

ENGINEERING DRAWING

CLASS: XII (046)

DESIGN OF THE QUESTION PAPER

Time: 3hours

M.M.: 70

The weightage of the distribution of marks over different contents of the question paper shall be as follows:-

A. WEIGHTAGE TO CONTENTS / SUBJECT UNITS

Unit	Contents	Marks
I	Isometric Projection of Solids	25
II	Machine Drawing	
	(i) Machine Parts	15
	(ii) Assembly / Disassembly	30

B. SCHEME OF OPTION

- (I) There will be no overall options.
- (II) Internal choice has been given in question of Machine Drawing.

C. WEIGHTAGE TO DIFFERENT LEVELS OF QUESTIONS

S. No.	Estimated Level of Difficulty	Percentage
I	Easy	15
II	Average	70
III	Difficult	15

- A weightage of 20% has been assigned to questions which test higher order thinking level .

ENGINEERING DRAWING

CLASS: XII (046)

BLUE PRINT

Time: 3hours

M.M. : 70

UNIT -I ISOMETRIC PROJECTION OF SOLIDS

25

S.No.	Contents	Weightage
i	Construction of Isometric Scale	04
ii	Isometric projection of a single vertical solid	07
iii	Isometric projection of combination of two solids	14

UNIT -II (a) MACHINE DRAWING

15

S.No.	Contents	Weightage
i	Drawing of Machine parts to a scale 1 : 1 (using instruments)	09
ii	Drawing of Machine parts by free hand sketching	06

UNIT-II (b) ASSEMBLY / DISASSEMBLY

30

S.No.	Contents	Weightage
i	Orthographic views	24
ii	Title, First angle projection symbol, Scale 1: 1, Dimensions and line work	06

Model Test Paper No: 1
ENGINEERING DRAWING

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 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).
- (vi) In no view of question 1, are hidden edges / lines required.
- (vii) In question 3, hidden edges / lines are to be shown in all full views.

- Q.1. (a) Construct an isometric scale. 4
- (b) Construct an isometric projection of the frustum of a cone, having its axis perpendicular to the H.P. The top. diameter = 40 mm and base diameter = 50 mm and height of frustum is 70 mm. Give all dimensions. Draw the axis. 7
- (c) A Square Pyramid of 30 mm base edge and 60 mm high with two base edges parallel to *V.P.*, is centrally placed on the top face of a Triangular Prism of base edge 50 mm and height 40 mm resting on the H.P. having vertical axis with one base edge, in front, parallel to *V.P.* Draw an isometric projection of *the* combination of *the* solids. Draw the common axis and indicate the direction of viewing. Give all the dimensions. 14

- Q.2. (a) Draw to scale 1: 1, the Sectional Front View of a SINGLE RIVETED LAP JOINT, assume thickness of plates = 16 mm each. Give all the standard dimensions. 9

OR

Draw to scale 1 : 1, the Front View of the assembly of a SQUARE HEAD BOLT(Across Flats) of nominal diameter, $d = 30$ mm, with a Hexagonal Nut -(Across Corners) and a Washer, keeping the axis horizontal. Length of the bolt = 120 mm, Threaded portion of bolt = 80 mm and Thickness of washer = 4 mm. Give all the standard dimensions.

- (b) Sketch freehand the Front View and the Top View of a ROUND HEAD MACHINE SCREW of diameter = 20, keeping its axis vertical. Give all the standard dimensions. 6

OR

Sketch freehand the Front View and the Top View of a DOUBLE HEAD FEATHER KEY WITH GIB HEAD on both ends. Keeping it horizontal, for a shaft of diameter = 48 mm. Give all the standard dimensions.

- Q.3. Fig.1.shows the detail drawings of different parts of GIB AND COTTER JOINT for joining two square rods. Assemble all the parts correctly and draw the following views to scale 1:1.

- (a) Front View, Upper Half in section. 18
- (b) Side View, viewing from the right hand side. 6

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

OR

Fig. 2. Shows the assembly of an OPEN BEARING. Disassemble the parts and draw the following views to scale 1 : 1.

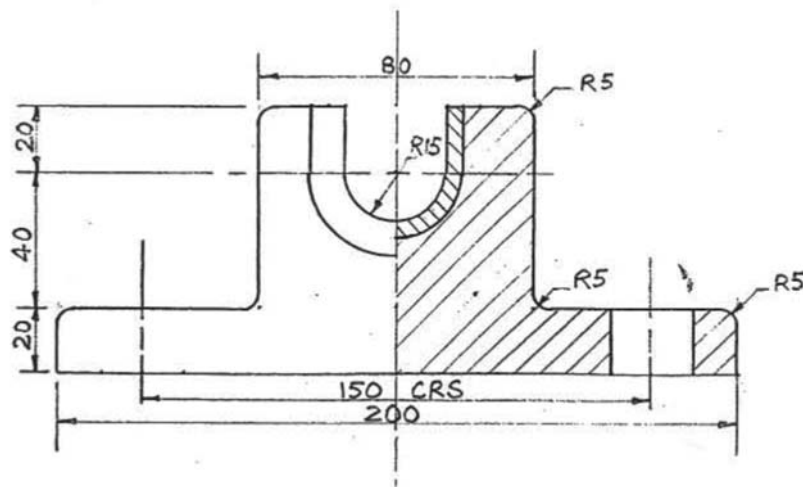
- (a) **BODY** 18
 - (i) Front view, left half in section.
 - (ii) Top view, without section.

- (b) **BUSH** 6
 - (i) Front view, upper half in section.
 - (ii) Side view, viewing from left.

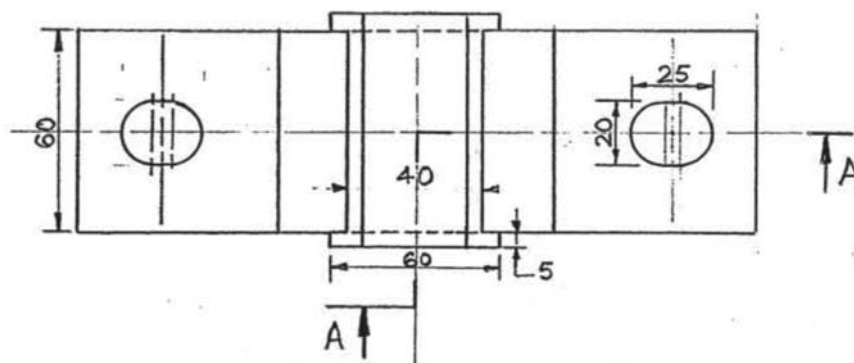
Print titles of both and the scale used. Draw the projection symbol. Give 6 important dimensions. 6

OPEN BEARING

Fig 2



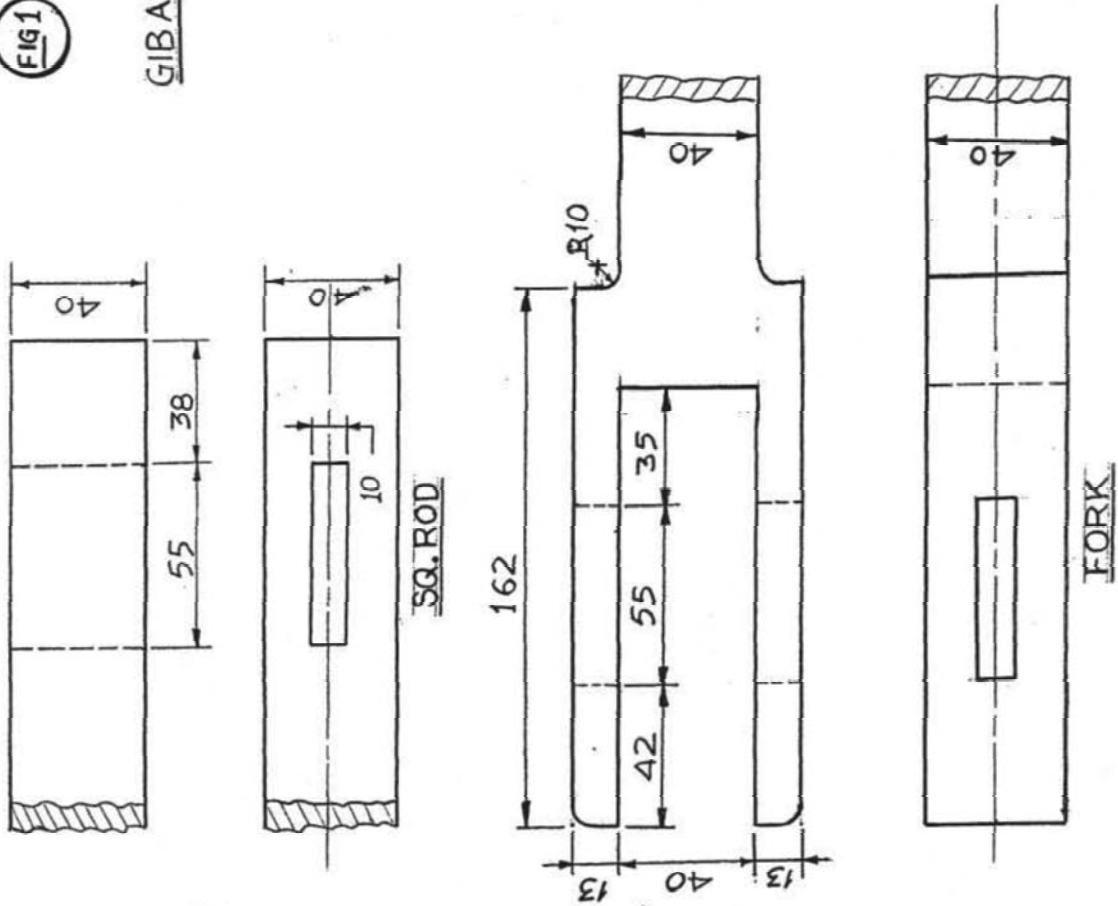
FRONT VIEW



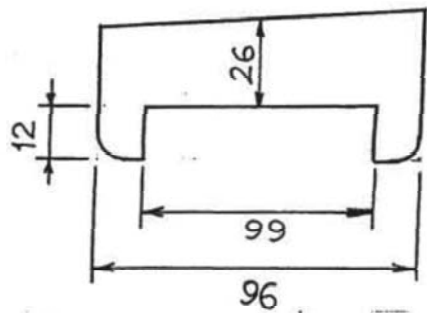
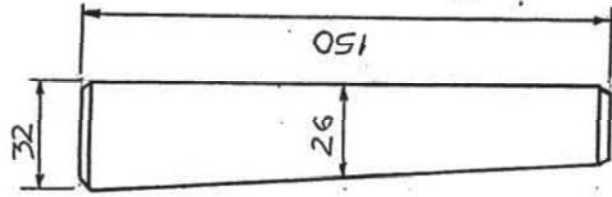
TOP VIEW

