (d) Pan head
18. The outer diameter of head in pan head rivet of diameter 'd' is
- (a) 1.6d
  - (b) 0.5d
  - (c) 0.8d
  - (d) 2d



19. The fastener used in boiler joint is
- Snap head rivet
  - Round head screw
  - Stud with square neck
  - Square head bolt
20. The top view of a vertical flat heat rivet comprises of
- two visible squares.
  - one visible and one invisible (dotted) circle
  - one visible and one invisible (dotted) square
  - two visible circles.

### SECTION – B

21. (a) Construct an isometric scale. 5
- (b) Draw the isometric projection of a triangular prism (base edge 40 mm, axial length 60mm) resting on its rectangular face on H.P. Its axis is perpendicular to V.P. Indicate the direction of viewing. Give all the dimensions. 10
22. Draw to scale 1:1, the standard profile of the **B.S.W. thread profile** with the pitch = 50mm. Give standard dimensions. 8

### OR

Draw to scale 1:1, the front view of an assembly of a M24 square bolt with a square nut, keeping the axis parallel to HP & VP. Give the standard dimensions. 8

23. Figure 1 shows the details of parts of a Gib and Cotter Joint. Assemble all the parts correctly and then draw to scale 1:1; it's following views:
- Front View, upper half in section 14
  - Side View seen from right 7

Print the title and scale used. Draw projection symbol. Give 6 important dimensions.

