ENGINEERING GRAPHICS

CLASS - XII (046) 2012

DESIGN OF THE QUESTION PAPER

Time : 3 Hrs *Max. Marks : 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	
	a) Machine Parts	15
	b) Assembly / Disassembly	30
	TOTAL	**70**

B. SCHEME OF OPTIONS

1. There will be no overall options.
2. Internal Choices has been given in question of Machine Drawing.

C. WEIGHTAGE TO DIFFERENT LEVEL OF QUESTIONS

S.No.	Estimated Difficult Level	Percentage
1	Easy	15
2	Average	70
3	Difficult	15

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

ENGINEERING GRAPHICS

CLASS – XII (046)

BLUE PRINT

Time : 3 Hrs *Max. Marks : 70*

1. UNIT I -- ISOMETRIC PROJECTION OF SOLIDS 24

S.No.	Contents	Weightage
a)	Construction of Isometric Scale	4
b)	Isometric Projection of a single vertical solid	7
c)	Isometric Projection of combination of two solids	13

2. UNIT II -- MACHINE DRAWING 41

a) MACHINE PARTS 13

S.No.	Contents	Weightage
i)	Drawing of machine parts by scale 1:1 using instruments	8
ii)	Drawing of machine parts by sketching free hand	5

b) ASSEMBLY / DISASSEMBLY 28

S.No.	Contents	Weightage
i)	Orthographic Views	22
ii)	Title, Symbol of Projection, Scale, Dimension, Line Work	6

3. SIMPLE MULTIPLE CHOICE QUESTIONS 5

(based on the fundamentals of the above units.)

SAMPLE QUESTION PAPER – I

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 2, are hidden edges or lines required.
(vii) In question 4, hidden edges or lines are to be shown in views without section.
(viii) Number your answers according to questions.

Q1. Answer the following multiple choice questions. Print the correct choice on your drawing sheet. 5

(i) In isometric projection the three edges of an object are inclined to each other at
(a) 60^o (b) 120^o (c) 100^o (d) 90^o

(ii) The angle between the flanks of a metric thread is
(a) 60^o (b) 90^o (c) 75^o (d) 55^o

(iii) The number of cotters used in an assembly of sleeve and cotter joint are
(a) One (b) Five (c) Four (d) Two

(iv) A square lamina in isometric projection appears as
(a) Rhombus (b) Rectangle (c) Trapezium (d) Parallelogram

(v) Hidden / invisible edges are represented as
(a) ..... (b) ——— (c) — · · — · · — (d) - - - - - - -

Q.2 (a) Construct an isometric scale of length 80mm. 4

(b) Draw the isometric projection to isometric scale of an inverted cone (diameter=70mm, height=75mm) with the circular face on top and its axis perpendicular to the H.P. Give all the dimensions. 7

(c) A hexagonal pyramid of base edge 25mm and height 50mm, is placed centrally on the top face of a square prism of base side 80mm and height 20mm. Two of the opposite edges of the hexagonal base of the pyramid are perpendicular to the V.P. The common axes are perpendicular to the H.P. Draw the isometric projection of the combination to isometric scale and Give all the dimensions and indicate the direction of viewing. 13

Q.3 (a) Draw to scale 1:1, the standard profile of the metric thread (internal) with the pitch=50mm.Give standard dimensions. 8

OR

Draw to scale 1:1, the front view and side view of a tee headed bolt with diameter M25, keeping its axis parallel to both V.P and H.P. Give standard dimensions.

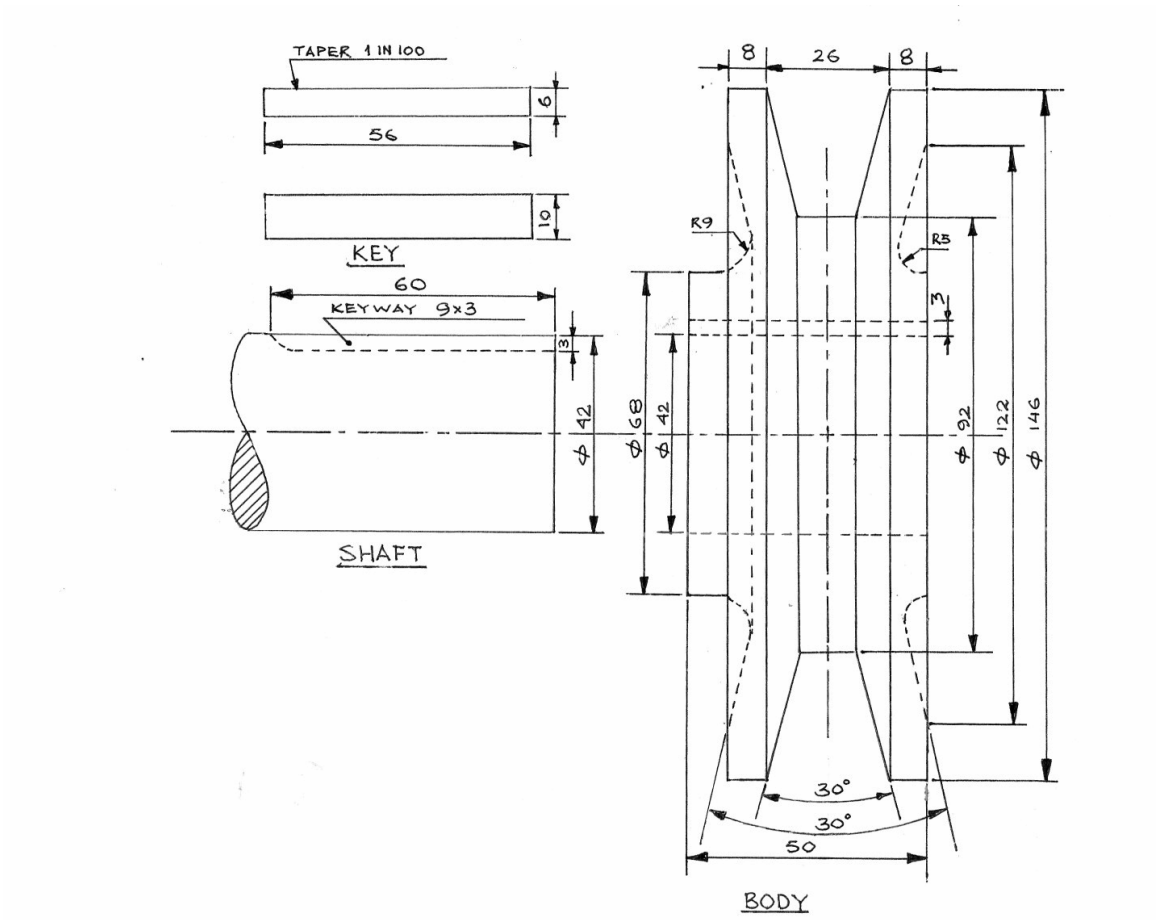
(b) Sketch free hand the front view and top view of a cheese head screw of size M20, keeping its axis vertical. Give all the standard dimensions. 5

