ENGINEERING DRAWING

Time allowed : 3 hours ***Maximum Marks : 70***

GENERAL INSTRUCTIONS :

(i) Attempt all the questions.

(ii) Use both sides of the drawing sheet, if necessary.

(iii) All dimensons are in millimeters.

(iv) Missing and mismatching dimensions, if any, may be suitably assumed.

(v) Follow the SP : 46-1988 codes.
(with First Angle method of projection).

QUESTION PAPER CODE 68/1

1. (a) Construct an isometric scale. 5

(b) A hemisphere of diameter 84 mm, is having its circular face, parallel to HP on the upper side. An equilateral triangular prism of base side 40 mm and length 50 mm, with its axis perpendicular to VP, is resting centrally on it, on one of its rectangular faces. Draw its isometric projection. Give all dimensions. 13

(c) A frustum of a cone with its base diameters of 60 mm in front and 40 mm at the back, length of axis being 75 mm, is having its axis perpendicular to VP. Draw its isometric projection. Give all dimensions. 7

2. (a) Draw to scale 1 : 1 the standard profile of a metric screw thread (external), taking enlarged pitch = 45 mm. Give standard dimensions. 9

OR

Draw to scale 1 : 1 the front view, side view and top view of a hexagonal nut of size M 30, keeping its axis vertical. Give standard dimensions.

(b) Sketch free-hand the front view and top view of a countersunk head rivet of diameter 20 mm, keeping its axis vertical. Give standard dimensions. 6

OR

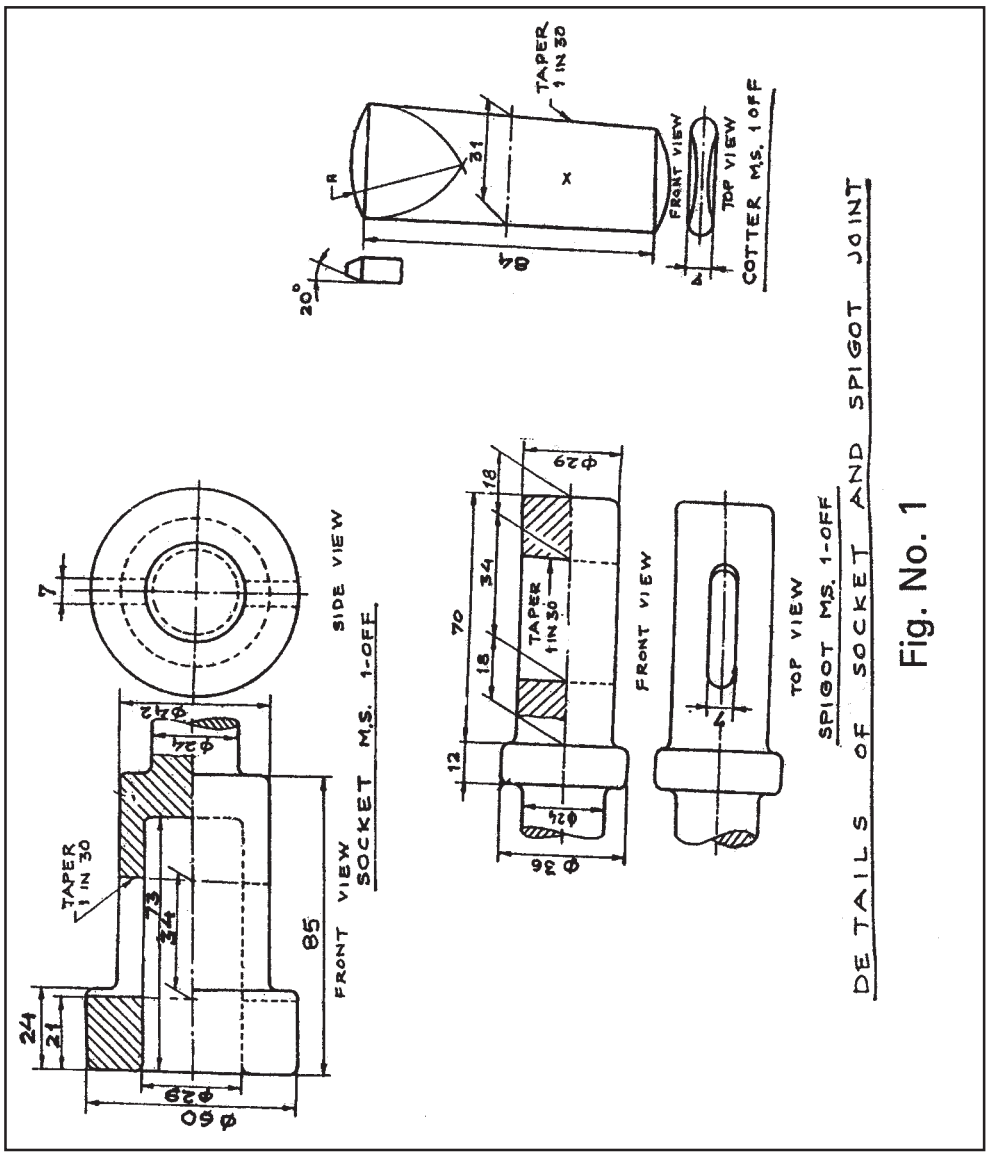
Sketch free-hand the front view and top view of a collar stud of size M 20, keeping its axis vertical. Give standard dimensions.

3. Fig. 1 shows the details of the parts of a Socket and Spigot Joint. Assemble these parts correctly and then draw its following views to scale 1 : 1 :

(a) Front view upper-half in section. 16

(b) Side view, as viewed from right. 10

Write heading and scale used. Draw projection symbol. Give six important dimensions. 4