FIG 1

GIB AND COTTER JOINT



3



GIB AND COTTER

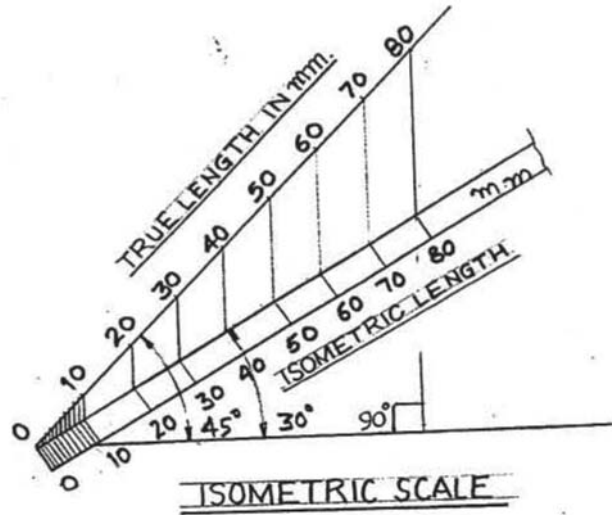
Model Test Paper No: 1

Value Points

Q.1 (a) Isometric Scale

4

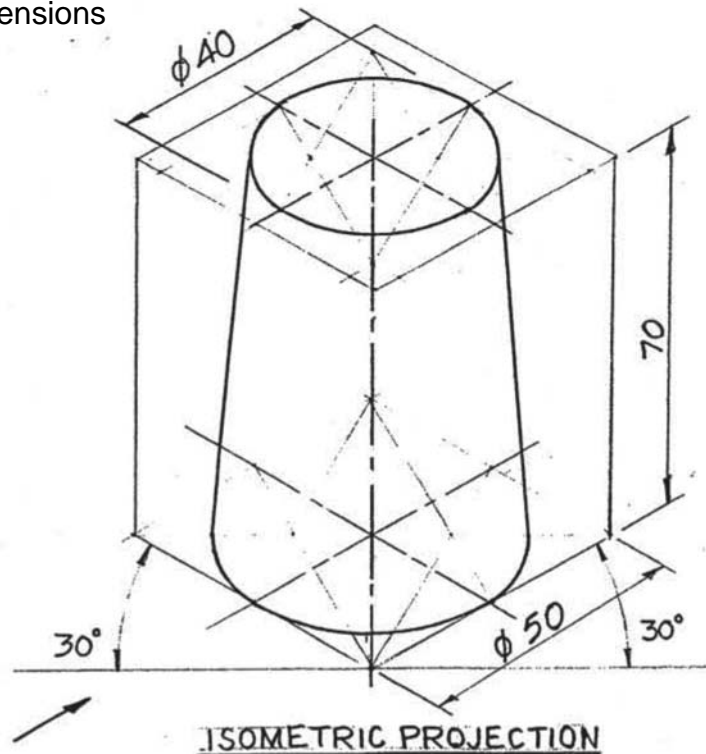
- (i) Drawing 45° inclined lines showing true length. 1
- (ii) Projections on 30° inclined line showing isometric length with 1 mm sub divisions. 2
- (iii) Writing titles, subtitles and angles. 1



(b) Isometric Projection of Frustum of a Cone

7

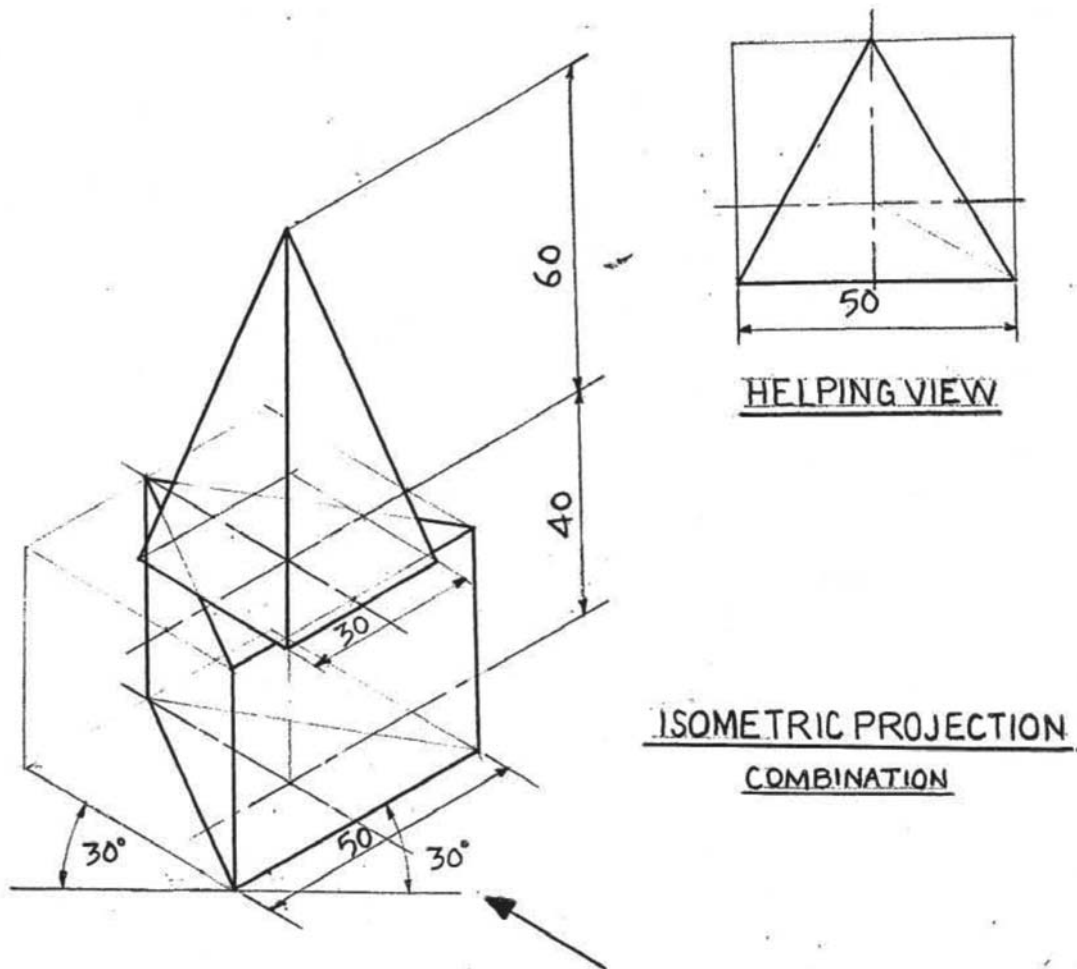
- (i) Drawing two elliptical curves. 3
- (ii) Drawing two generators. 2
- (iii) Indicating the axis 1
- (iv) Three dimensions 1



(c) Isometric Projection of Combination of solids

14

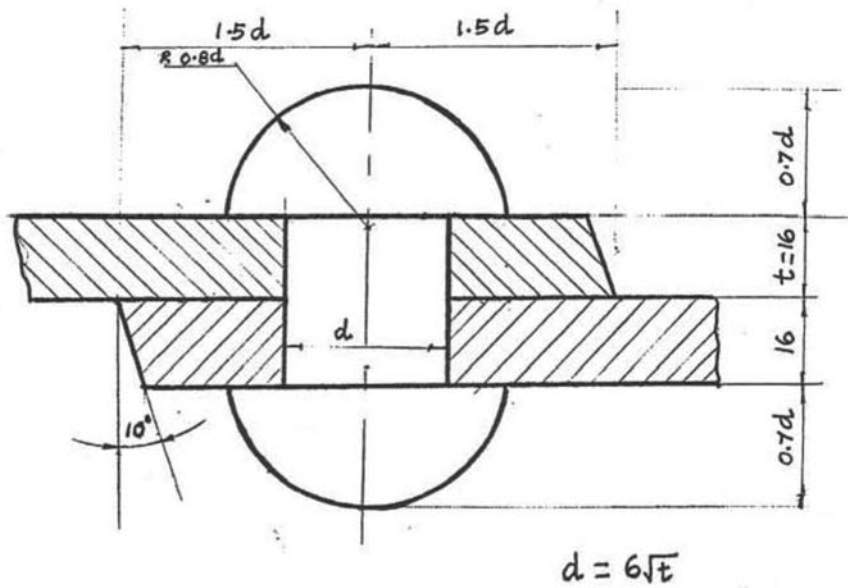
- | | |
|---|---|
| (i) Helping view of a triangle. | 1 |
| (ii) One base edge, in front, parallel to V.P. | 1 |
| (iii) Drawing isometric triangles. | 2 |
| (iv) Drawing three vertical lines indicating the faces. | 2 |
| (v) Drawing Square Base of pyramid. | 2 |
| (vi) Drawing three slant edges. | 2 |
| (vii) Common axis, Dimensioning, Direction of Viewing | 4 |



Q.2 (a) Single Riveted Lap Joint

9

- | | |
|---|---|
| (i) Drawing two plates showing beveled edges and section lines. | 3 |
| (ii) Drawing two profiles of a rivet with shank. | 3 |
| (iii) Writing title and standard values. | 3 |



SINGLE RIVETED LAP JOINT

OR

(a) Square Bolt, Hexagonal Nut and Washer (Assembled)

9

(i) Drawing square bolt with thread convention.

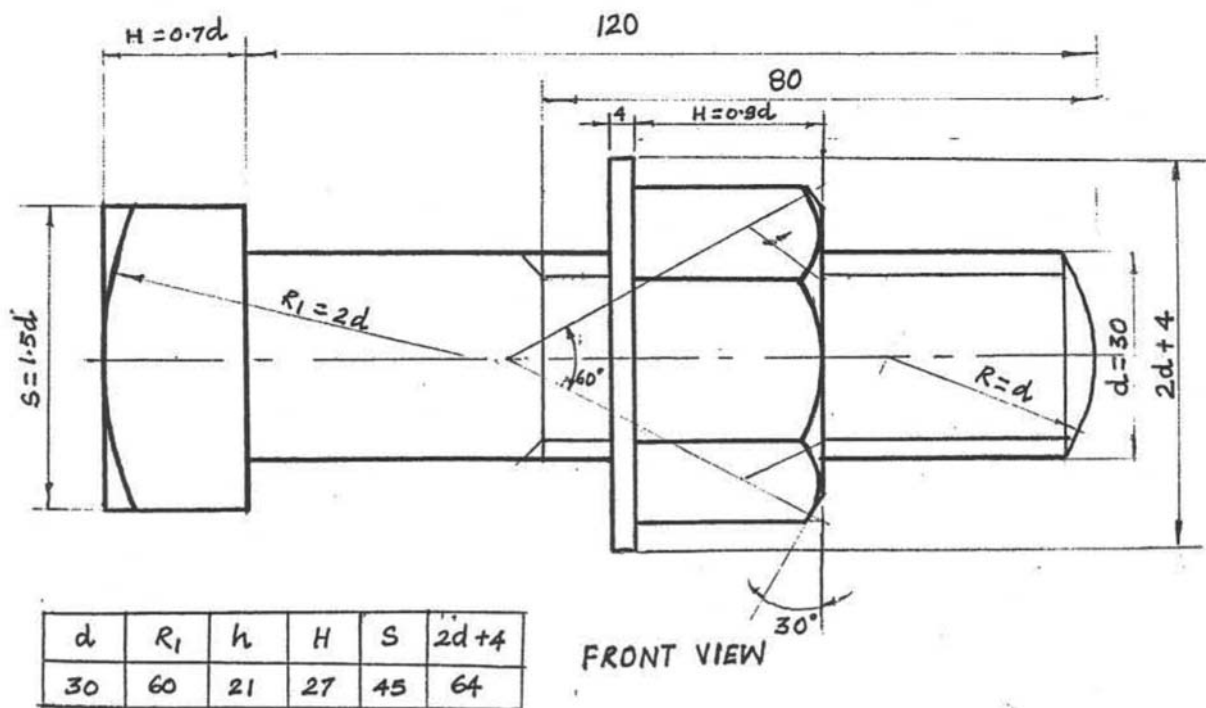
3

(ii) Drawing hexagon nut with washer.

3

(iii) Writing title and standard values.