OR

Sketch free hand the front view, top view and side view of a rectangular sunk taper key for a shaft of 60mm diameter. Give all the standard dimensions.

Q.4 Assemble the given V-Belt Pulley, Shaft and Rectangular Sunk Key as shown in Fig 1 and draw the following views, to scale 1:1: 28

(a) Front View, upper half in section.
(b) Side view looking from the right end.
(c) Give 8 important dimensions, Title, Projection symbol and Scale.



SINGLE GROOVE V-BELT PULLEY

FIG - 1

OR

Dis-assemble the Bushed Bearing as shown in Fig 2, and draw the views of the following parts:

(a) BODY

(i) Front View, left half in section.

(ii) Top View.

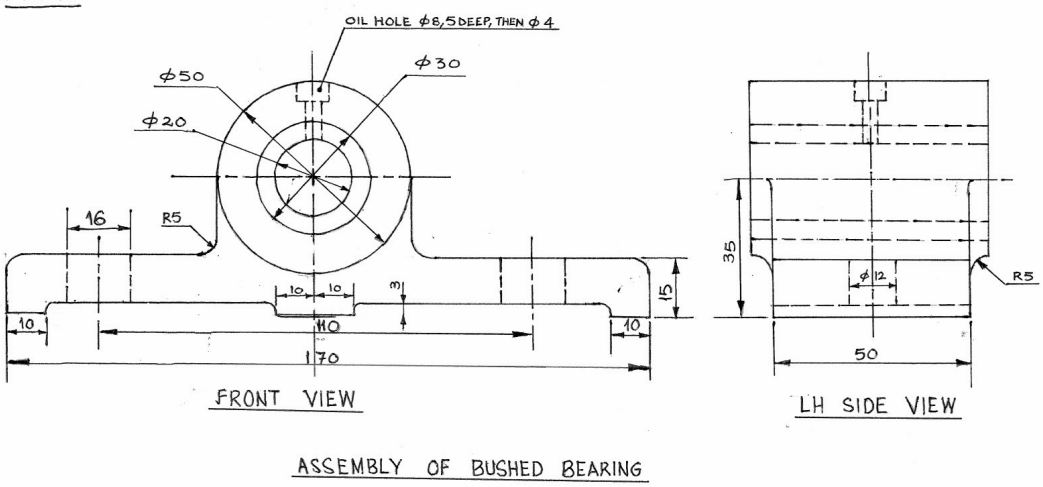
(b) BUSH

(i) Front View, right half in section.

(ii) Top View.

(c) Give 8 important dimensions, Title, Projection symbol and Scale.

FIG-2



ASSEMBLY OF BUSHED BEARING

SAMPLE QUESTION PAPER – I

VALUE POINTS

Q1 MULTIPLE CHOICE QUESTIONS

(i)	b	**1**
(ii)	a	**1**
(iii)	d	**1**
(iv)	a	**1**
(v)	d	**1**

Q2 (a) ISOMETRIC SCALE : FIG – 1.1 **4**

(i) Drawing 45° inclined lines showing true lengths 1

(ii) Projections on 30° inclined line showing isometric length with one 1mm subdivisions 2