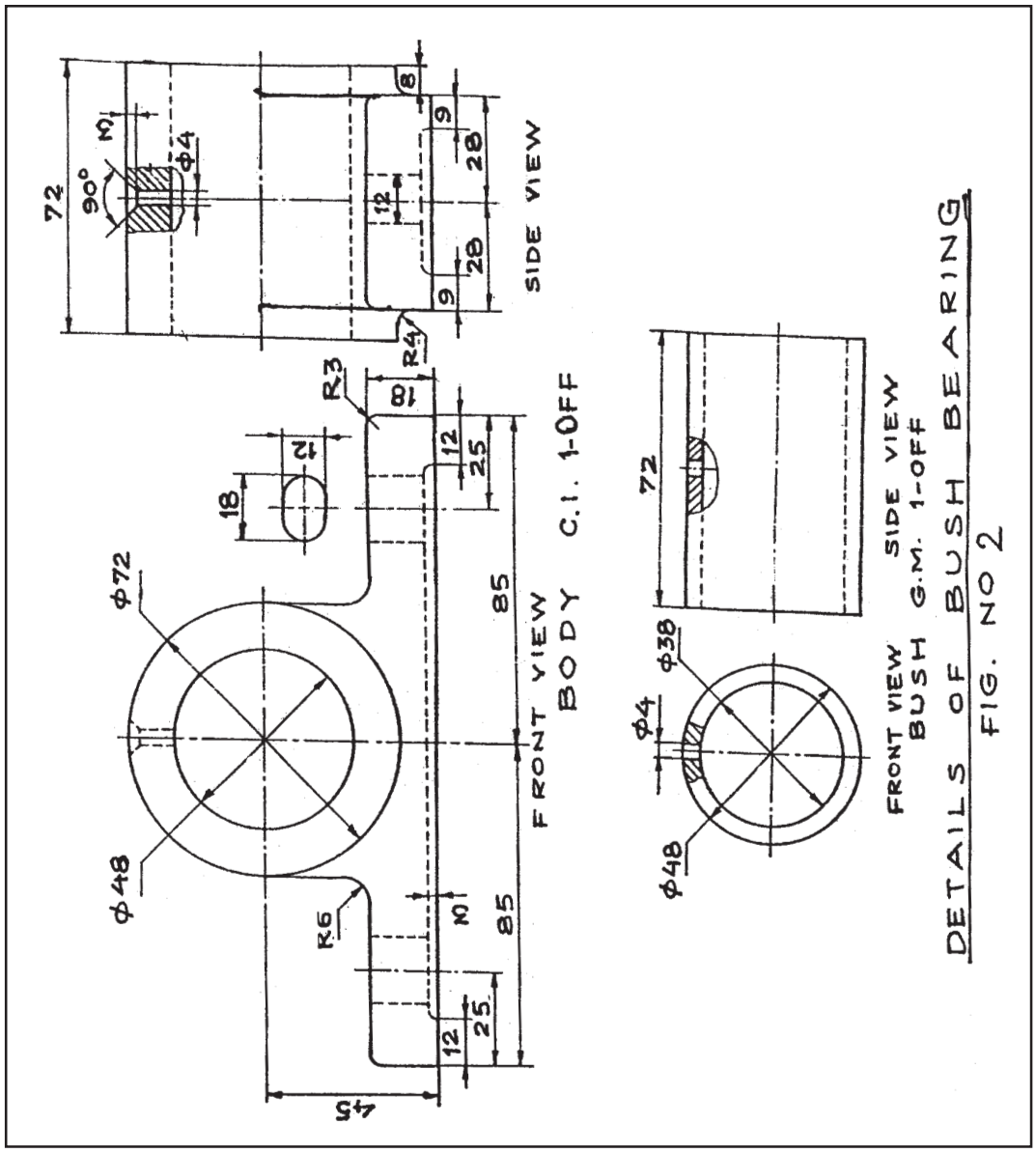
OR

Fig. 2 shows the details of the parts of a Bush Bearing. Assemble these parts correctly and then draw its following views to scale 1 : 1 :

(a) Front view, right-half in section. 16

(b) Top view 10

Write heading and scale used. Draw projection symol. Give six important dimensions. 4



QUESTION PAPER CODE 68

1. (a) Construct an isometric scale. 5

(b) A hemisphere of diameter 84 mm is having its circular face parallel to HP on the upper side. A regular pentagonal prism of base side 24 mm and height 55 mm, is resting centrally on it, with a base side, away from the observer, parallel to VP and their common axis perpendicular to HP. Draw its isometric projection. Give all dimensions. 13

(c) A frustum of a regular hexagonal pyramid, base side 28 mm, top side 16 mm and height of frustum 60 mm, is having a base side parallel to VP and axis perpendicular to HP. Draw its isometric projection and give all dimensions. 7

2. (a) Draw to scale 1 : 1 the standard profile of a metric screw thread (external), taking enlarged pitch = 50 mm. Give standard dimensions. 9

OR

Draw to scale 1 : 1 the front view and side view of a square headed bolt of size M24×3×110 mm long, fitted with a hexagonal nut. Keep their common axis parallel to HP and VP. Give standard dimensions.

(b) Sketch free-hand the front view of a round head machine screw of size M12, keeping its axis vertical. Give standard dimensions. 6

OR

Sketch free-hand the front view and top view of a flat head rivet of diameter 20 mm, keeping its axis vertical. Give standard dimensions.

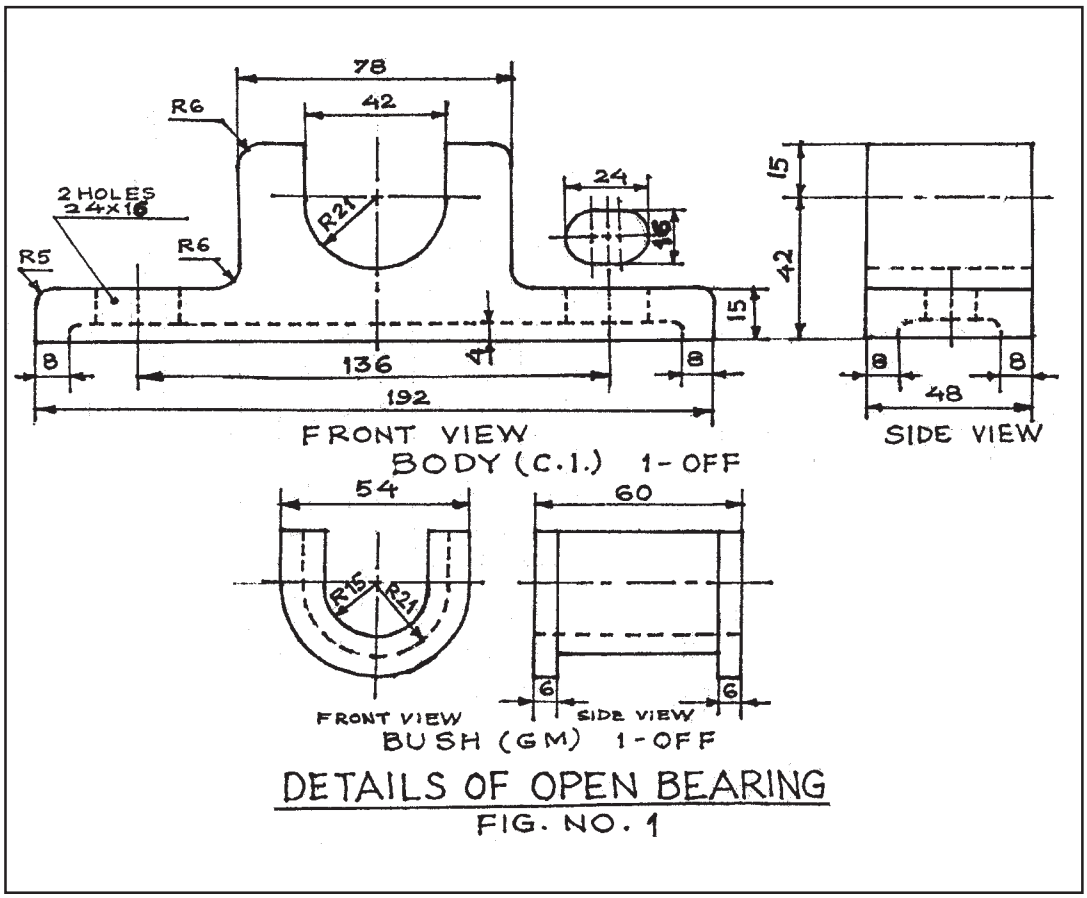
3. Fig. 1 shows the details of the parts of an Open Bearing. Assemble these parts correctly and then draw its following view to scale 1 : 1 :

(a) Front view, right-half in section. 16

(b) Top view 10

(c) Side view as viewed from left. 6

Write heading and scale used. Draw projection symbol. Give 6 important dimensions. 4