3

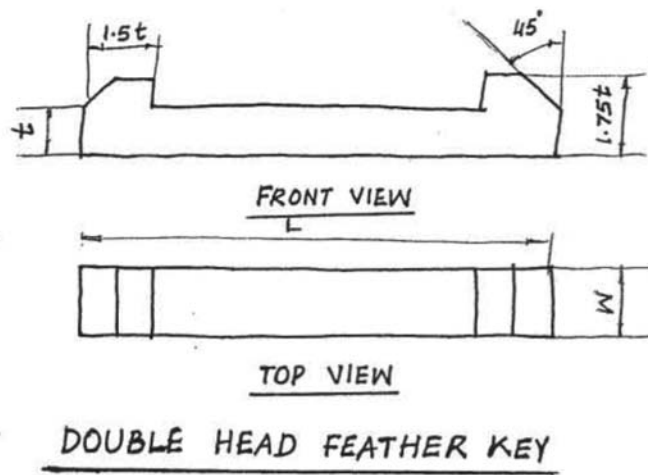
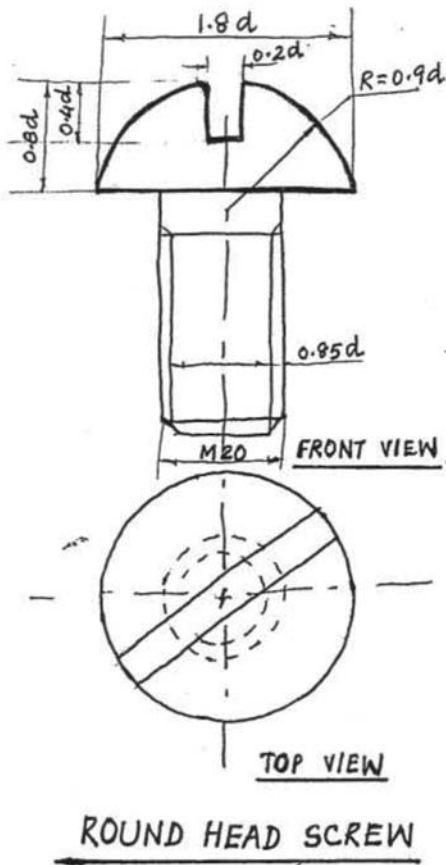


SQUARE HEAD BOLT WITH HEXAGONAL NUT AND WASHER

Q.2 (b) Round Head Machine Screw

6

- (i) Sketching head with threaded shank. 3
- (ii) Sketching conventional top view. 1
- (iii) Writing title, standard values and axis. 2



$$d = 48$$

$$W = d/4$$

$$t = d/6$$

OR

(b) Double Head Feather Key with Gib Head on both ends

6

- (i) Sketching Front View with Gib ends. 2
- (ii) Sketching Top View. 2
- (iii) Writing title and standard values. 2

Q.3 Assembly of Gib and Cotter Joint

30

(a) Front View, Upper Half in section.

18

(i) Drawing eye end, fork end and sectioning lines as per convention for upper half.

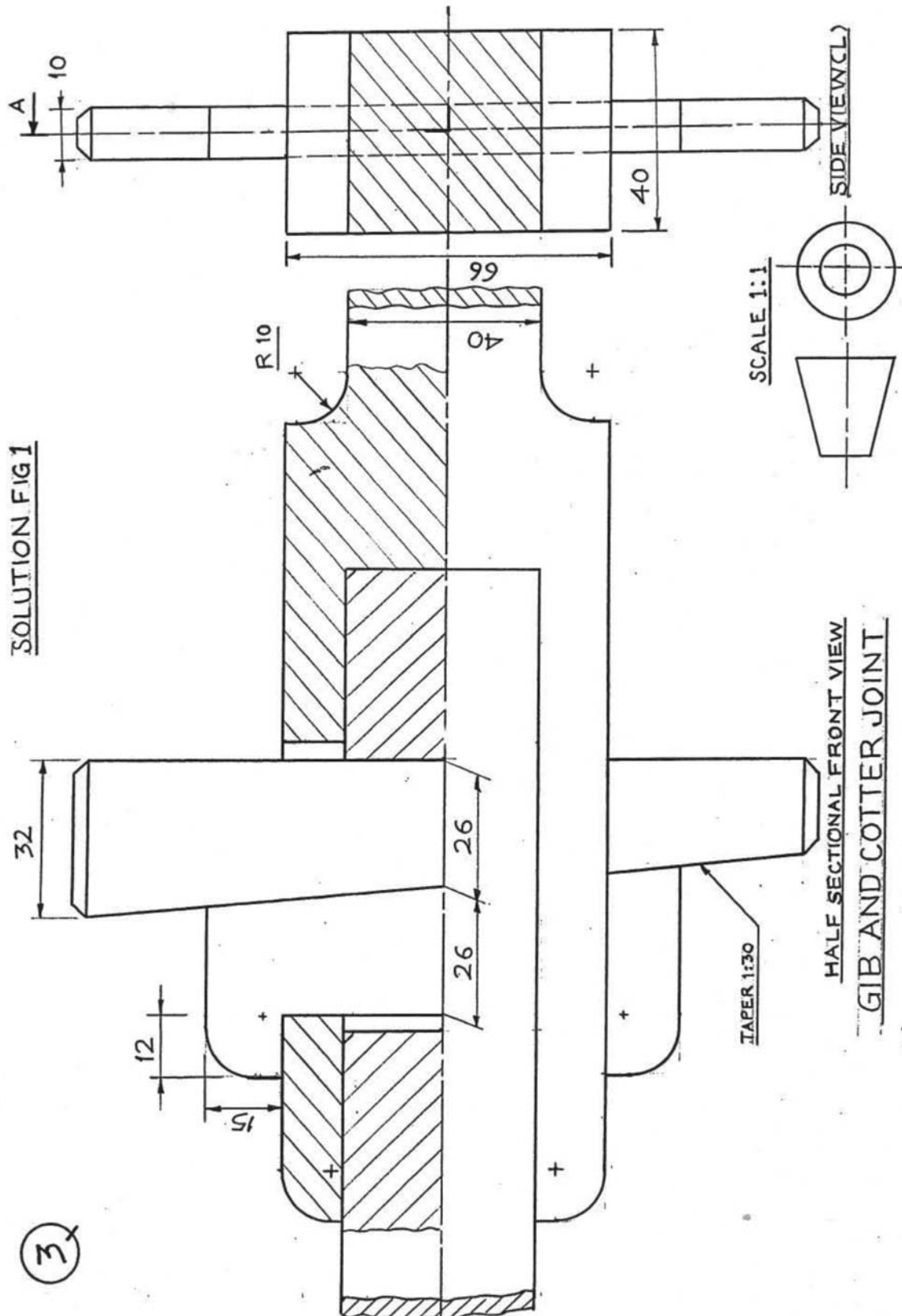
8

(ii) Drawing eye end and fork end for lower half.

4

(iii) Vertical Cotter and Gib with taper.

6



(b) Side View, viewing from the right hand side	6
(i) Conventional end of the square rod.	2
(ii) Side View of fork end, Gib and cotter.	4
(c) Others	6
(i) Important Dimensions.	2
(ii) Titles, Symbol of Projection, scale and line work.	4

OR

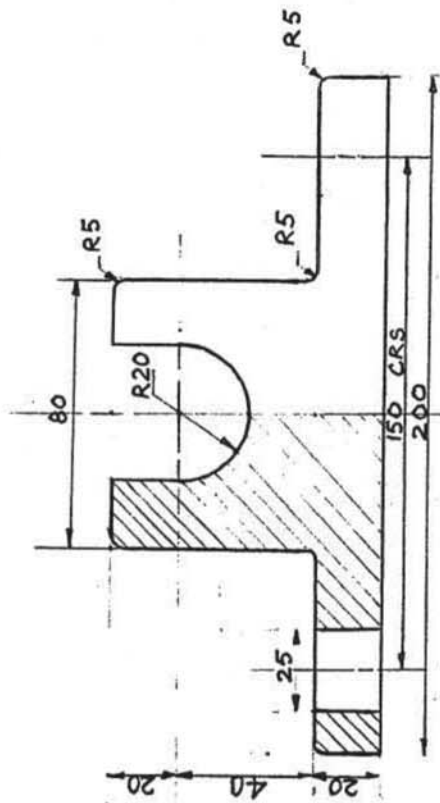
Disassembly of Open Bush Bearing	30
A BODY	16
(a) Front View, Left half in section.	10
(i) Drawing sectional left half with hole.	7
(ii) Drawing right half.	3
(b) Top view	6
(i) Drawing Boundary of the Body.	4
(ii) Drawing two mounting holes.	2
B BUSH	8
(a) Front View, left half in section.	5
(i) Drawing sectional left half.	3
(ii) Drawing right half.	2
(b) Side View, viewing from the left hand side	3
(i) Drawing the boundary with two collars.	2
(ii) Hidden details.	1
C Others	6
(i) Important Dimensions.	2
(ii) Titles, Symbol of Projection, scale and line work.	4

OPEN BEARING

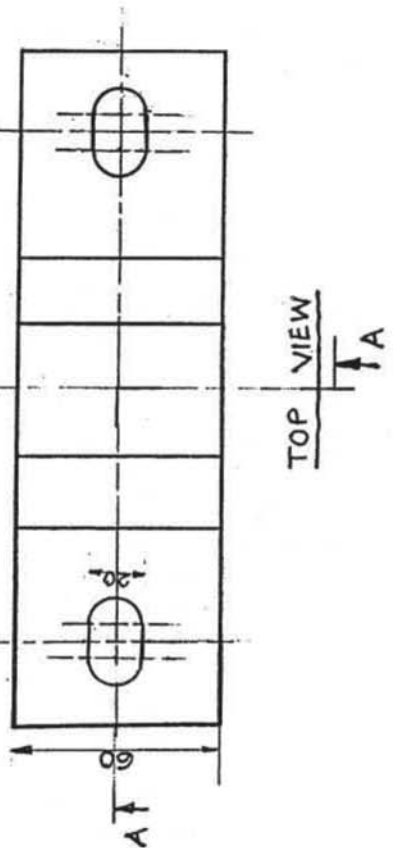
SOLUTION FIG 2

3

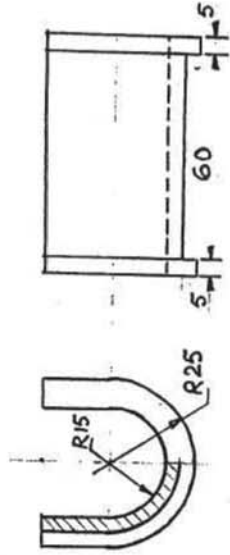
BODY



FRONT VIEW
SECTION AT AA



TOP VIEW
AA

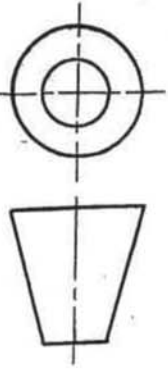


FRONT SEC.
VIEW

LEFT SIDE VIEW

BUSH

SCALE 1:1



Model Test Paper No: 2
ENGINEERING DRAWING

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 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).*
- (vi) *In no view of question 1, are hidden edges / lines required.*
- (vii) *In question 3, hidden edges/ lines are to be shown in all full views.*

- Q.1. (a) Construct an isometric scale. 4
- (b) Construct an isometric projection to isometric scale, of the frustum of a regular hexagonal pyramid, having its axis vertical and two base edges parallel to V.P. The top edge = 20 mm, base edge = 40 mm and height = 80 mm. Give all the dimensions. Draw the axis and indicate the direction of viewing. 7
- (c) A sphere of diameter 80 mm is resting centrally on its curved surface on top of a vertical pentagonal prism, having its base edge = 40 mm and height = 80 mm, keeping one of its rectangular face, in front, parallel to the V.P. Draw an isometric projection of the combination of solids. Draw the common axis and indicate the direction of viewing. Give all the dimensions. 14
- Q.2. (a) Draw to scale 1 : 1, the standard profile of a METRIC SCREW THREAD (external), taking an enlarged pitch = 50 mm. Give all the standard dimensions. 9

OR

Draw to scale 1 : 1, the front view and top view of a SQUARE NUT, for a nominal diameter $d = 20$ mm, keeping its axis perpendicular to H.P. and two sides of the square parallel to V.P. Give all the standard dimensions.