(iii) Writing titles, sub titles and angles 1

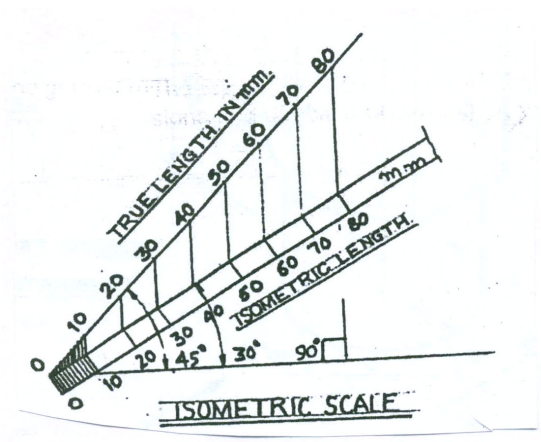


FIG – 1.1

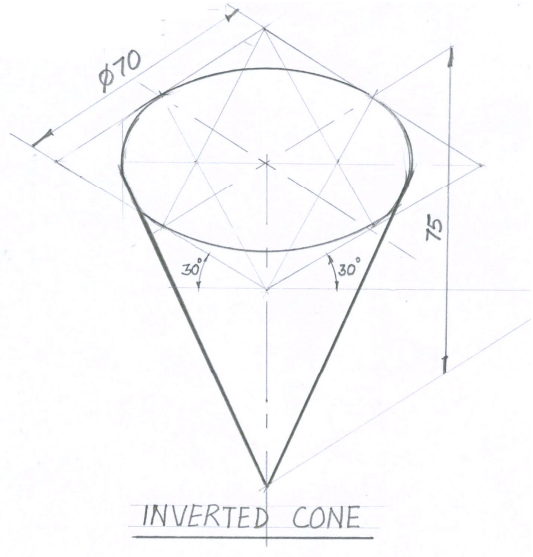


FIG – 1.2

(b) ISOMETRIC PROJECTION OF A CONE : FIG – 1.2 **7**

(i) Drawing elliptical curve 3

(ii) Drawing two generators 2

(iii) Indicating the axis 1

(iv) Three dimensions 1

(c) ISOMETRIC PROJECTION OF COMBINATION OF SOLIDS : FIG – 1.3 **13**

(i) Helping figures	1
(ii) Drawing isometric squares	2
(iii) Drawing vertical lines indicating the faces	2
(iv) Drawing hexagonal base of pyramid	2
(v) Drawing slant edges	2
(vi) Common axis, dimensioning, direction of viewing	4