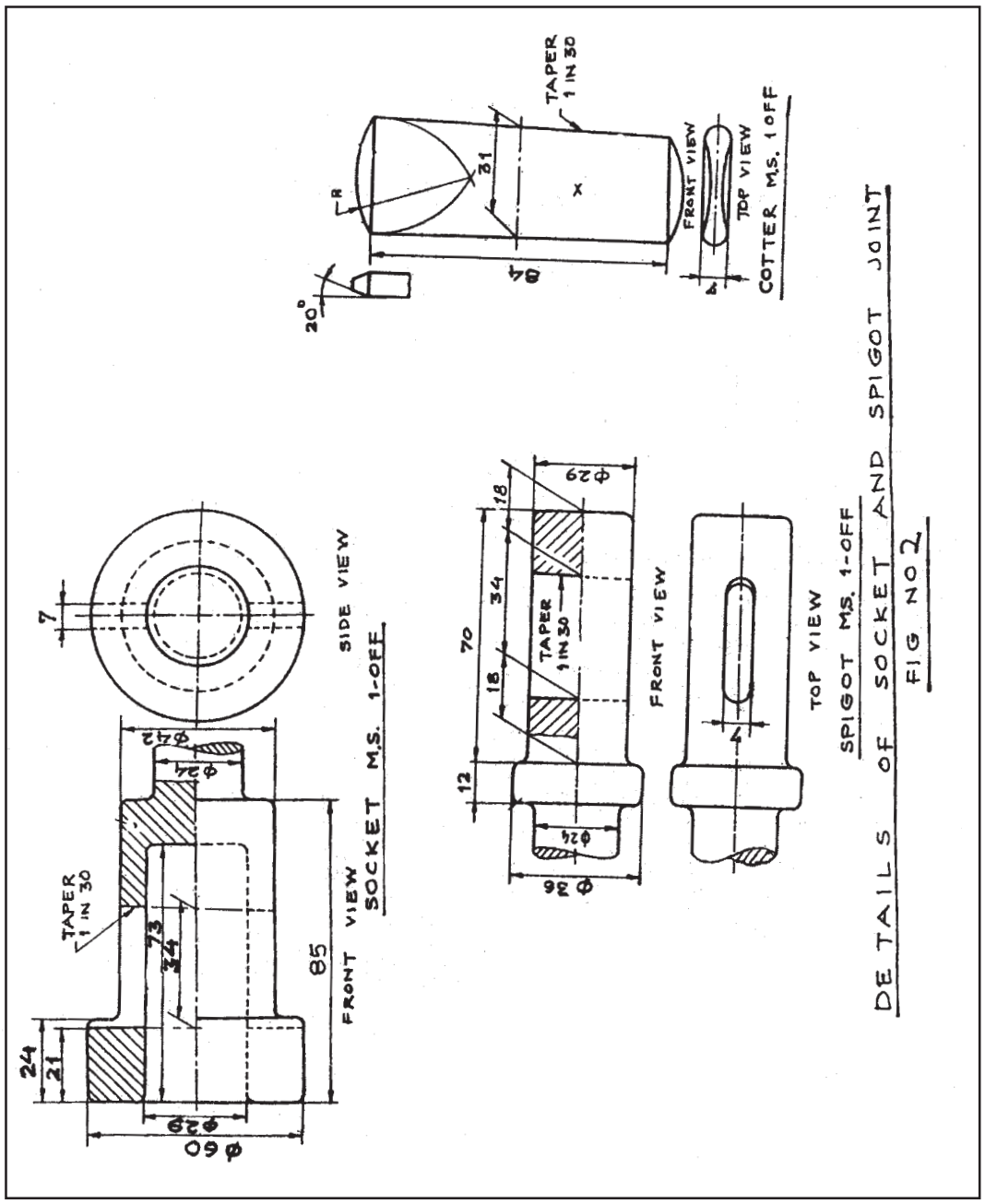
OR

Fig. 2 shows the details of the parts of a socket and spigot joint. Assemble these parts correctly and then draw its following views to scale 1 : 1 :

(a) Front view full in section. 16

(b) Side view, as viewed from right. 10

Write heading and scale used. Draw projection symbol. Give 6 important dimensions. 4



Marking Scheme—Engineering Drawing

NOTE :

(i) Dimensioning mistakes of ±1 mm to be ignored.

(ii) Arrow heads of various types and all methods of dimensioning as per SP : 46-1988 codes should be treated as correct.

(iii) Give marks proportionate to the work done.

QUESTION PAPER CODE 68/1

Q.NO.	VALUE POINTS	MARKS
1.	The following portions drawn correctly and accurately with good line work :	
	(a) **Isometric scale**	**5**
	(b) **Isometric Projection of Hemisphere :**	**6**
	(i) Ellipse (3)	
	(ii) Semi-Circle (2)	
	(iii) Dimensions (1)	
	Triangular Prism :	**7**
	(iv) Helping View (1)	
	(v) Triangular Prism placed centrally (1)	
	(vi) Isometric Triangles (3)	
	(vii) Edges of the prism (1)	
	(viii) Dimensions (1)	
	(c) **Isometric Projection of Frustum of a Cone :**	**7**
	(ii) Isometric Ellipses (4)	
	(iii) Common Tangents to Ellipes (2)	
	(iv) Dimensioning (1)	
	Note : For incorrect position of the frustum of cone deduct (1) mark.	
		25
2.	(a) **External Metric Thread Profile :**	**9**
	(Drawn to scale 1:1)	
	(i) Construction of thread profile with hatching lines (5+1)	
	(ii) Good line work and dimensions (2+1)	
	Note : Deduct 2 marks if sketched free-hand.	

Q.NO.	VALUE POINTS	MARKS

(OR)

Hexagonal Nut

(Drawn to scale 1:1)

(i) Front View (2½)

(ii) Top View (2½)

(iii) Side View (1)

(iv) Good line work and dimensioning (2+1)

Note : Deduct 2 marks if sketched free-hand.

(b) The following portions sketched free-hand and drawn proportionately : **6**

COUNTER SUNK HEAD RIVET :

(i) Front view (4)

(ii) Top view (1)

(iii) Dimensions (1)

Note : Deduct 1 mark, if drawn to scale.

OR

COLLAR-STUD :

(i) Front view (4)

(ii) Side view (1)

(iii) Dimensions (1)

Note : Deduct 1 mark, if drawn to scale.

15

3. SOCKET AND SPIGOT JOINT

The following portions drawn correctly and accurately :

(a) **FRONT VIEW** (Upper half in Section) **15**

(i) Socket : Upper half in Section. (4)

(ii) Socket : Lower half w/o Section. (3)

(iii) Spigot: Upper half in Section (4)

(iv) Spigot: Lower half w/o Section (2)

(v) Cotter: Having one side taper (2)

(b) **SIDE VIEW (R.H.S.)** **8**

(i) For Socket and Spigot (6)

(ii) Cotter (2)

Q.NO.	VALUE POINTS	MARKS

(c) **Heading (1), Scale used (1), Projection symbol (1), Dimensions (2) Line work in front view and side view (2)** **7**

Note : (a) If front view is drawn full in section, then deduct 2 marks.
(b) If side view is not drawn as per instruction deduct 1 mark.