6

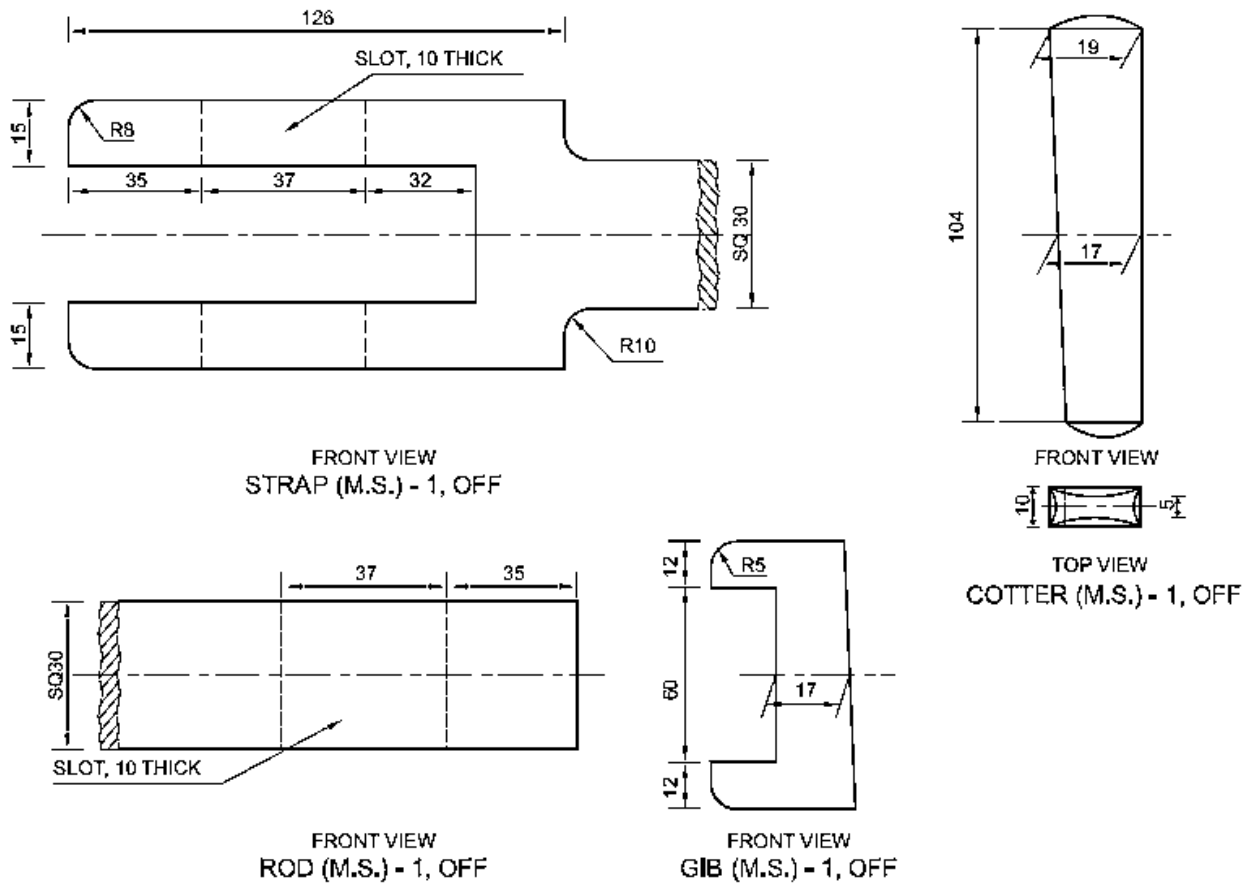


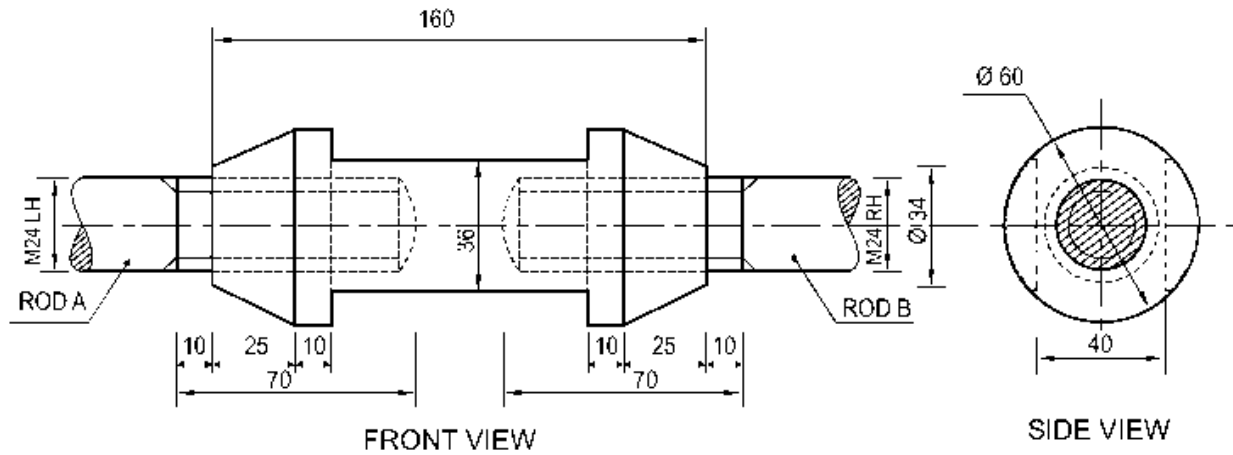
FIG 1. GIB AND COTTER JOINT

**OR**

Figure 2 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



**FIG 2 : TURNBUCKLE**

**SAMPLE QUESTION PAPER**  
**MARKING SCHEME**  
**XII – (2023-24)**  
**ENGINEERING GRAPHICS (046)**

*Time Allowed: 3 hours*

*Maximum Marks: 70*

**SECTION – A**

**Value Points**

- |  |   |
|--|---|
| 1. (a) or 15°  | 1 |
| 2. (b) or on the left side of front view   | 1 |
| 3. (d) or orthographic projection  | 1 |
| 4. (d) or 120°   | 1 |
| 5. (c) or B and C only   | 1 |
| 6. (b) or B and C only   | 1 |
| 7. (a)   | 1 |
| 8. (a)   | 1 |
| 9. (d) or B and D only   | 1 |
| 10. (a)  | 1 |
| 11. (a) or Journal   | 1 |
| 12. (d) or 60°   | 1 |
| 13. (c) or Nut   | 1 |
| 14. (c) or three   | 1 |
| 15. (b) or C, A, D, E, B   | 1 |
| 16. (b) or Machine screws are temporary fasteners whereas rivets are permanent fasteners | 1 |
| 17. (b) or collar head   | 1 |
| 18. (a) or 1.6d  | 1 |
| 19. (a) or Snap head rivet   | 1 |
| 20. (b) or one visible and one invisible (dotted) circle                                 | 1 |