- (b) Sketch freehand, the front view and the top view of a COUNTER SUNK HEAD(60°) RIVET of diameter = 20 mm, keeping its axis vertical. Give all the standard dimensions. 6

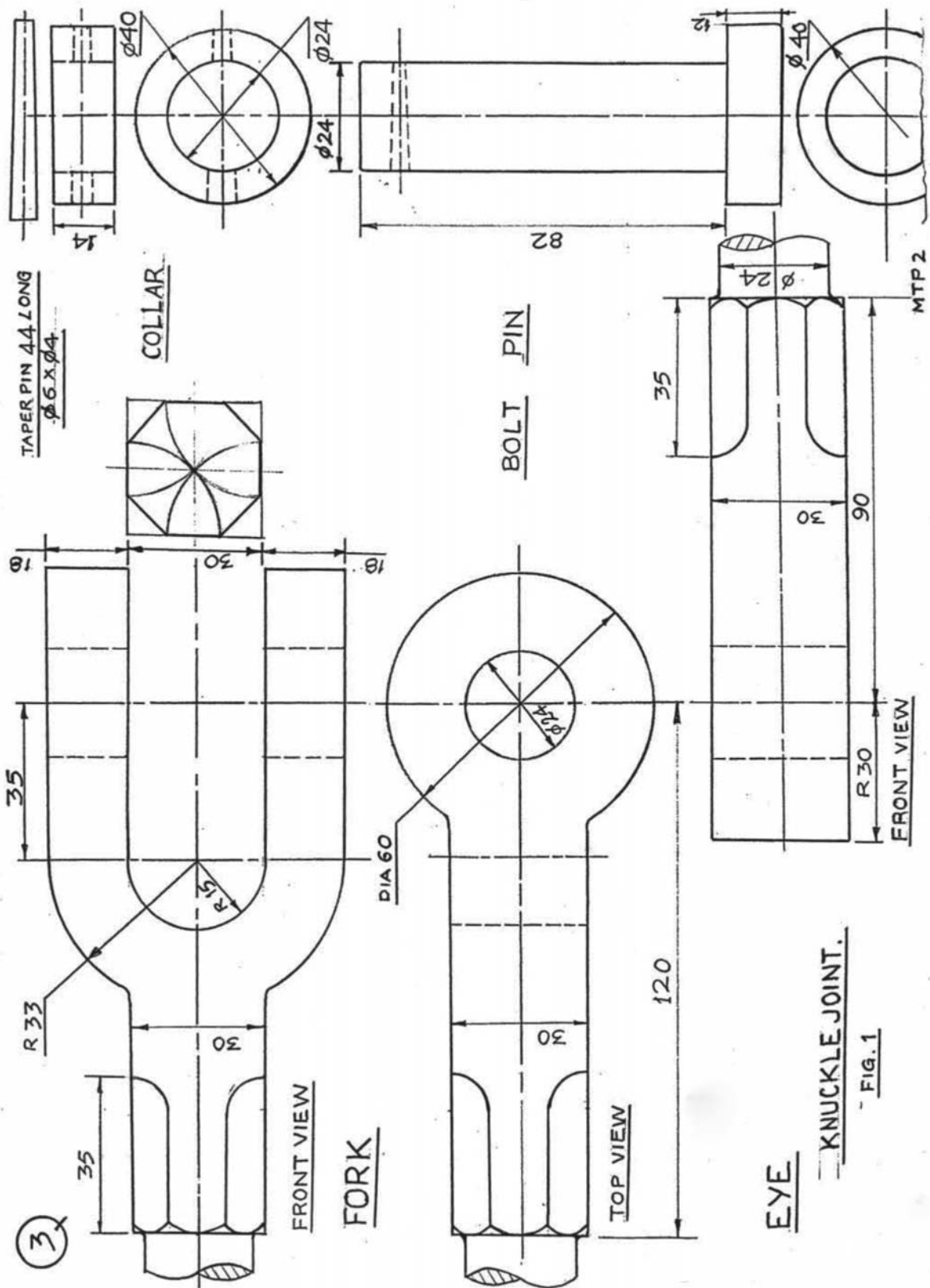
OR

Sketch freehand, three views of a WOODRUFF KEY for using on a shaft of diameter = 60 mm. Give all the standard dimensions.

Q.3. Fig.1. shows the parts of a KNUCKLE JOINT. Assemble the parts correctly and then draw the front view, showing upper half in section, using the scale 1 : 1. 24

Print title and scale used. Give 6 important dimensions.

6

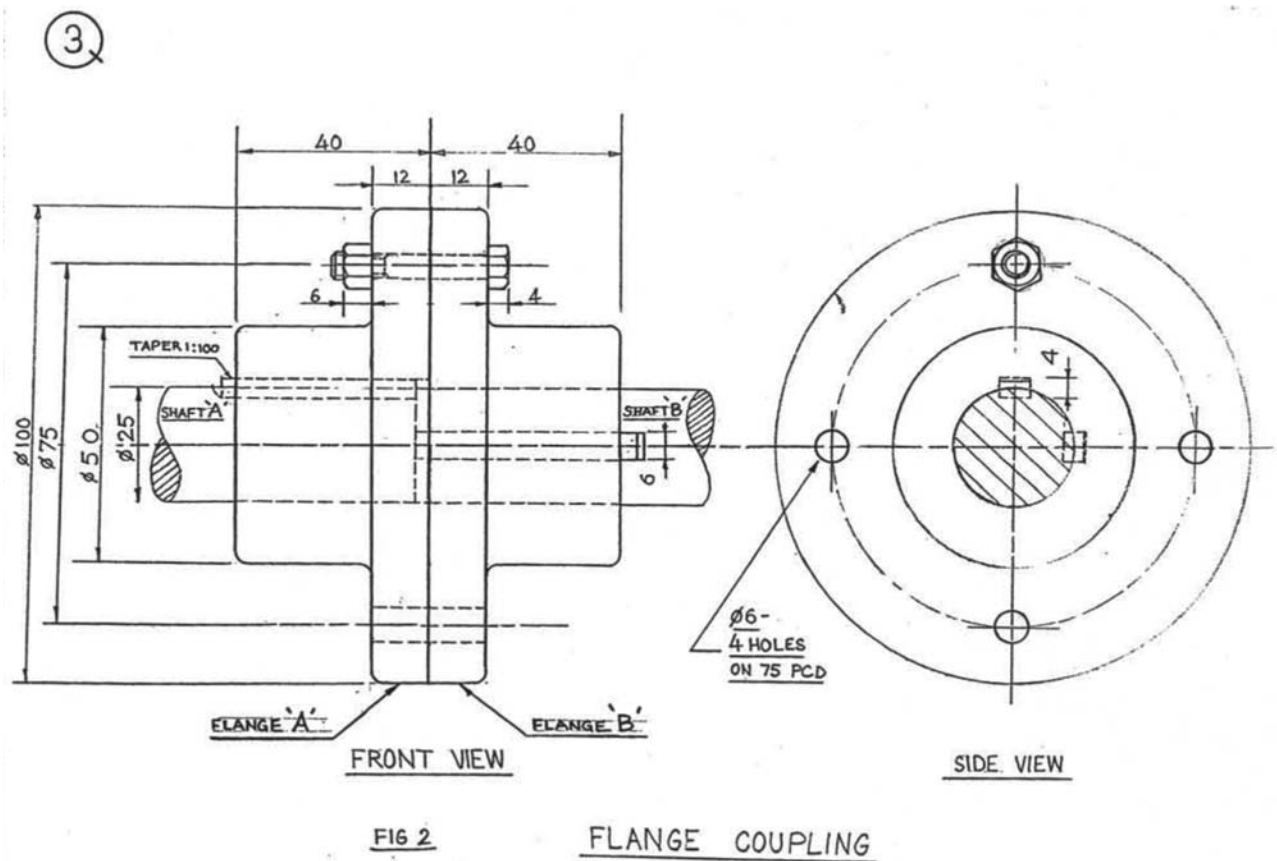


OR

Fig. 2. Shows the assembly of an UNPROTECTED FLANGE COUPLING. Disassemble the parts *and* draw the following views to scale 1 :1.

- (a) FLANGE 'A' 18
(i) Front view, upper half in section.
(ii) Side view, viewing from the left hand side.
- (b) SHAFT 'A' 6
(i) Front view.,
(ii) Side view, viewing from the right hand side.

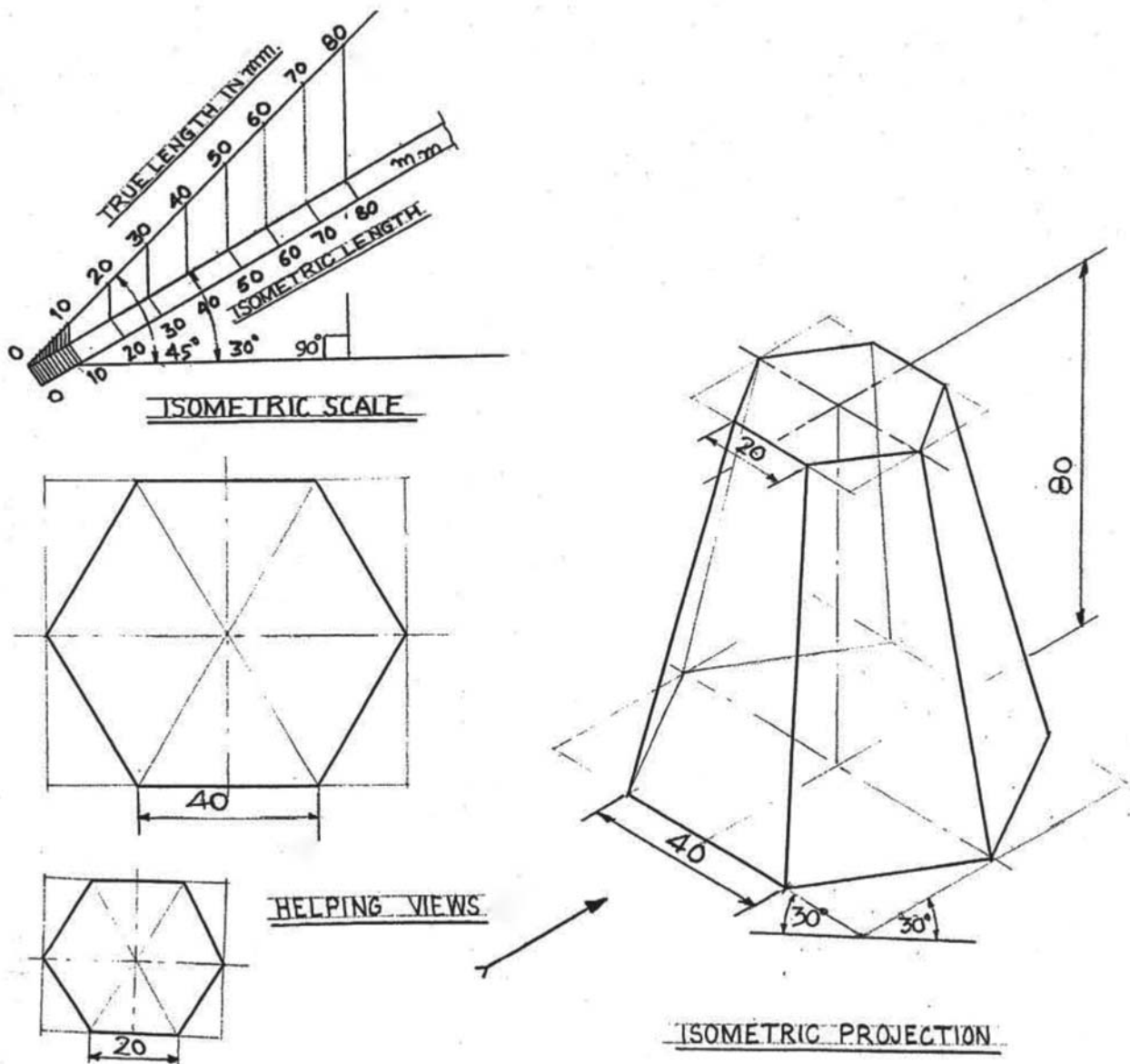
Print titles, symbol of projection and scale used. Draw the projection symbol. Give 6 important dimensions.