30

OR

BUSHED BEARING :

The following portions drawn correctly and accurately :

(a) **Front View Block /Body (with Oil Hole)** **15**
- (i) Right Half in Section (7)
- (ii) Left Half without Section (4)

Bush (With Hole)
- (iii) Right — Half in Section (2)
- (iv) Left Half without Section (2)

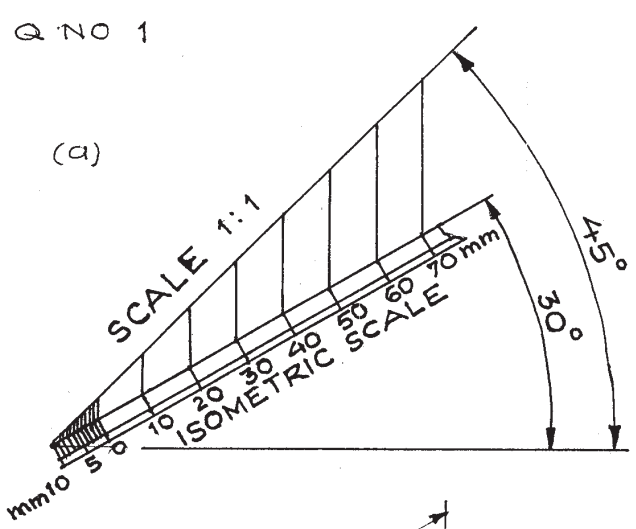
(b) **TOP VIEW** **8**
- (i) Body (2+2)
- (ii) 2 Bolt Holes (2)
- (iii) Oil Hole (1)
- (iv) Bush (1)

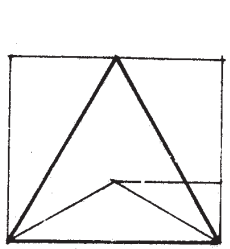
(c) **Heading (1), Scale used (1), Projection symbol (1), Dimensions (2) Line work in front view and side view (2)**

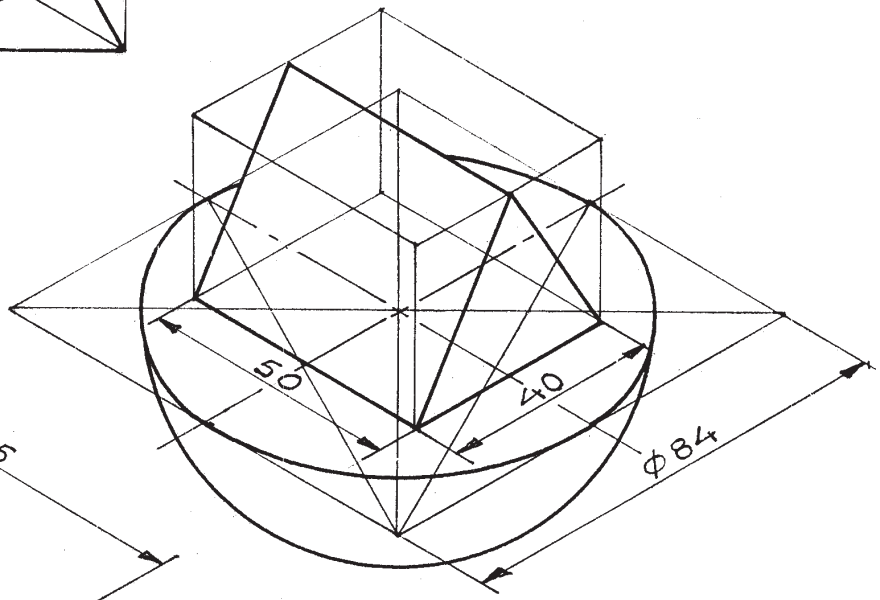
Note : If front view is drawn full in section, then deduct 2 marks.

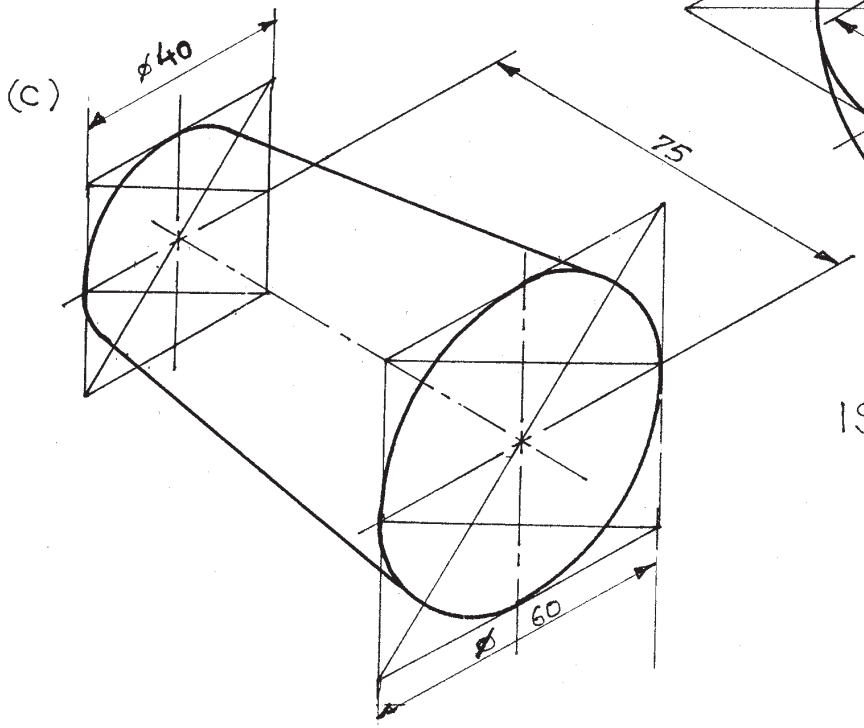
30

Q NO 1





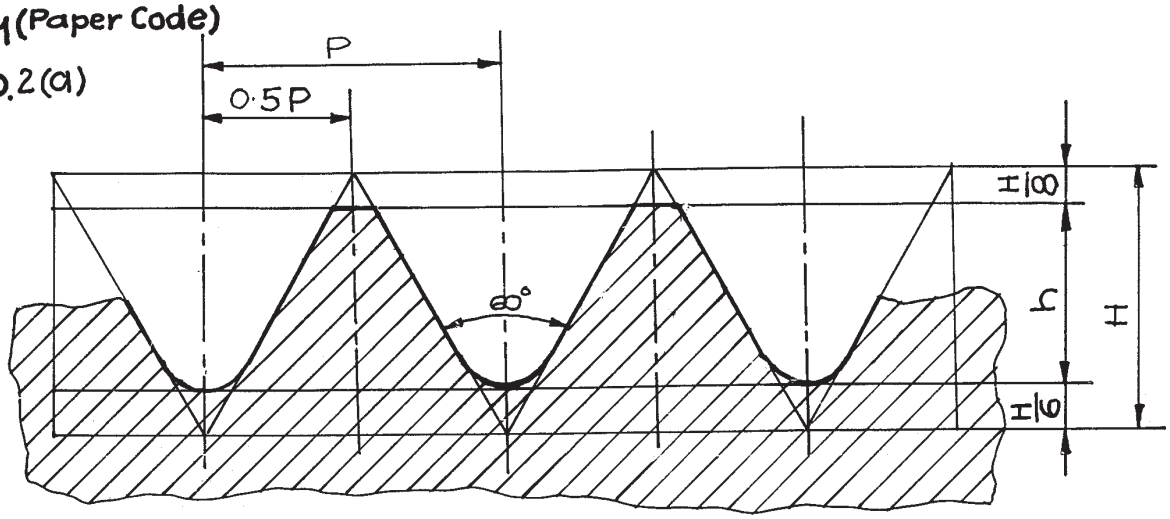




ISOMETRIC PROJECTIONS

68/1 (Paper Code)

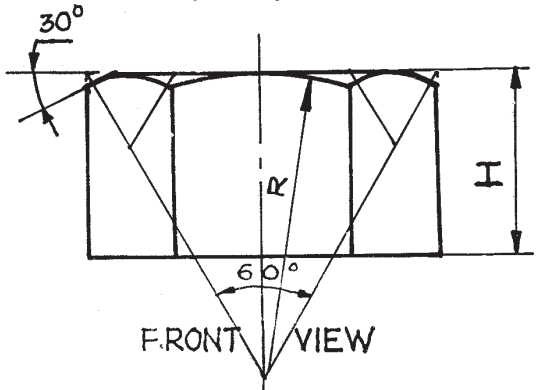
Q.NO.2(a)