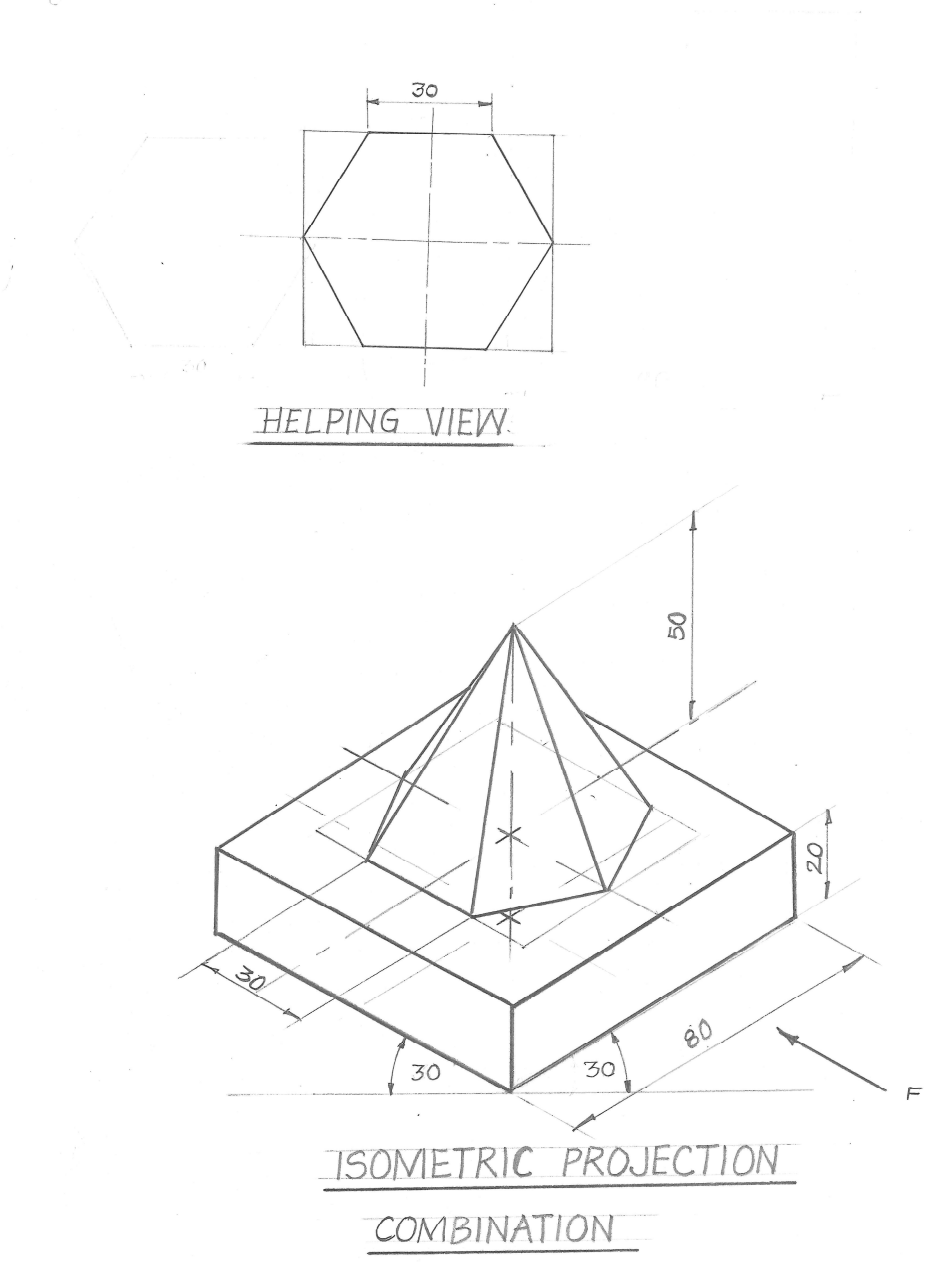


FIG – 1.3

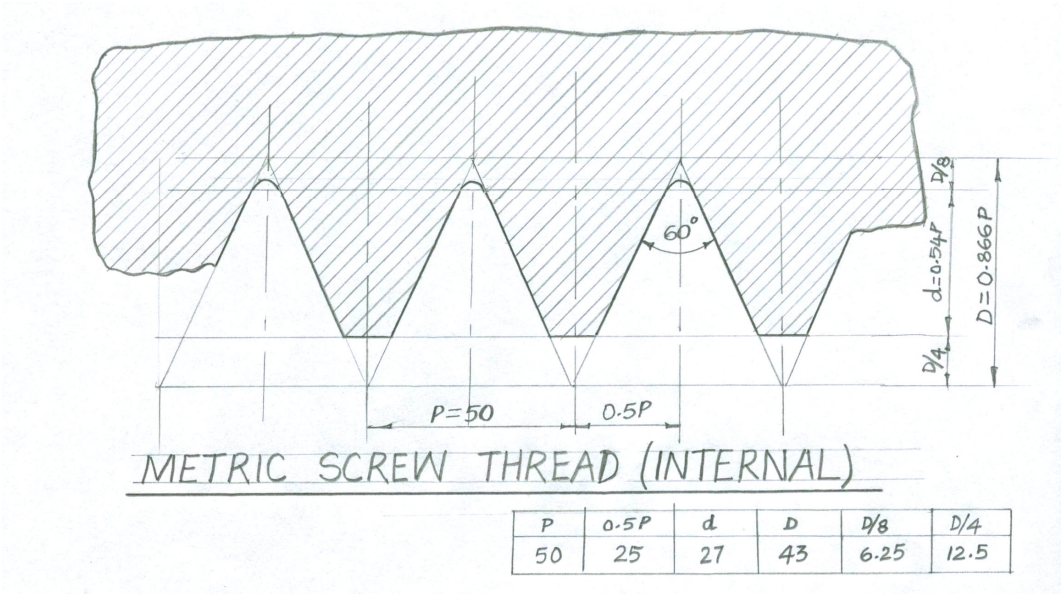
Q3 (a) METRIC THREAD (INTERNAL) : FIG – 1.4 **8**