Model Test Paper No: 2

Value Points

- Q.1 (a) Isometric Scale 4
- (i) Drawing 45° inclined lines showing true length. 1
- (ii) Projections on 30° inclined line showing isometric length with 1 mm sub divisions. 2
- (iii) Writing titles, subtitles and angles. 1



- (b) Isometric Projection of Frustum of a Hexagonal Pyramid. 7
- (i) Helping view of a hexagon. 1
- (ii) Drawing hexagons. 2
- (iii) Drawing slant edges. 2
- (iv) Axis, Dimensioning, Direction of Viewing. 2

(c) Isometric Projection of Combination of solids.

14

(i) Helping view of a pentagon.

1

(ii) Drawing isometric pentagons with vertical lines.

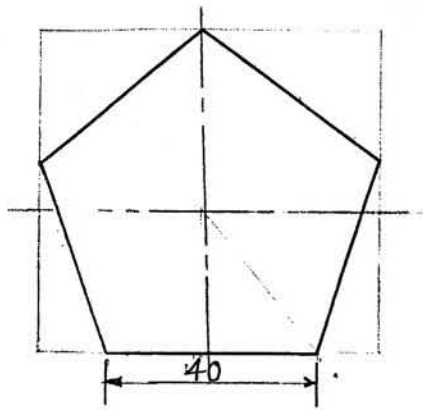
5

(iii) Drawing Sphere with true radius from isometric center.

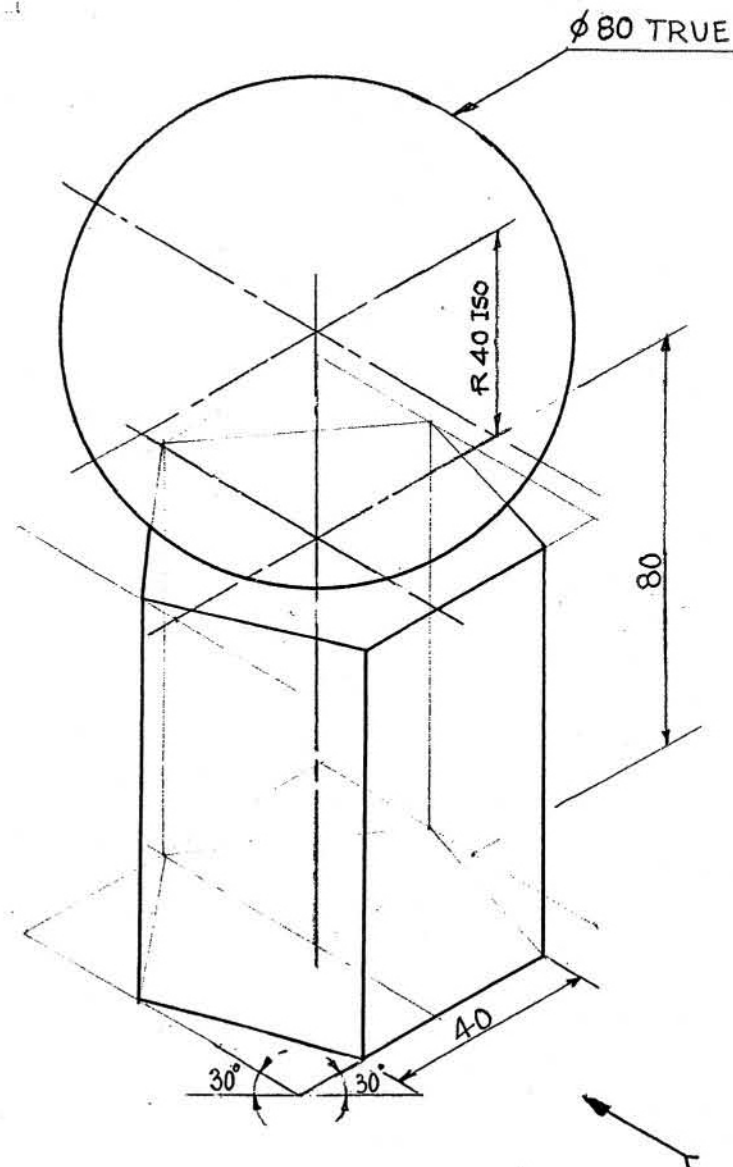
4

(iv) Common axis, Dimensioning, Direction of Viewing.

4



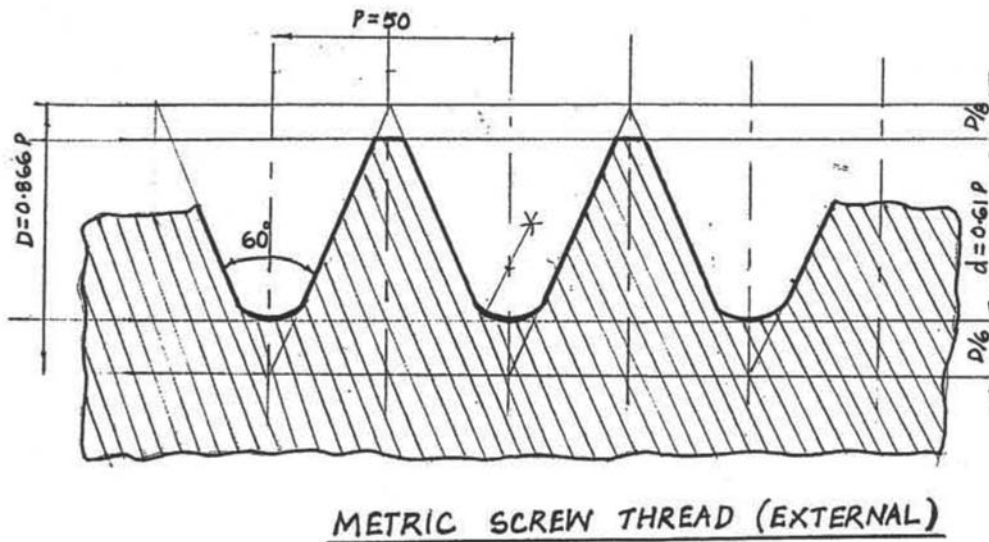
HELPING VIEW



ISOMETRIC PROJECTION OF COMBINATION

Q.2 (a) Metric Screw Thread Profile (External) 9

- (i) Drawing two crests and two roots. 4
- (ii) Drawing conventional break with sectioning. 3
- (iii) Writing title and standard values. 2



OR

(a) Square Nut 9

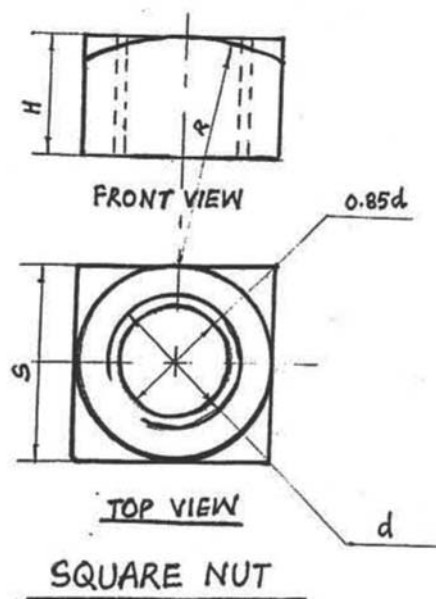
- (i) Drawing Front View across flat with details. 4
- (ii) Drawing Top View with details. 3
- (iii) Writing title and standard values. 2

$$d = 20$$

$$H = 0.8d \text{ to } d$$

$$R = 1.5d + 6$$

$$S = 1.5d + 3$$



Q.2 (b) Counter Sunk Head Rivet

6

(i) Sketching head with shank.

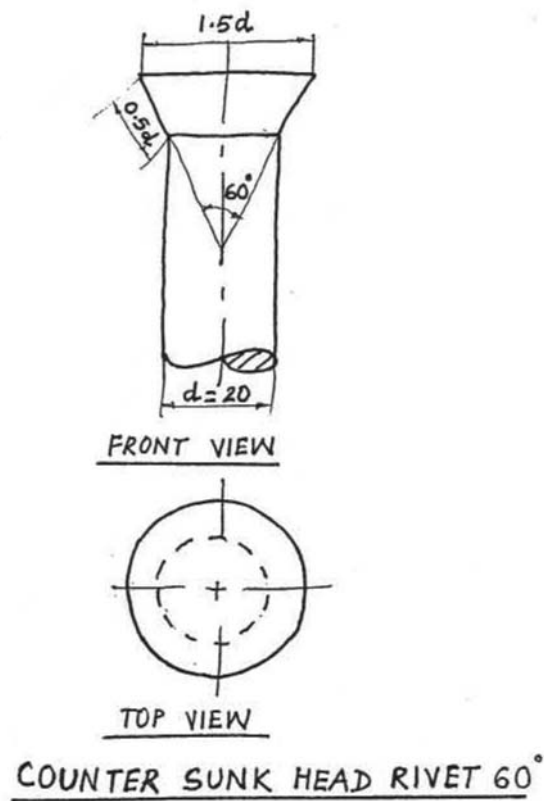
3

(ii) Sketching conventional top view.

1

(iii) Writing title, standard values and axis.

2



OR

(b) Woodruff Key

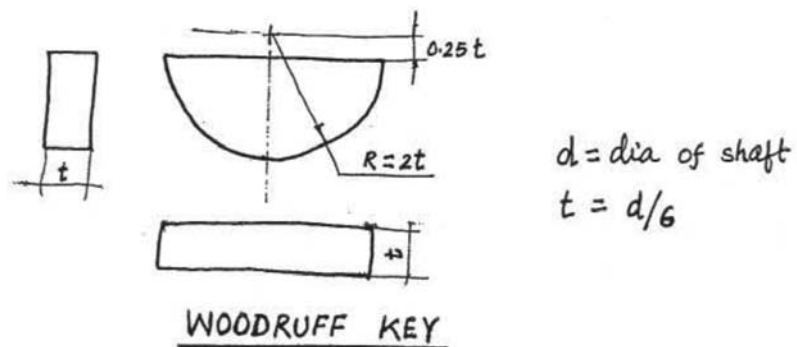
6

(i) Sketching Front View, Top View and Side View.

4

(ii) Writing title and standard values.