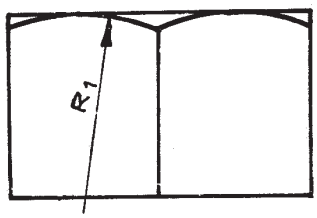
EXTERNAL METRIC SCREW THREAD PROFILE

P	H	h
45·0	0·86P	0·61P

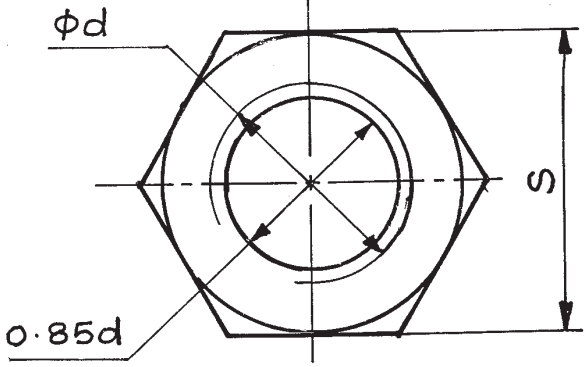
(OR)



FRONT VIEW



SIDE VIEW



TOP VIEW

HEXAGONAL NUT

H = 0·9d to d

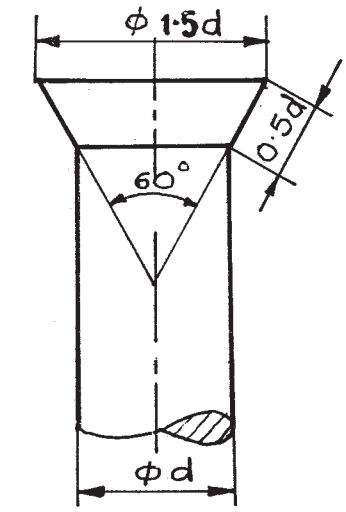
S = 1·5d to 1·5d+3
(OR 2d method for hex.)

R = 1·2d to 1·5d OR 60° ∠ method

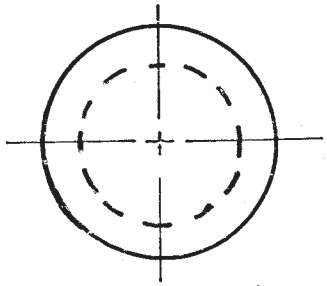
$R_1 = \frac{7}{8}d$ to d approx.

Hidden Lines may be omitted

Q. NO. 2(b)



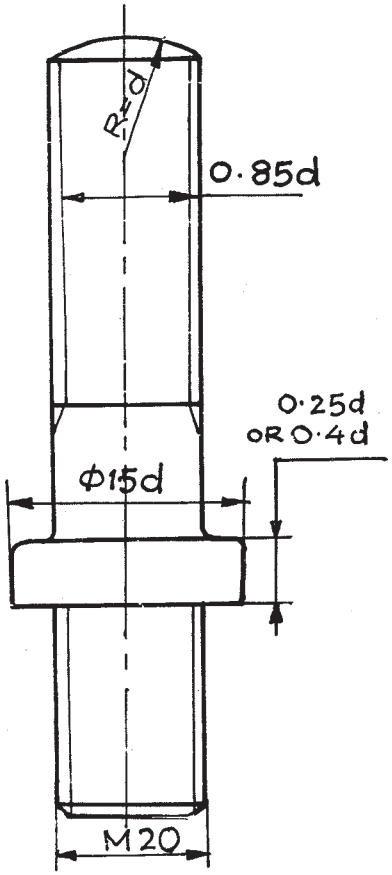
FRONT VIEW



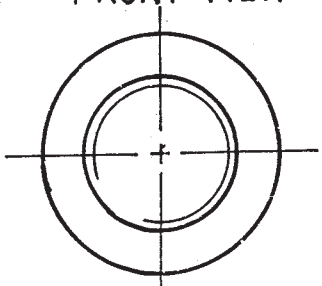
TOP VIEW

CSK HEAD RIVET

OR



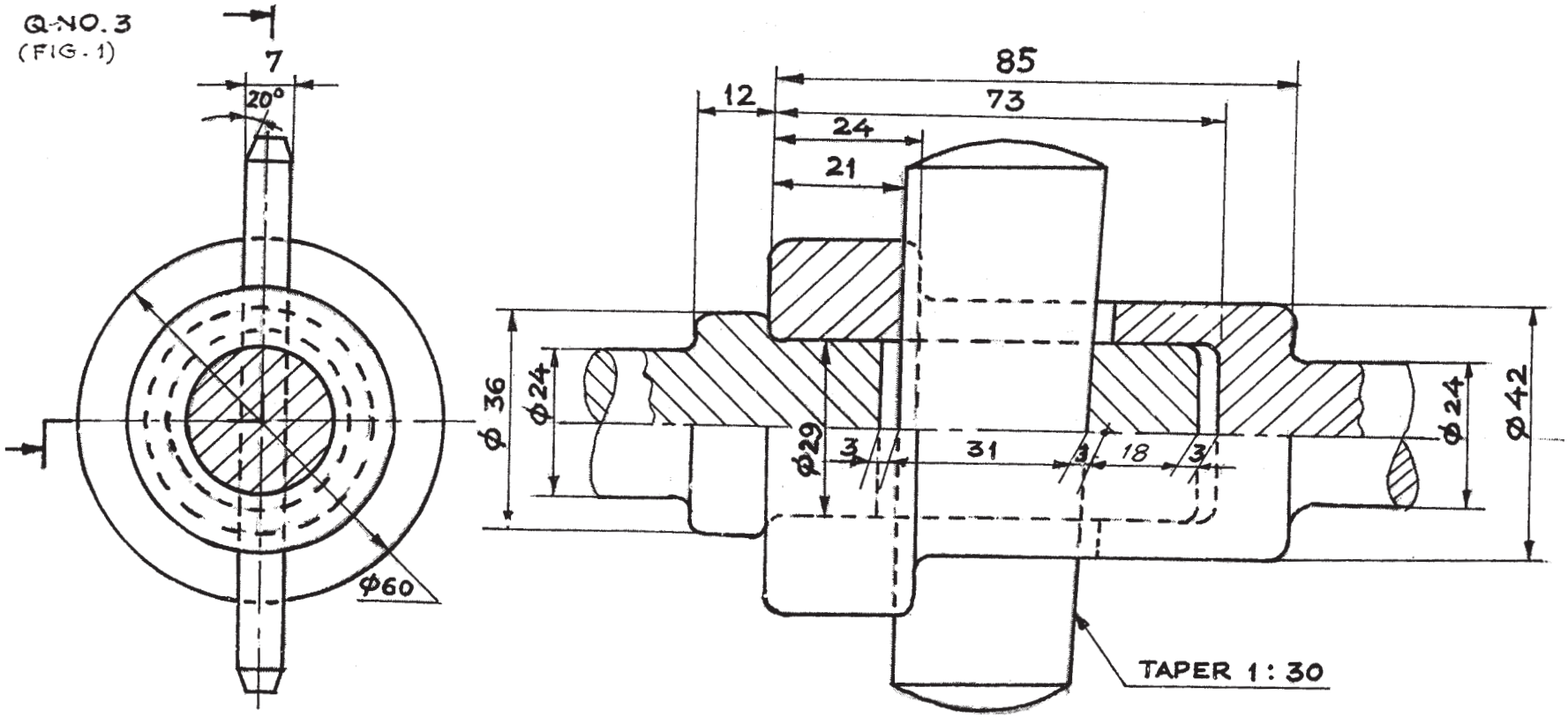
FRONT VIEW



TOP VIEW

COLLAR STUD

Q-NO. 3
(FIG. 1)