(i) Distance equal to pitch, and angles of 60° 2

(ii) Flat edges and curves for threads 2

(iii) Side edges / flanks 2

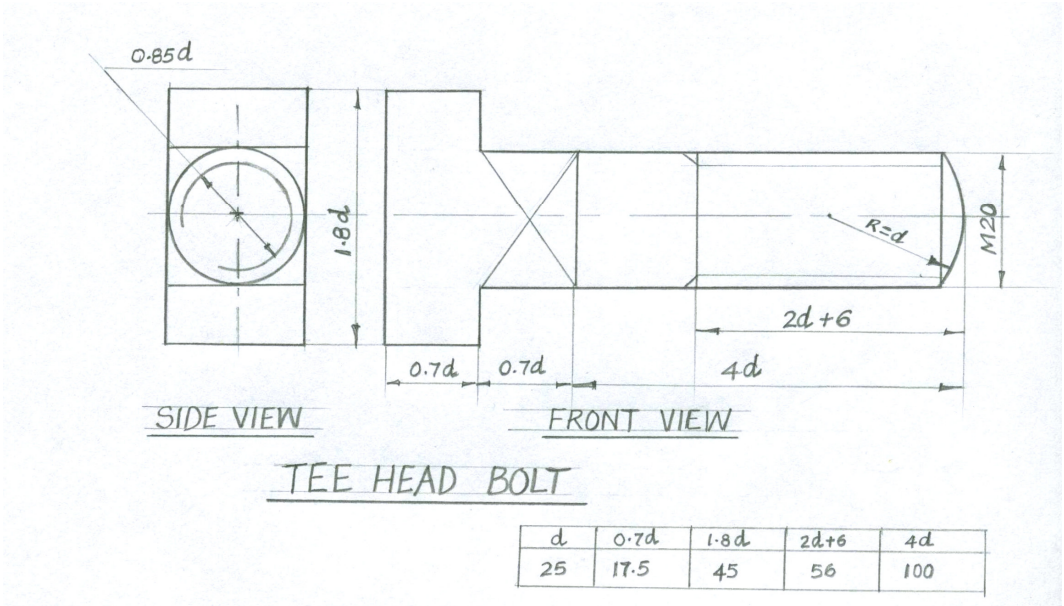
(iv) Dimensions 2



P	0.5P	d	D	D/8	D/4
50	25	27	43	6.25	12.5

FIG – 1.4

OR



d	0.7d	1.8d	2d+6	4d
25	17.5	45	56	100

FIG – 1.5

TEE BOLT : FIG – 1.5 **8**

Front View

(i) Cylindrical shank, square neck and centre line $2^1/_2$

(ii) Head of bolt 1

Side View

(i) Two circles $1^1/_2$

(ii) Square neck and rest of the portion $1^1/_2$

Dimensions $1^1/_2$

(b) CHEESE HEAD SCREW : FIG – 1.6 **5**

(i) Sketching head with threaded shank $2^1/_2$

(ii) Sketching conventional top view 1

(iii) Writing title, standard values and axis $1^1/_2$

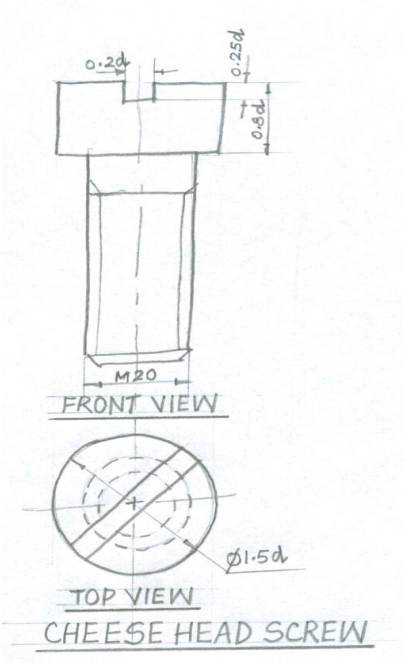


FIG – 1.6

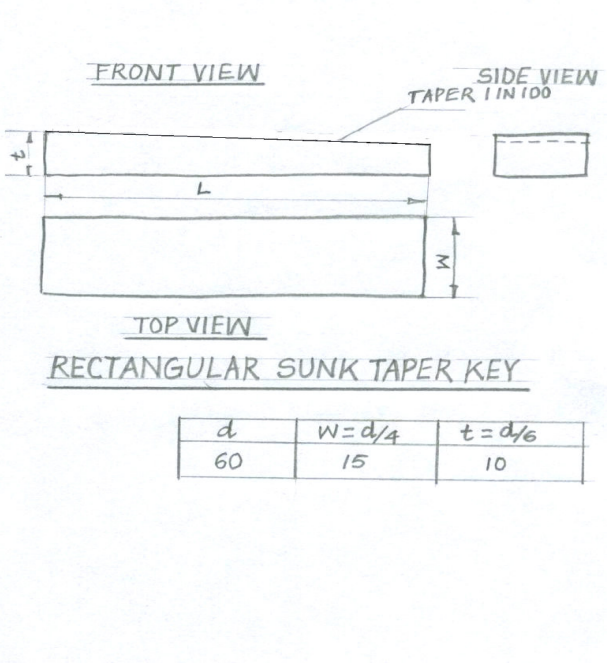


FIG – 1.7

OR

RECTANGULAR SUNK TAPER KEY : FIG – 1.7 **5**

(i) Sketching front view $1^1/_2$

(ii) Sketching top view and side view 2

(iii)Writing title and standard values $1^1/_2$

Q 4 ASSEMBLY OF V-BELT PULLEY: FIG – 1.8 **28**

(a) FRONT VIEW, UPPER HALF IN SECTION

Drawing upper half in section with V groove.	8
Drawing Lower half without section.	5

(b) SIDE VIEW, VIEWING FROM THE RIGHT HAND SIDE

Drawing five circles.	5
Drawing other details.	4

(c) OTHERS

Important Dimensions.	2
Titles, Symbol of Projection and Scale.	4

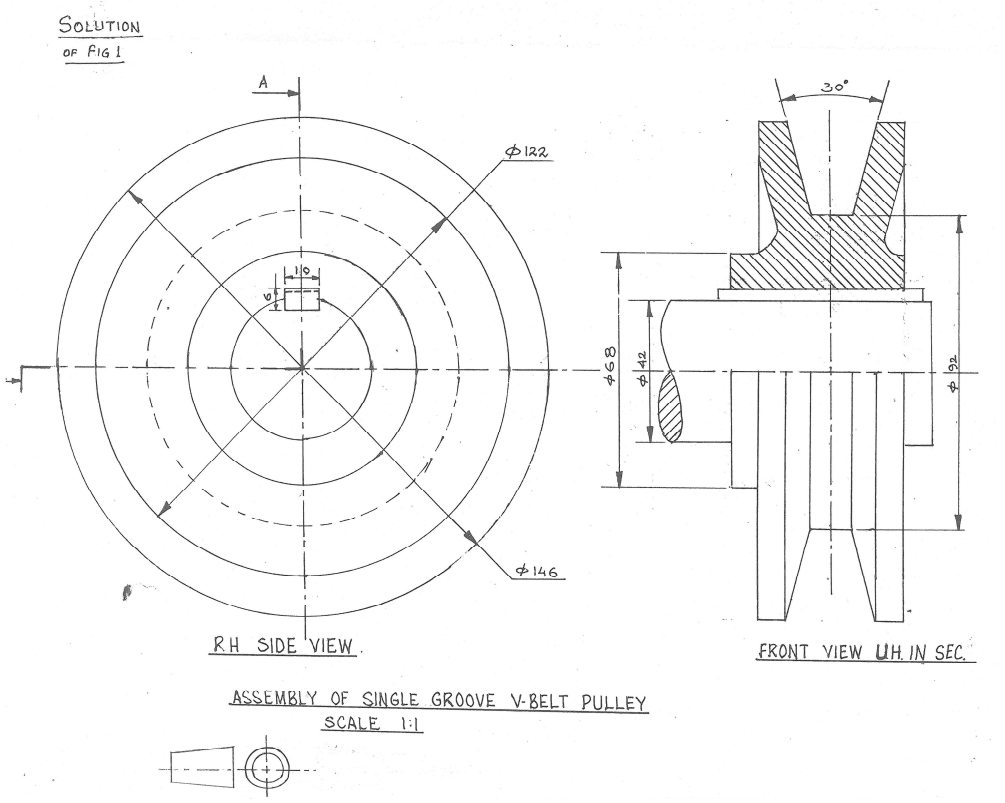


FIG – 1.8

OR

DIS-ASSEMBLY OF BUSHED BEARING: FIG – 1.9 **28**

(a) BODY

(i) Front View.