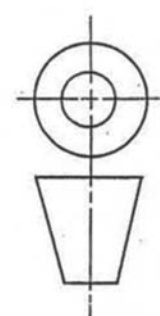
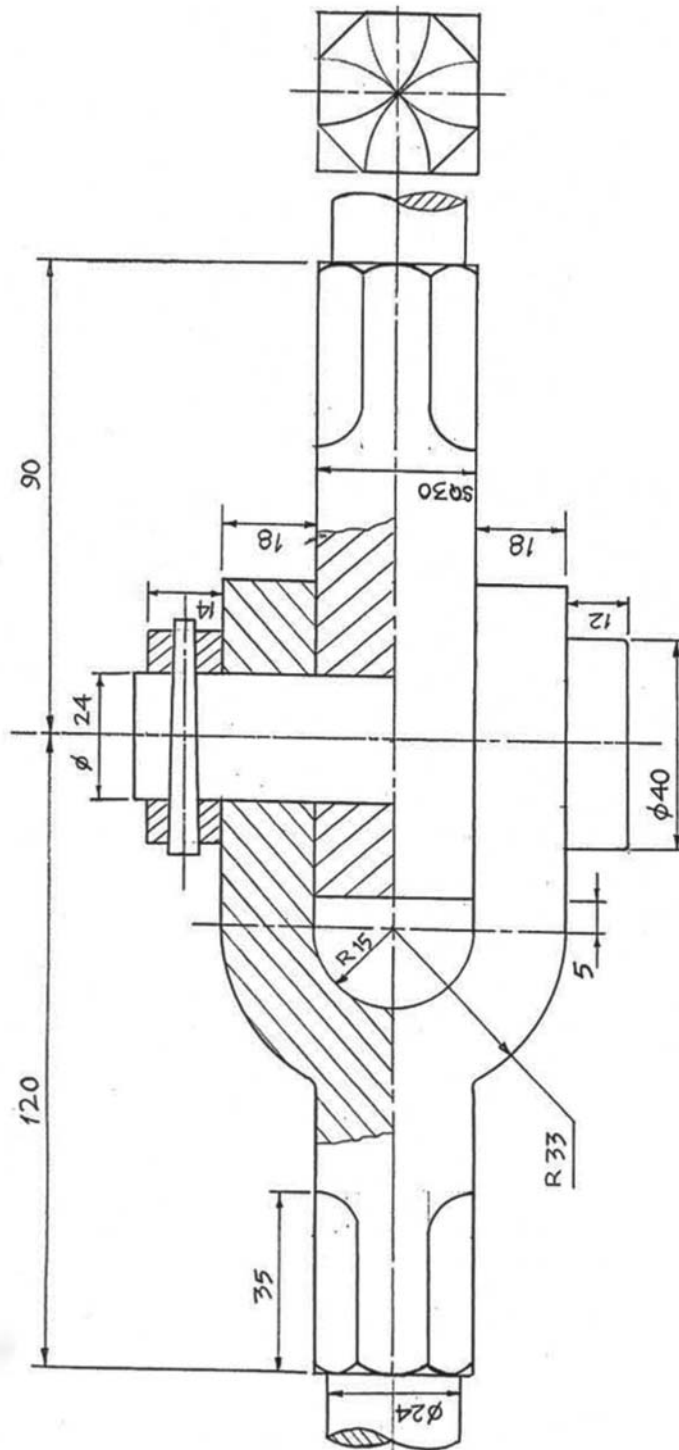
2



Q.3 Assembly of Knuckle joint

30

- (a) Front View, Upper Half in section. 24
 (i) Drawing eye end, fork end and sectioning lines as per convention for upper half. 12
 (ii) Drawing eye end and fork end for lower half. 6
 (iii) Bolt Pin, Collar in section with Taper Pin in position. 6
- (b) Others 6
 (i) Important Dimensions. 2
 (ii) Titles, Symbol of Projection, scale and line work. 4

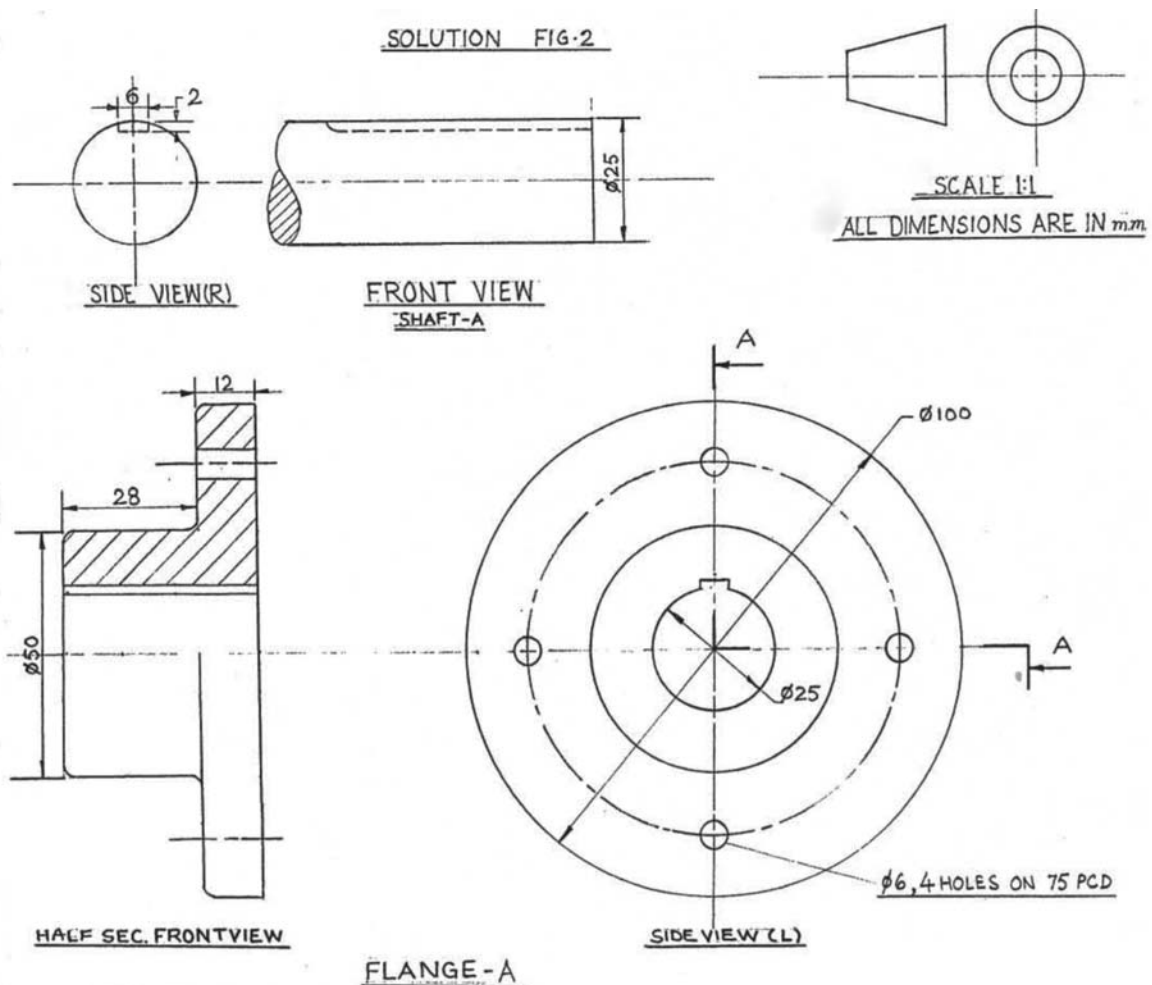


HALF SECTIONAL FRONT VIEW
 KNUCKLE JOINT

SOLUTION FIG 1

OR

Q.3	Disassembly of Flange Coupling	30
A	FLANGE-A	18
(a)	Front View, Upper half in section.	11
(i)	Drawing sectional upper half with hole and key way.	7
(ii)	Drawing lower half.	4
(b)	Side View, viewing from the left hand side.	7
(i)	Drawing four circles with key way.	5
(ii)	Drawing four PCD holes.	2
B	SHAFT-A	6
(i)	Drawing conventional Front view with key way.	4
(ii)	Drawing Side View, viewing from the right hand side.	2
C	Others	6
(i)	Important Dimensions.	2
(ii)	Titles, Symbol of Projection, scale and line work.	4



Model Test Paper No: 3
ENGINEERING DRAWING

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 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).
(vi) In no view of question 1; are hidden edges / lines required.
(vii) In question 3; hidden edges/ lines are to be shown in all full views.*

- Q.1. (a) Construct an isometric scale. 4
(b) Draw an isometric projection of an inverted frustum of a triangular pyramid having axis perpendicular to H.P. keeping one of its base edge, at the back, parallel to V.P. The top edge=40 mm, base edge=30 mm and height=70 mm. Give all the dimensions and direction of viewing. 7

- (c) A hexagonal prism of base edge=30 mm and height=60 mm with two base edges perpendicular to V.P. is placed centrally and vertically on top of a cylinder of diameter=50 mm and height =40 mm. Draw the Isometric projection of the combination. Give all the dimensions and direction of viewing. 14

- Q.2. (a) Draw to scale 1: 1, the standard profile of a 'B.S.W.' thread. Taking an enlarged pitch =40 mm. Give all the standard dimensions. 9

OR

Draw to scale 1 : 1, the Front View and Top View of a HOOK BOLT', taking nominal diameter = 24 mm, keeping its axis perpendicular to H.P. Give standard dimensions.

- (b) Sketch freehand the Front View and the Top View of a STUD with A SQUARE NECK, keeping the axis perpendicular to H.P. Take nominal diameter = 20mm. Give standard dimensions. 6

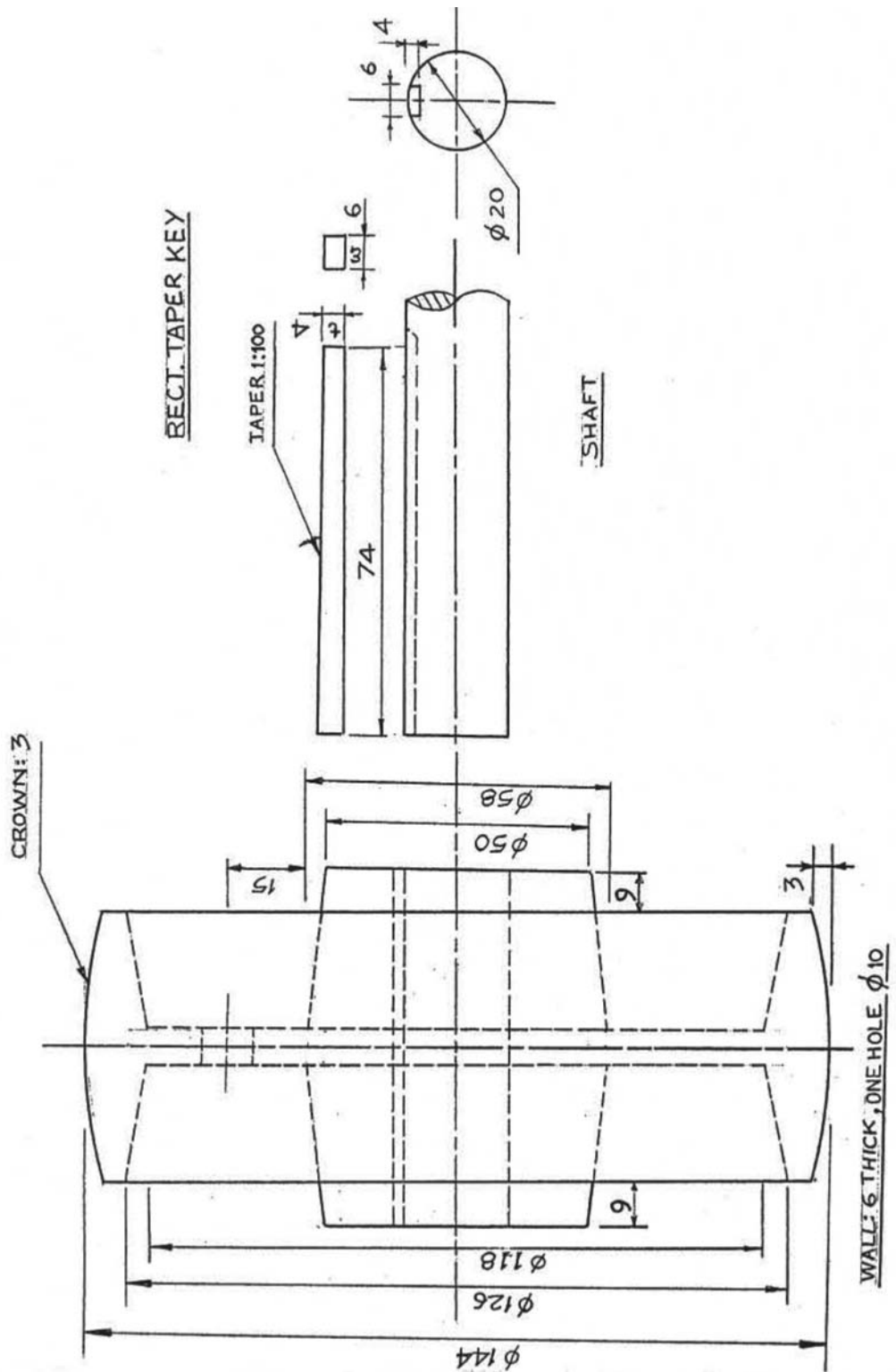
OR

Sketch freehand the front view and the top view of a PAN-HEAD RIVET without tapered neck, keeping the axis vertical. Take diameter of the rivet as 20 mm. Give standard dimensions.