## SECTION – B

21. (a) ISOMETRIC SCALE	<b>5</b>
(i) Drawing $45^\circ$ inclined line showing true lengths	1
(ii) Projections on $30^\circ$ inclined line showing isometric length with 1mm subdivisions in one part	3
(iii) Writing titles, sub titles and angles	1
21. (b) ISOMETRIC PROJECTION OF TRIANGULAR PRISM	<b>10</b>
(i) Helping figure	1
(ii) Drawing both the iso-triangles	4
(iii) Drawing three long/face edges	3
(iv) Dimensions	1
(v) Indicating the axis and direction of viewing	1
22. B.S.W. THREAD	<b>8</b>
(i) Distance equal to pitch, and angles of $55^\circ$	2
(ii) Curves for threads	2
(iii) Side edges / flanks	2
(iv) Dimensions	2

OR

ASSEMBLY OF SQUARE BOLT AND NUT (Front view)	<b>8</b>
(i) Drawing front view of square bolt with details	4
(ii) Drawing front view of square nut assembled properly with details	2
(iii) Dimensions	2

## 23. ASSEMBLY OF GIB AND COTTER JOINT

<b>(a) FRONT VIEW UPPER HALF IN SECTION</b>	<b>13</b>
(i) Drawing upper half of fork end and eye end with clearance	5
(ii) Drawing lower half of fork end and eye end	3
(iii) Drawing the gib and cotter	4
(iv) Hatching lines	1
<b>(b) SIDE VIEW, SEEN FROM RIGHT</b>	<b>8</b>
(i) Drawing fork end with conventional end in the eye end of body	4 <sup>1</sup> / <sub>2</sub>
(ii) Drawing gib and cotter with hidden lines	3
(iii) Drawing cutting plane	<sup>1</sup> / <sub>2</sub>
<b>(c) OTHERS</b>	<b>6</b>
(i) 6 Important Dimensions	3
(ii) Printing title, Projection symbol and Scale used	3

OR

## DIS-ASSEMBLY OF TURNBUCKLE

<b>(a) BODY</b>	
(i) Front View Upper Half In Section	<b>9</b>
a. Drawing body with conical ends and hatching lines in upper half	6
b. Drawing space for rods with internal threads	3
(ii) Top View.	<b>6</b>
a. Drawing body with conical ends and correct vertical and horizontal lines	4
b. Drawing hidden lines for internal threads and space for rods	2



**(b) ROD – A**

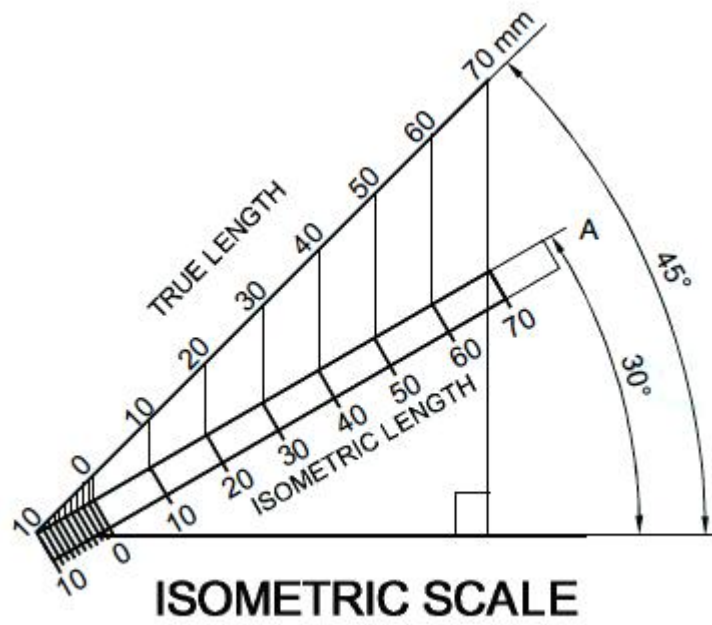
- (i) Front View **4**
  - a. Drawing rod with conventional broken end and threads as per convention 4
  