Drawing left half in section. 5

Drawing right half without section. 3

(ii) Top View. 7

(b) BUSH

(i) Front View, right half in section. 4

(ii) Top View. 3

(c) OTHERS

Important Dimensions. 2

Titles, Symbol of Projection and Scale. 4

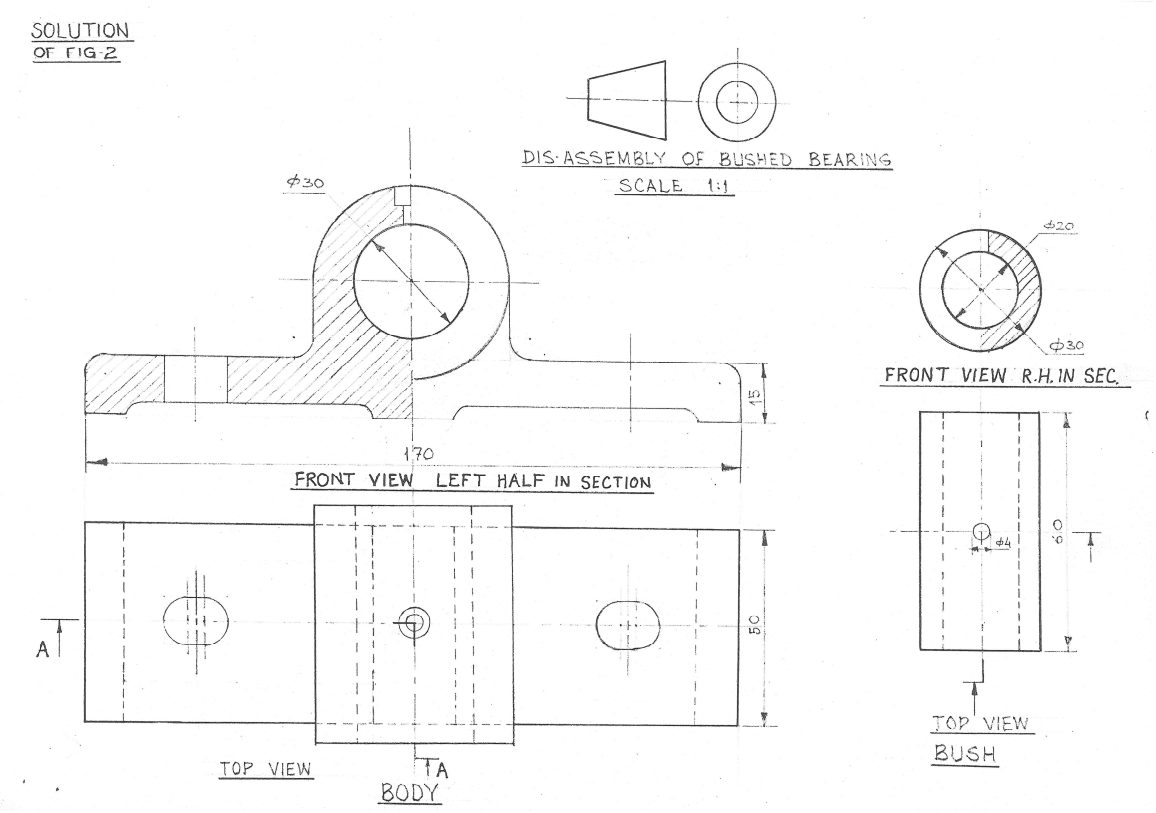


FIG – 1.9

SAMPLE QUESTION PAPER – II

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 2, are hidden edges or lines required.
(vii) In question 4, hidden edges or lines are to be shown in views without section.
(viii) Number your answers according to questions.

Q1. Answer the following multiple choice questions. Print the correct choice on your drawing sheet. 5

(i) Which one among the following represents a permanent fastener
a) Nut b) Rivet c) Screw d) Bolt

(ii) The convexity provided on the rim of the solid web cast iron pulley is called
a) Bending b) Curving c) Crowning d) Riveting

(iii) Section lines are generally inclined with the base, at an angle of
a) 30^{o} b)45^{o} c)60^{o} d)90^{o}

(iv) The isometric view of a sphere is always
a) a circle b) an ellipse c) a Parabola d) a Semicircle

(v) In isometric projection, the four center method is used to construct
a) an ellipse b) a square c) a triangle d) a rectangle

Q.2 (a) Construct an isometric scale of 80mm long. 4

(b) Construct the isometric projection to isometric scale of the frustum of a regular square pyramid, kept in the inverted position, with base edge 30mm, top edge 50mm and height 80mm, resting on the H.P., with its axis vertical. Two of the opposite parallel edges of the square face are perpendicular to the V.P. Draw the axis and indicate the direction of viewing. 7

(c) A hemisphere of diameter 60mm is placed centrally with its circular face upwards, on a pentagonal prism of base edge 50mm and height 20mm. One of the base edges of the pentagonal prism is perpendicular to the V.P. The common axes are perpendicular to the H.P. Draw the isometric projection of the combination of solids and give all the dimensions. Indicate the direction of viewing. 13

Q3. (a) Draw to scale 1:1, the front view and top view of a hexagonal nut, the bolt diameter is given as 20 mm. The axis of the nut is vertical. Give the standard dimensions. 8

OR

Draw to scale 1:1, the front view and side view of a square headed bolt of diameter 20mm, keeping its axis parallel to both V.P. & H.P. Give all the standard dimensions.