Q.3. Fig.1. shows the details of a SOLID CAST IRON PULLEY, SHAFT AND KEY. Assemble all the parts *correctly* and draw the following views to scale 1:1.

- (a) Front view, upper half in section. 14
 (b) Side View, Viewing from left. 10

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



SOLID C.I. PULLEY

FIG. 1

Fig. 2. Shows the assembly of a SLEEVE AND COTTER JOINT.
Disassemble the following parts and draw the following views to scale 1:1.

(a) SLEEVE 14

(i) Front View, Upper Half in Section.

(ii) Side View, viewing from left.

(b) ROD-B 10

(i) Front View.

(ii) Side View, viewing from right.

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

3

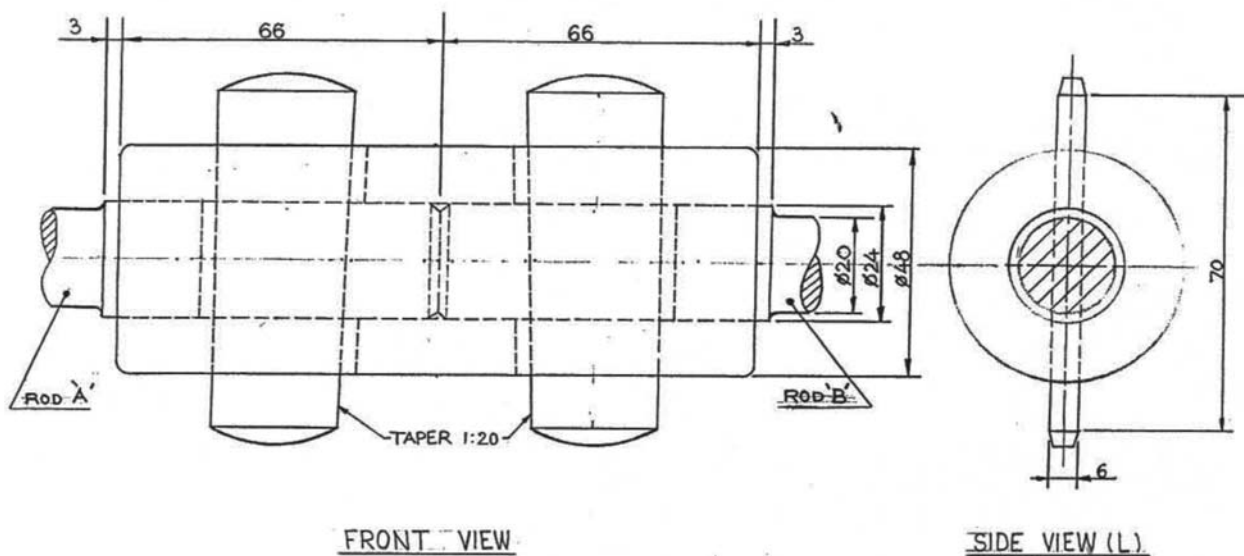
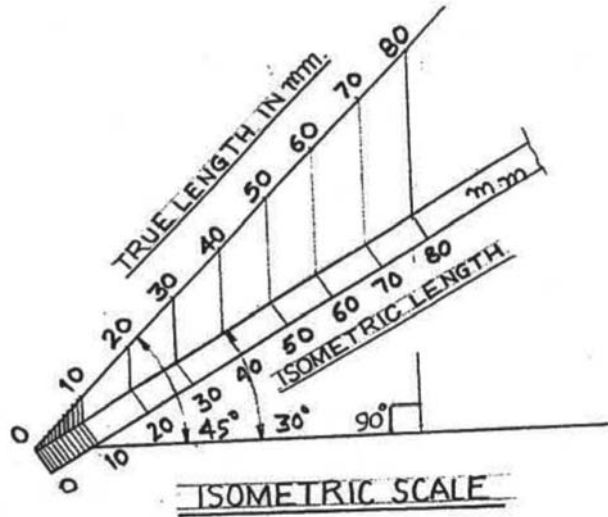


FIG 2 SLEEVE AND COTTER JOINT

Model Test Paper No: 3

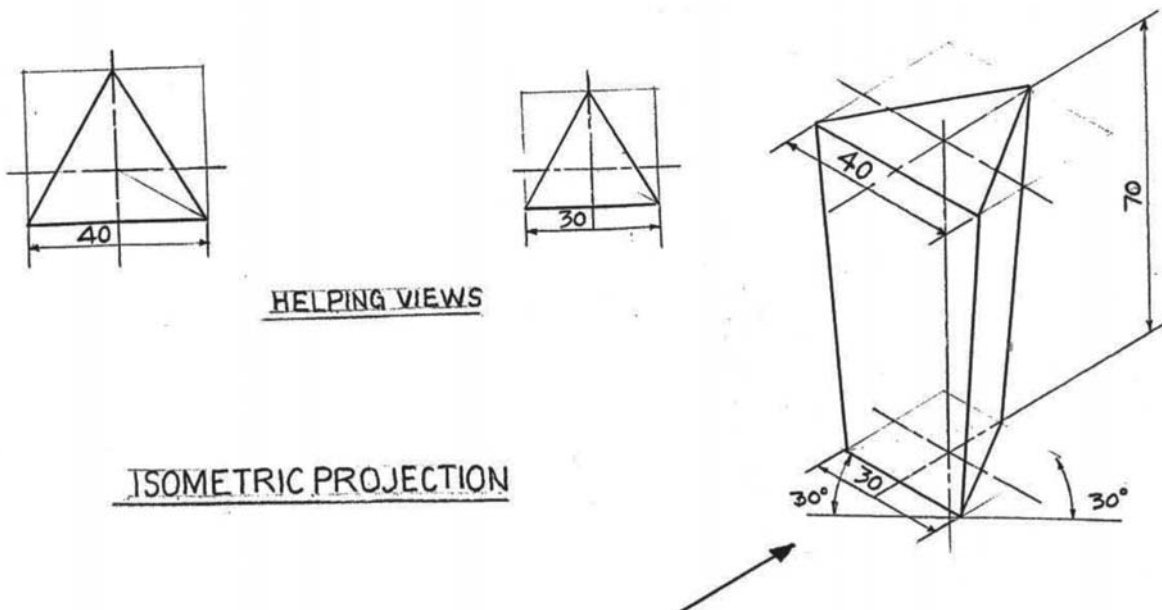
Value Points

- | | | |
|-----|---|---|
| Q.1 | (a) Isometric Scale | 4 |
| | (i) Drawing 45° inclined lines showing true length. | 1 |
| | (ii) Projections on 30° inclined line showing isometric length with 1 mm sub divisions. | 2 |
| | (iii) Writing titles, subtitles and angles. | 1 |



- | | | |
|--|--|---|
| | (b) Isometric Projection of Frustum of the inverted Triangular Prism | 7 |
|--|--|---|

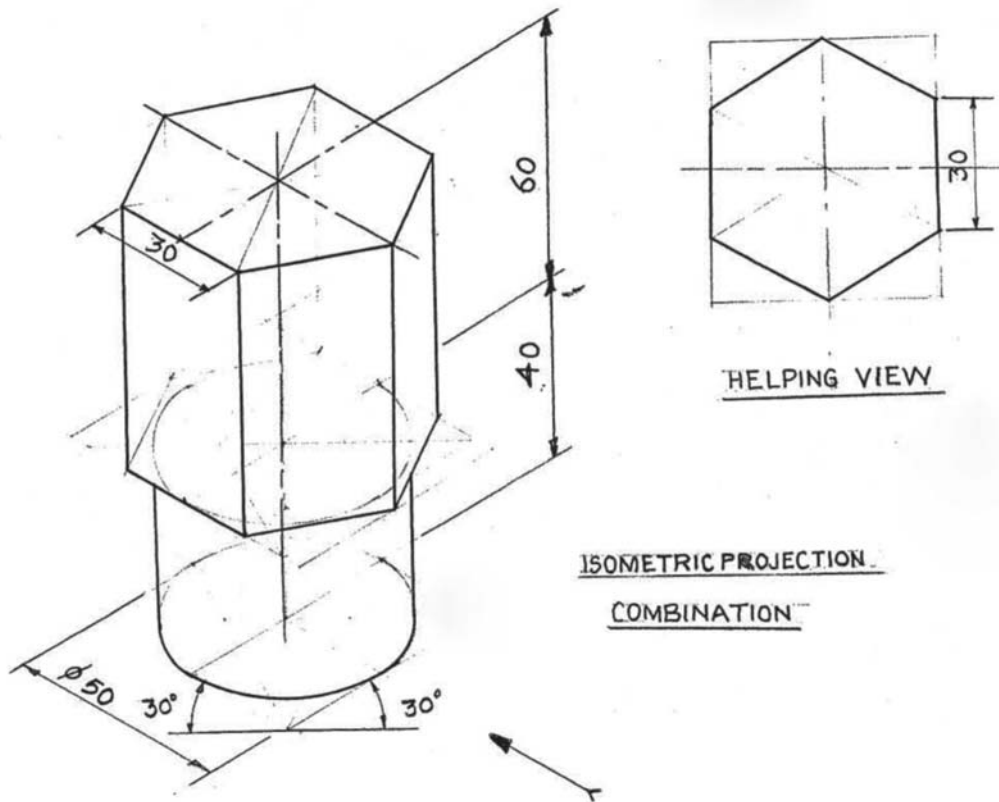
- | | | |
|--|--|---|
| | (i) Helping view of triangles. | 1 |
| | (ii) Drawing triangles. | 2 |
| | (iii) Drawing slant edges. | 2 |
| | (iv) Axis, Dimensioning, Direction of Viewing. | 2 |



(c) Isometric Projection of Combination of solids.

14

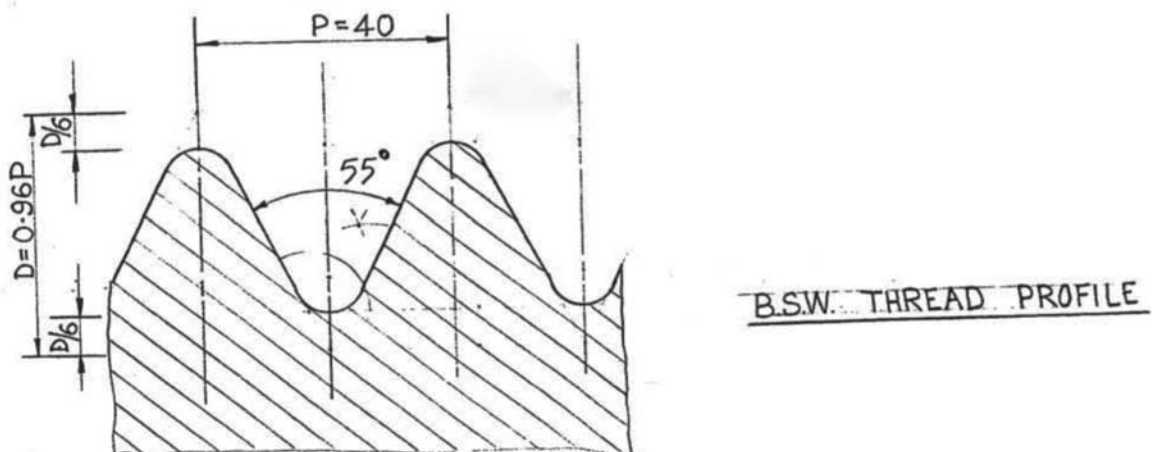
- (i) Drawing isometric cylinder. 4
- (ii) Helping view of a hexagon. 1
- (iii) Drawing isometric hexagon with vertical lines. 5
- (iv) Common axis, Dimensioning, Direction of Viewing. 4



Q.2 (a) British Standard Whitworth (BSW) Thread Profile

9

- (i) Drawing two crests and two roots. 4
- (ii) Drawing conventional break with sectioning. 3
- (iii) Writing title and standard values. 2



OR

(a) Hook Bolt

9

(i) Drawing conventional Front View.