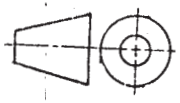


RH SIDE VIEW

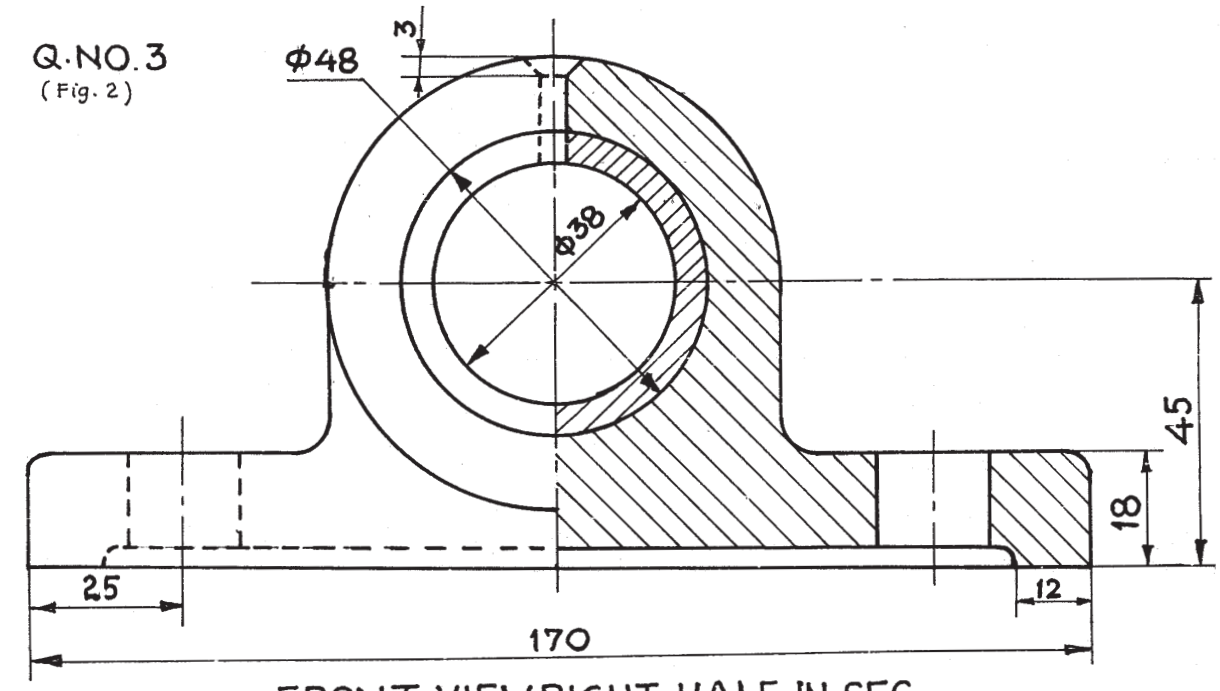
FRONT VIEW (TOP HALF IN SEC.)

SOCKET AND SPIGOT JOINT

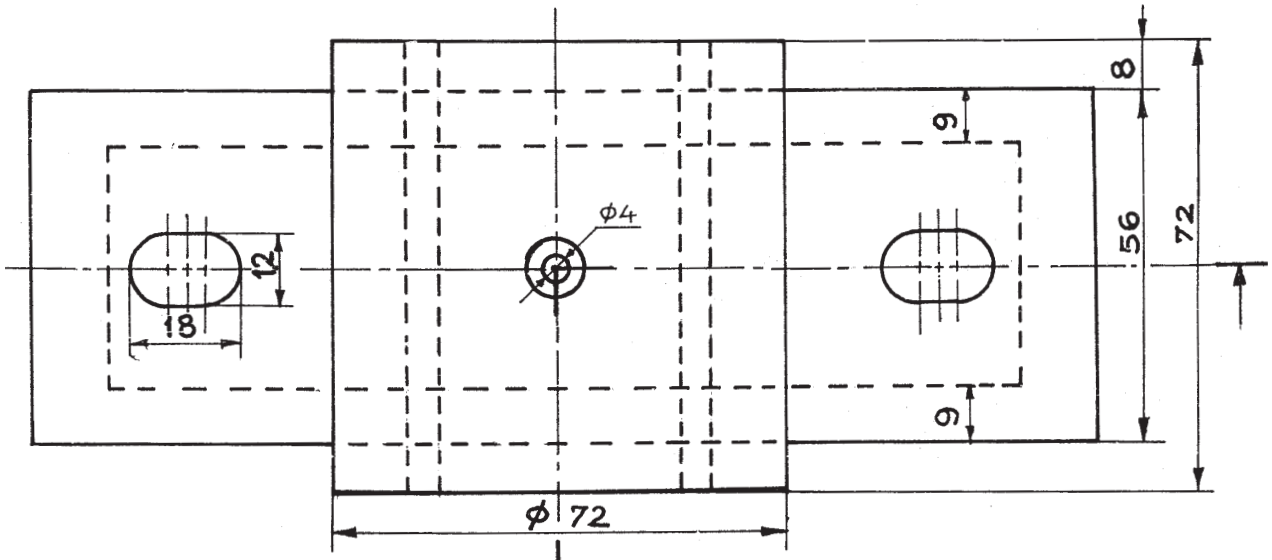
SCALE 1:1



Q.NO.3
(Fig. 2)



FRONT VIEW RIGHT HALF IN SEC.



TOP VIEW

BUSH BEARING

SCALE 1:1

QUESTION PAPER CODE 68

Q.NO.	VALUE POINTS	MARKS
1.	The following portions drawn correctly and accurately with good line work :	
	(a) **Isometric scale**	**5**
	(b) **Isometric projection of Pentagonal Prism on Hemisphere :**	**6**
	Hemi Sphere :	
	(i) Ellipse (3)	
	(ii) Semi-Circle (2)	
	(iii) Dimensions (1)	
	Note : For incorrect position of the hemi-sphere deduct (1) mark.	
	Pentagonal Prism :	**7**
	(vi) Helping View (1)	
	(v) Placed Centrally (1)	
	(vi) Two Pentagons (3)	
	(vii) Face Edges (1)	
	(viii) Dimensions (1)	
	(c) **Isometric Projection of Frustum of Hexagonal Pyramid :**	**7**
	(i) Helping View for 2 Hexagons (2)	
	(ii) Isometric hexagons (3)	
	(iii) Slant edges (1)	
	(iv) Dimensions (1)	
	Note : For incorrect positon of each solid deduct (1) mark.	
		25
2.	(a) **External Metric Thread Profile**	**9**
	(Drawn to scale 1:1)	
	(i) Construction of thread profile with hatching lines (5+1)	
	(ii) Good line work and dimensioning (2+1)	
	Note : Deduct 2 marks if sketched free-hand.	
	OR	
	Square Headed Bolt With Hexagonal Nut	
	(Drawn to scale 1:1)	
	(i) **Front View**	
	(a) Square Head Bolt (2)	
	(b) Hexagonal Nut (2)	
	(ii) Side View (2)	
	(iii) Good line work and dimensioning (2+1)	
	Note : Deduct 2 marks if sketched free-hand.	

Q.NO.	VALUE POINTS	MARKS

(b) The following portions sketched free-hand and drawn proportionately :

Round Head Machine Screw : **6**

(i) Front view (5)

(ii) Dimensions (1)

Note : Deduct 1 mark, if drawn to scale.

OR

Flat Head Rivet :

(i) Front view (4)

(ii) Top view (1)

(iii) dimensions (1)

Note : Deduct 1 mark, if drawn to scale.