- (ii) Right Side View **2**
  - a. Drawing two circles as per conventions 2

**(c) OTHERS 6**

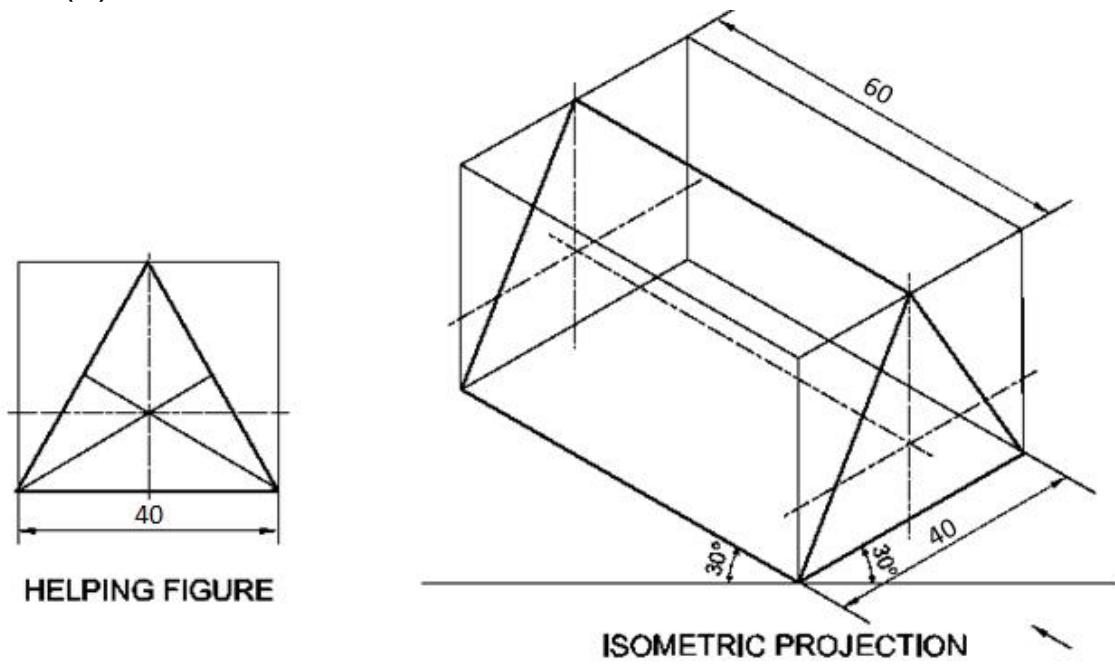
- (i) 6 Important Dimensions. 3
- (ii) Printing titles, Symbol of Projection and Scale used. 3



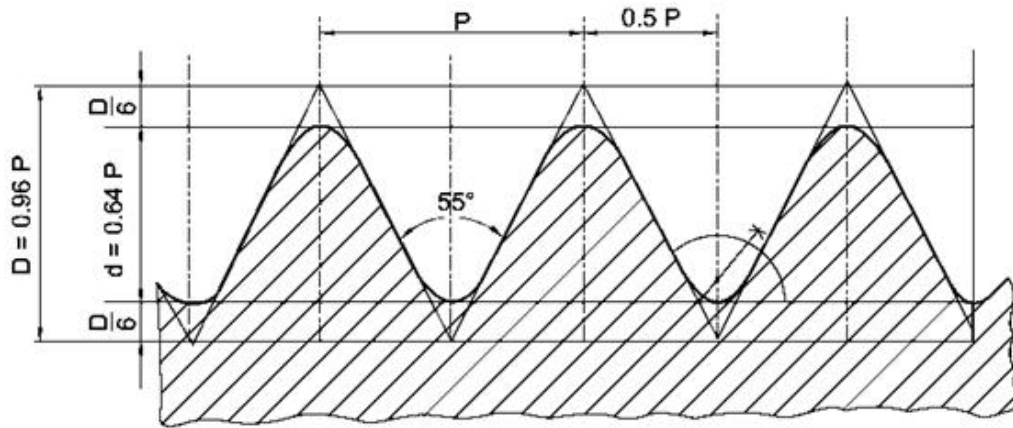
Q21 (a)



Q21 (b)