(b) Sketch free hand the front view and top view of a snap head rivet of diameter 30mm, taking its axis vertical. Give all the standard dimensions. 5

OR

Sketch free hand the front view and side view of a collar stud of size M20, keeping its axis perpendicular to the H.P. Give all the standard dimensions.

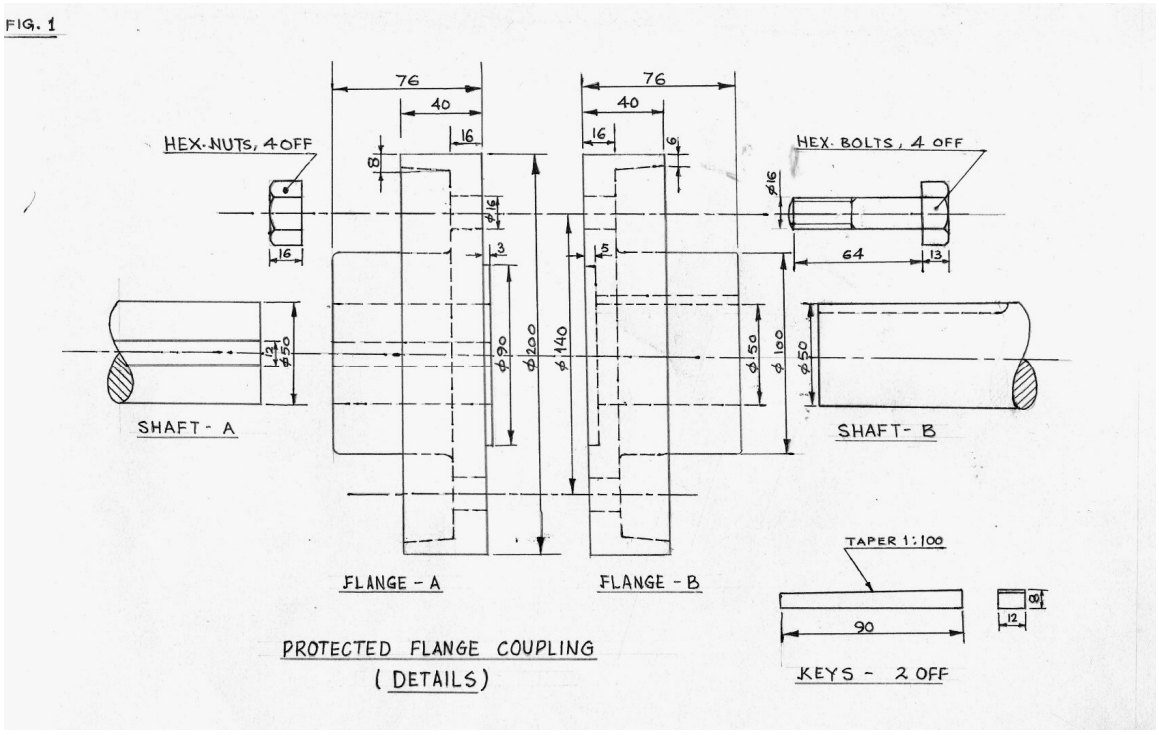
Q.4 Assemble the Protected Flange Coupling, Shaft with Nut-Bolt as shown in Fig 1 and draw the following views: 28

(a) Front View, upper half in section.

(b) Side view looking from the Left end.

(c) Give 8 important dimensions, Title, Projection symbol and Scale.

FIG. 1



OR

Dis-assemble the Gib and Cotter as shown in Fig 2, and draw the views of the following parts, to scale 1:1: 28

(a) FORK END

(i) Front View, Upper half in section.

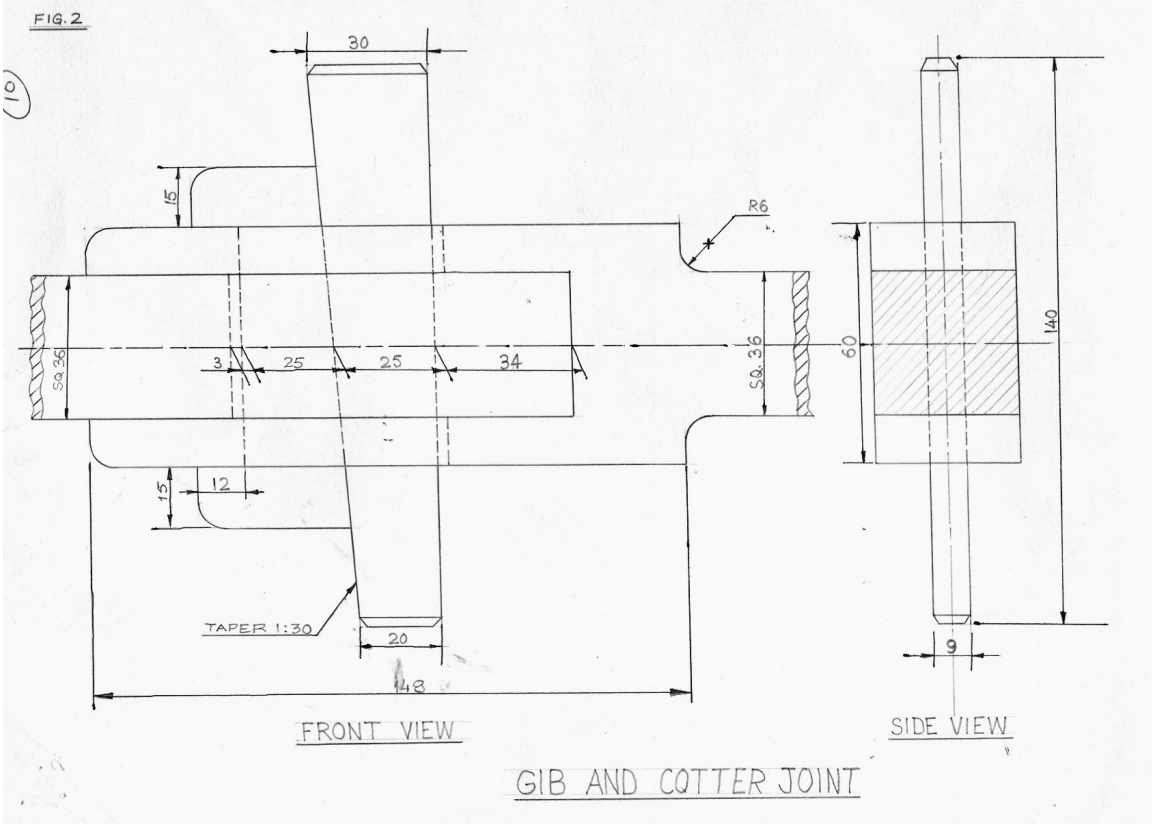
(ii) Top View.