15

3. OPEN BUSH BEARING :

The following portions drawn correctly and accurately :

(a) **FRONT VIEW** **15**

Body

(i) Right Half in Section (6)

(ii) Left Half w/o Section (4)

Open Bush

(iii) Right — Half in Section (3)

(iv) Left Half w/o Section (2)

(b) **TOP VIEW** **8**

(i) Body (5)

(ii) Bush (3)

(d) **Heading (1), Scale used (1), Projection Symbol (1), Diamension (2), Line work in F.V and S.V. (2)** **7**

Note : If front view is drawn full in section, then deduct 2 marks.

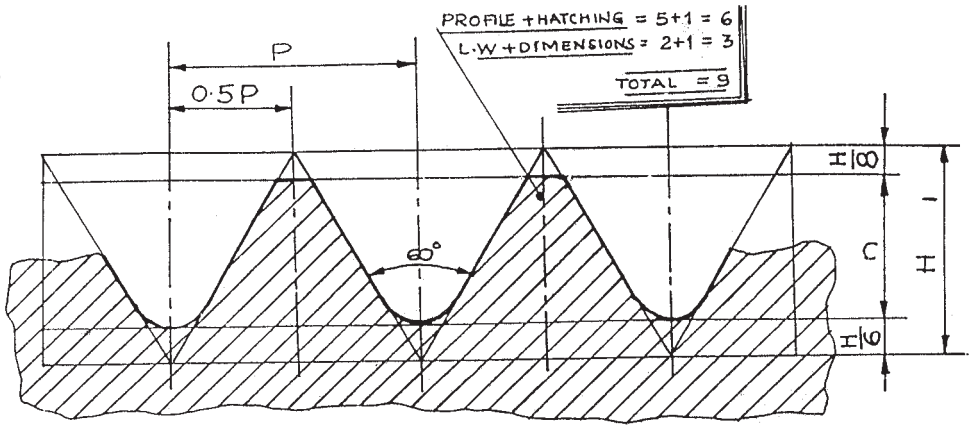
30

OR

Q.NO.	VALUE POINTS		MARKS
	Socket and Spigot Joint :		
	The following portions drawn correctly and accurately :		
(a)	**Front View** (Full Section)		**15**
	(i) Socket: Full Section	(7)	
	(ii) Spigot: Full Section	(6)	
	(iii) Cotter: Having one side taper	(2)	
(b)	**SIDE VIEW (R.H.S.)**		**8**
	(i) For Socket and Spigot	(6)	
	(ii) Cotter	(2)	
(c)	**Heading (1), Scale used (1), Projection Symbol (1), Dimension (2), Line work in F.V. and S.V. (2)**		**7**
	Note:		
	(a) If front view is drawn full in section, then deduct 2 marks.		
	(b) If side view is not drawn as per instruction, deduct 1 mark.		
			30

Q. No. 1
(b)
24
ISOMETRIC PROJECTION
65
48
24
(a)
TRUE LENGTHS (m.m)
0 10 20 30 40 50 60
ISOMETRIC LENGTHS
0 10 20 30 40 50 60
30°
45°
ISOMETRIC SCALE
60
28
16

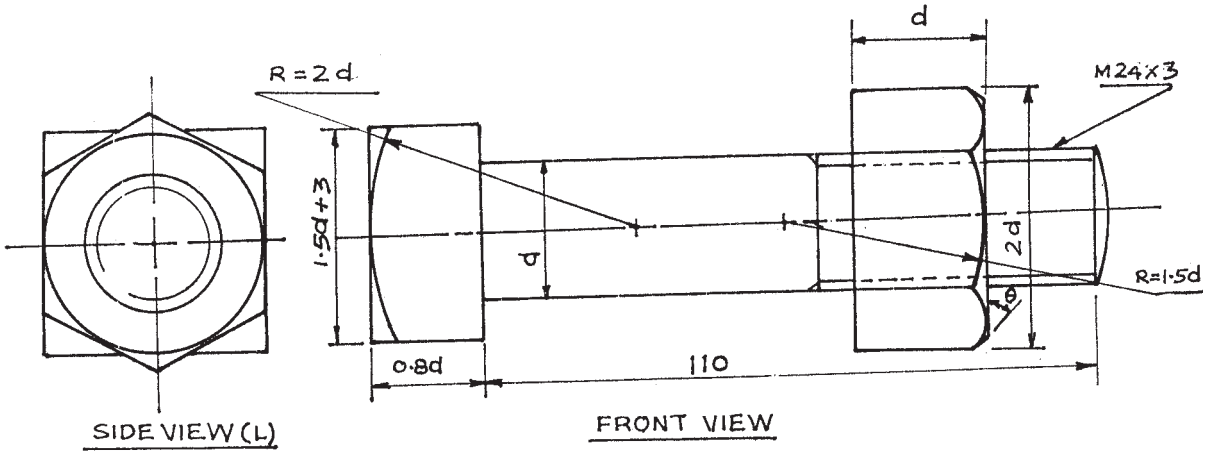
Q. No. 2 (a)



EXTERNAL METRIC SCREW THREAD PROFILE

P	H	h
50.0	0.86P	0.61P

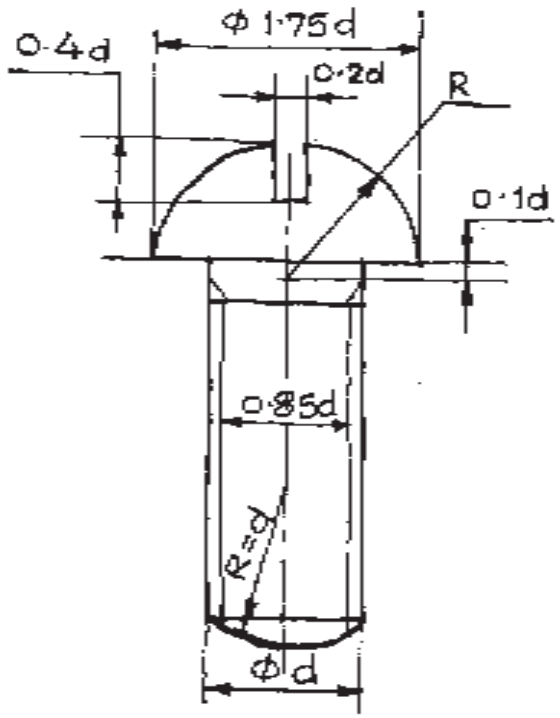
(OR)



SQUARE HEAD BOLT WITH HEXAGON NUT

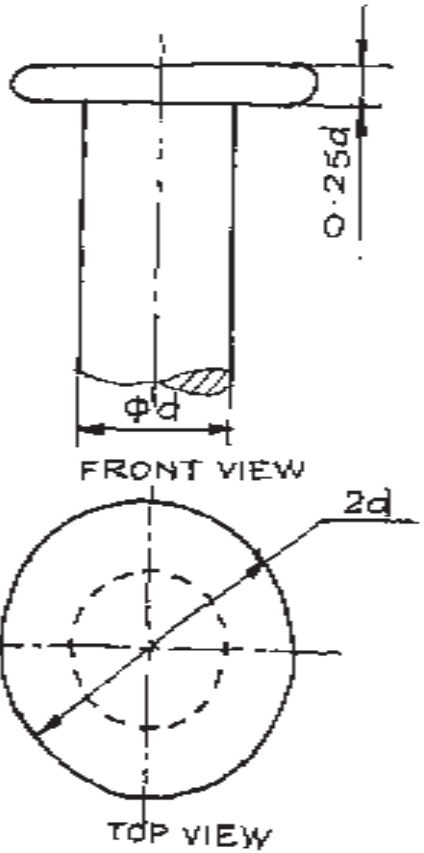
d	θ
24.0	30°

Q.NO. 2 (b)