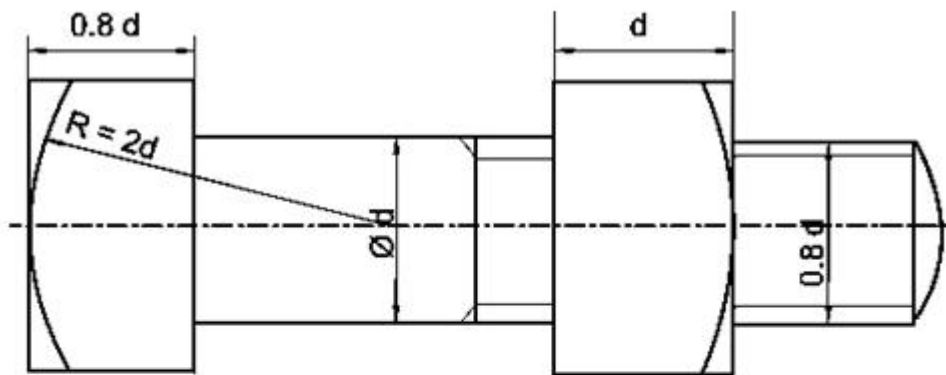
Q22



P	D	d	D/6
50	48	32	8

**STANDARD PROFILE OF B.S.W. SCREW THREAD**

**OR**

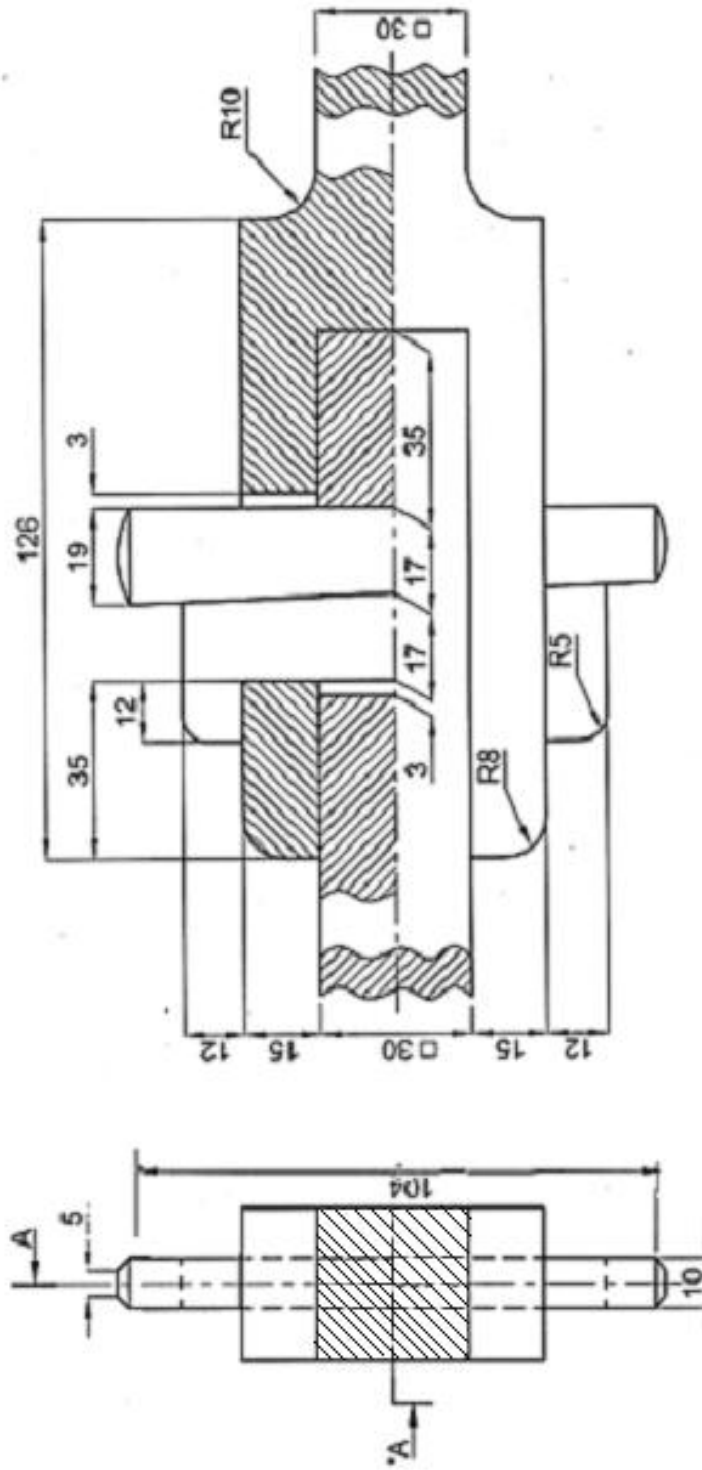


**FRONT VIEW**

$d$	$0.8d$	$1.5d$	$2d$	$2d+6$
24	19.2	36	48	54

**ASSEMBLY OF SQUARE BOLT AND SQUARE NUT**

Q23



FRONT VIEW, UPPER HALF IN SECTION