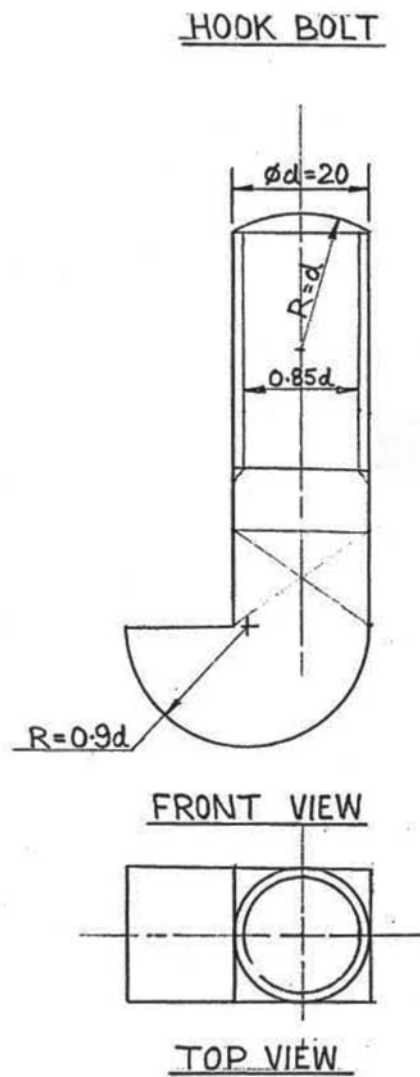
5

(ii) Drawing Top View with details.

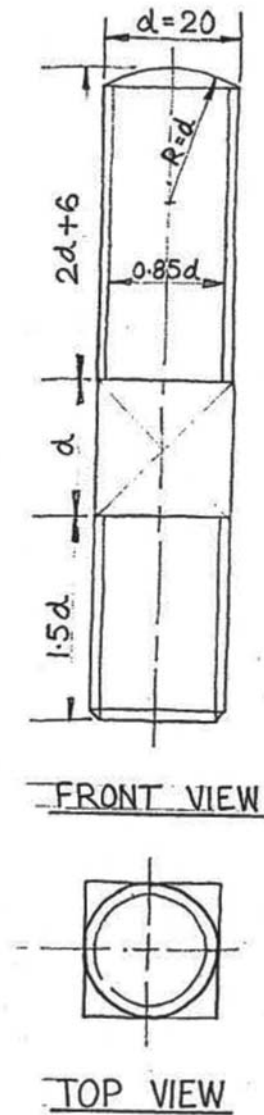
2

(iii) Writing title and standard values.

2



STUD WITH SQUARE NECK



Q.2 (b) Stud with Square Neck

6

(i) Sketching Stud with Square Neck.

3

(ii) Sketching conventional top view.

1

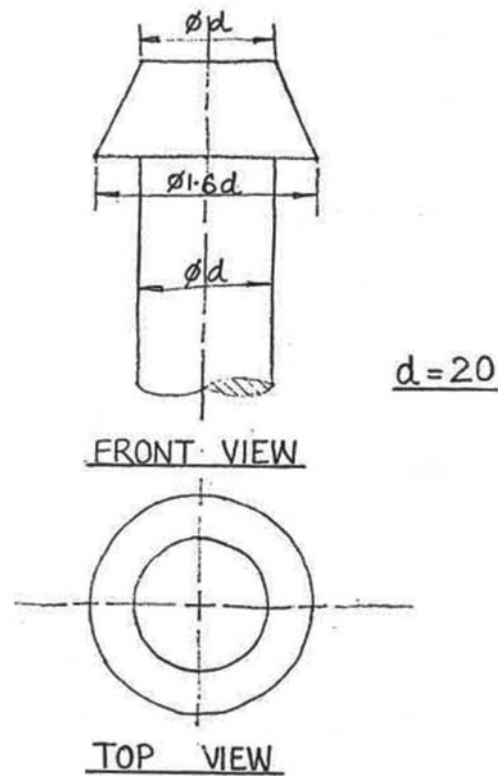
(iii) Writing title, standard values and axis.

2

OR

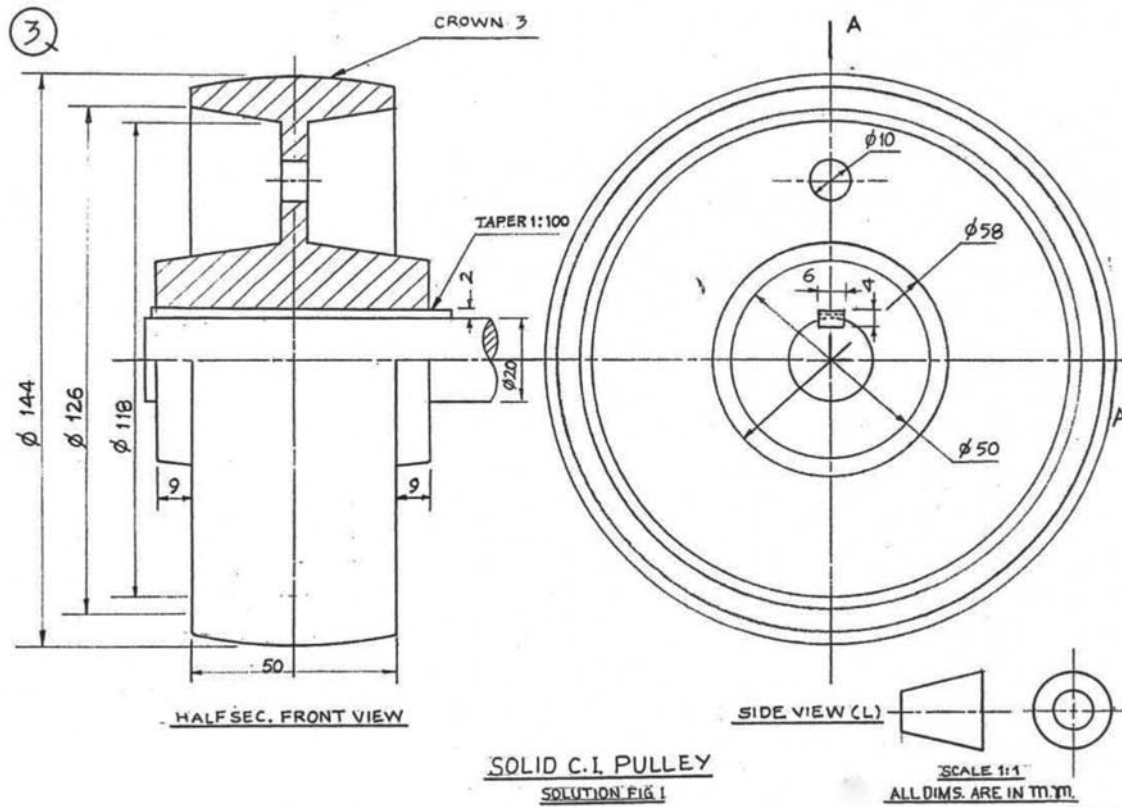
- | | |
|--|---|
| (b) Pan Head Rivet without Taper Neck | 6 |
| (i) Sketching Head with Shank. | 3 |
| (ii) Sketching Top View. | 1 |
| (iii) Writing title and standard values. | 2 |

PAN HEAD RIVET
WITHOUT TAPERED NECK



- | | | |
|-----|---|----|
| Q.3 | Assembly of Solid Cast iron Pulley with Shaft and key | 30 |
| | (a) Front View, Upper Half in section | 14 |
| | (i) Drawing upper half in section with crowning and web hole. | 9 |
| | (ii) Drawing lower half without section with crowning | 5 |
| | (b) Side View, viewing from the left hand side. | 10 |
| | (i) Drawing seven circles. | 7 |
| | (ii) Drawing key and web hole. | 3 |

- | | |
|---|---|
| (c) Others | 6 |
| (i) Important Dimensions | 2 |
| (ii) Titles, symbol of Projection, scale and line work. | 4 |

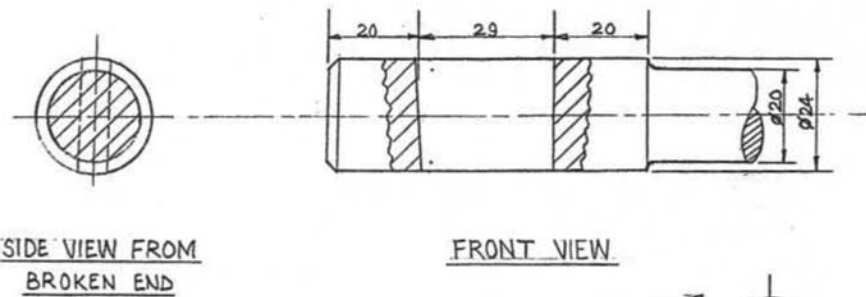
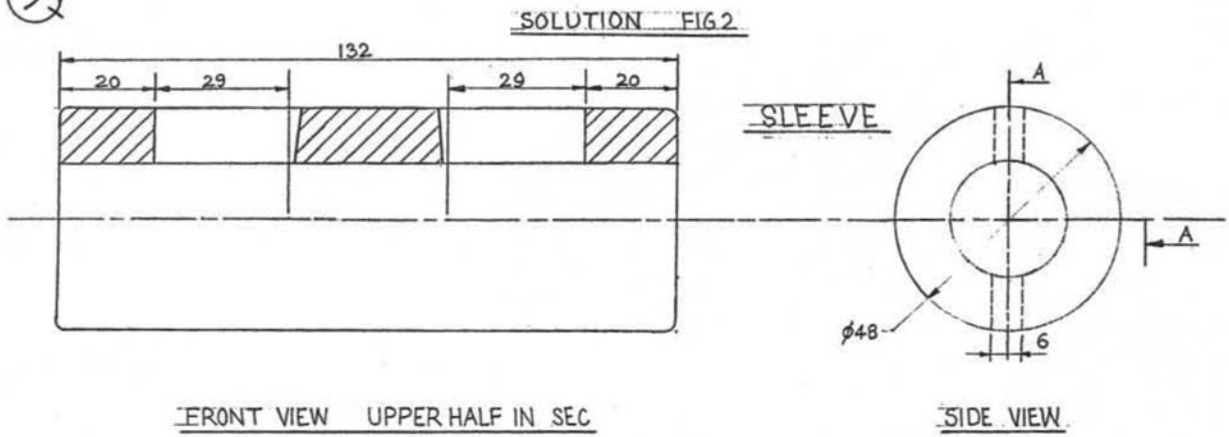


OR

- | | | |
|------|--|----|
| Q.3 | Disassembly of Sleeve and Cotter Joint | 30 |
| A) | SLEEVE | 14 |
| | (a) Front View, Upper half in section. | 10 |
| (i) | Drawing sectional upper half with cotter holes. | 8 |
| (ii) | Drawing lower half. | 2 |
| | (b) Side view, viewing from left hand side with two circles and cotter hole. | 4 |
| B) | SHAFT-A | 10 |
| | (c) Drawing conventional Front View with cotter hole. | 7 |

- (d) Drawing Side View, viewing from the right hand side. 3
- C) Others 6
- (i) Important Dimensions. 2
- (ii) Titles, Symbol of Projection, scale and line work. 4

3



SCALE 1:1
ALL DIMENSIONS ARE IN mm

ROD-B