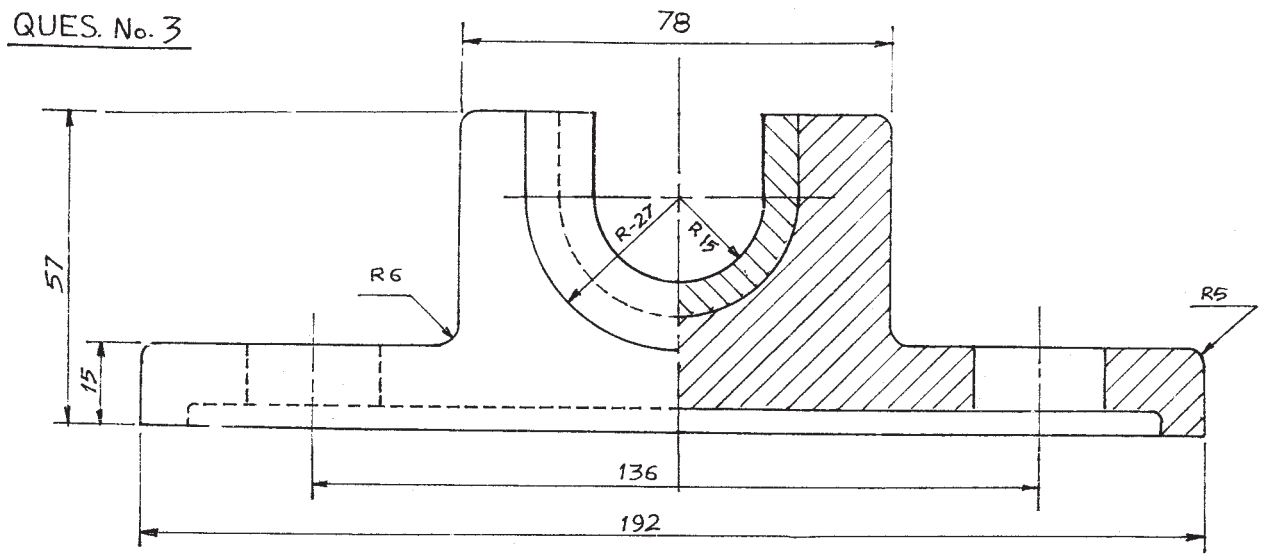
FRONT VIEW

ROUND HEAD
M/C SCREW

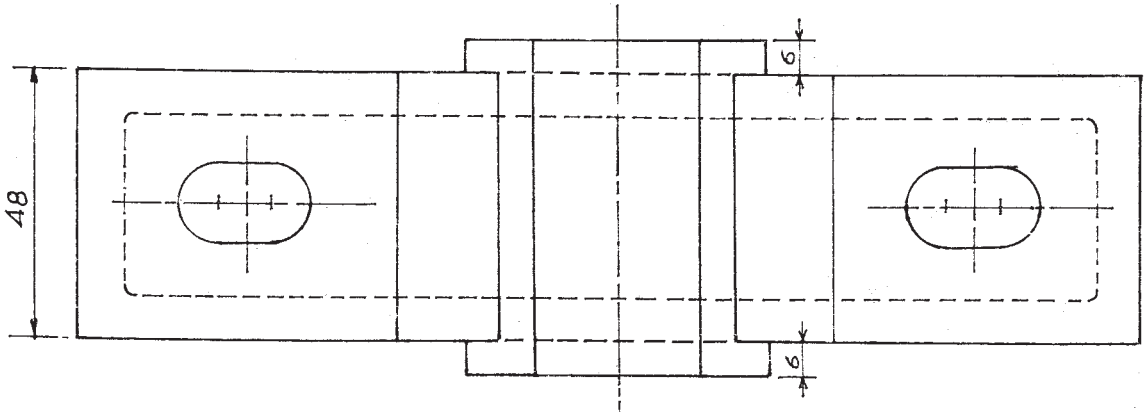


FLAT HEAD RIVET

QUES. No. 3

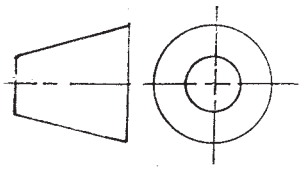


HALF SECTIONAL FRONT VIEW



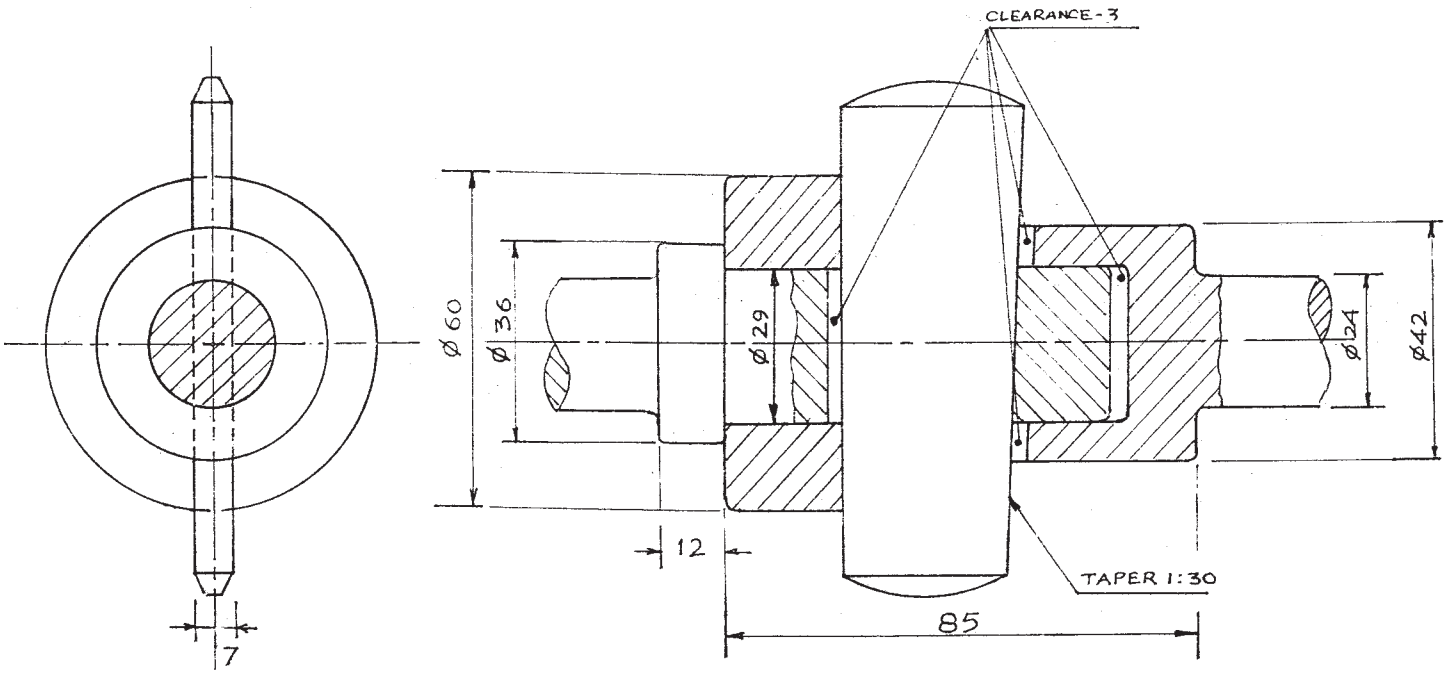
TOP VIEW

OPEN BUSH BEARING



SCALE 1:1

QUES No. 3



SIDE VIEW

SECTIONAL FRONT VIEW

SOCKET AND SPIGOT JOINT