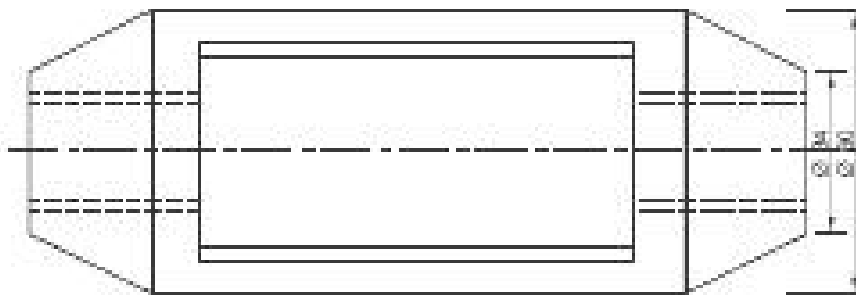
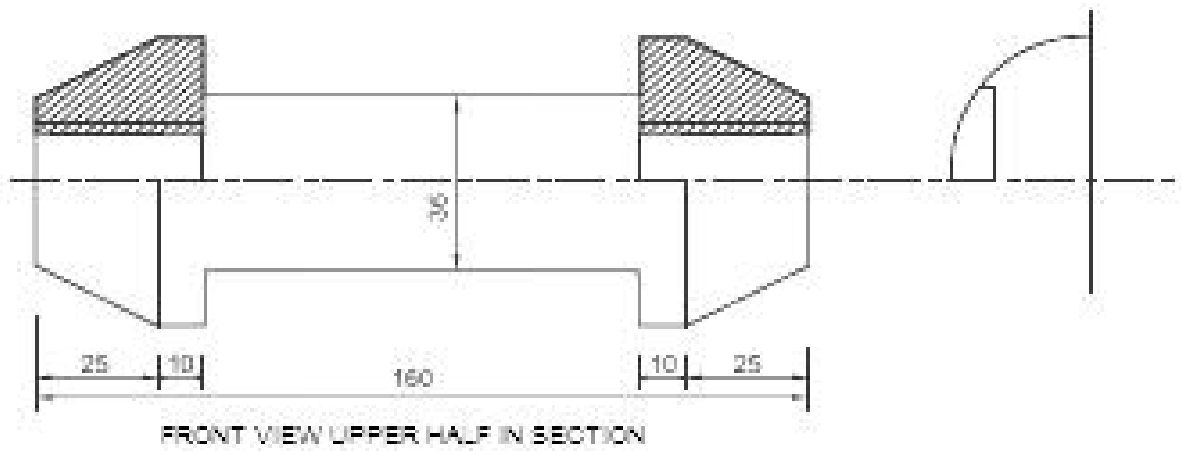
R.H. SIDE VIEW

SCALE 1:1

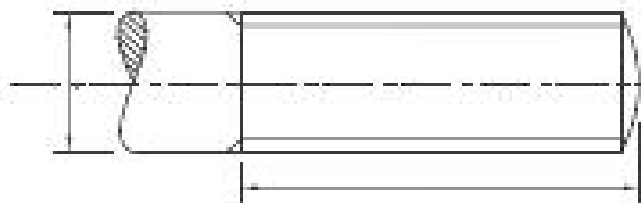
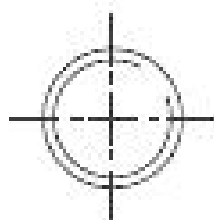


ASSEMBLY OF GIB AND COTTER JOINT

OR

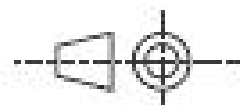


BODY



ROD - A

SCALE 1:1



**DISASSEMBLY OF TURNBUCKLE**