(b) GIB

(i) Front View.

(ii) Side View.

(c) Give 8 important dimensions, Title, Projection symbol and Scale.



SAMPLE QUESTION PAPER – II

VALUE POINTS

Q1 MULTIPLE CHOICE QUESTIONS

(i)	b	**1**
(ii)	c	**1**
(iii)	b	**1**
(iv)	a	**1**
(v)	a	**1**

Q2 (a) ISOMETRIC SCALE : FIG – 2.1 **4**

(i) Drawing 45° inclined lines showing true lengths 1

(ii) Projections on 30° inclined line showing isometric length with one 1mm subdivisions 2

(iii) Writing titles, sub titles and angles 1

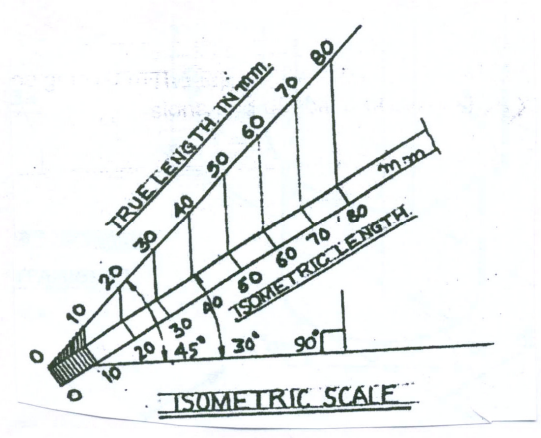


FIG – 2.1

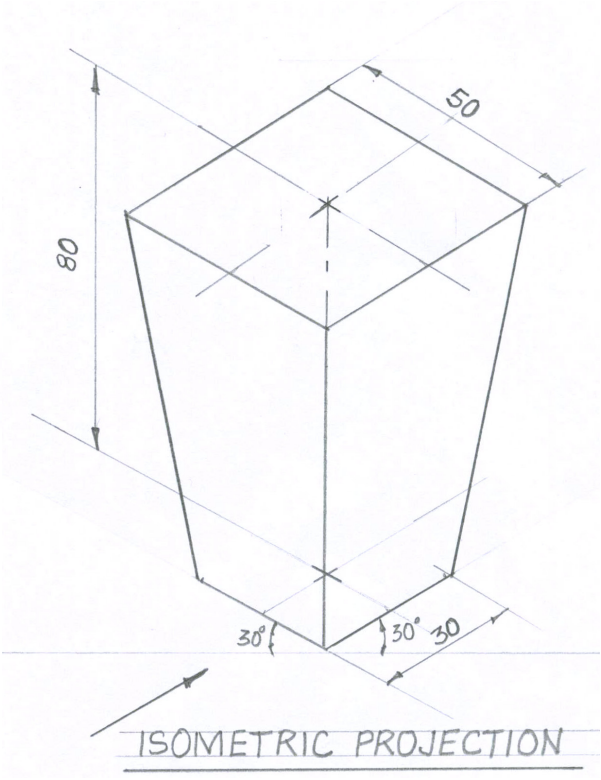


FIG – 2.2

(b) ISOMETRIC PROJECTION OF THE FRUSTUM OF AN INVERTED SQUARE PYRAMID: FIG – 2.2 **7**

(i) Drawing Isometric squares 3

(ii) Drawing slant edges 2

(iii) Axis, dimensioning, direction of viewing 2

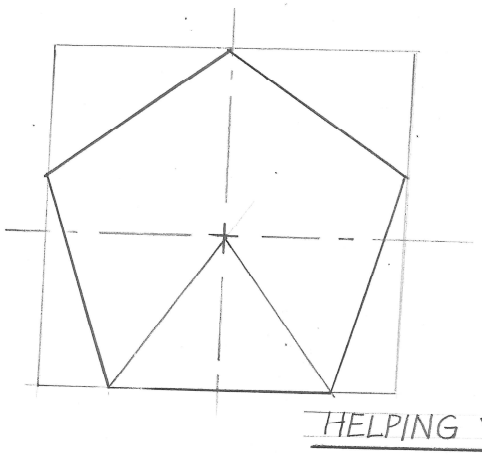
(C) ISOMETRIC PROJECTION OF COMBINATION OF SOLIDS: FIG – 2.3 **13**

(i) Helping views 1

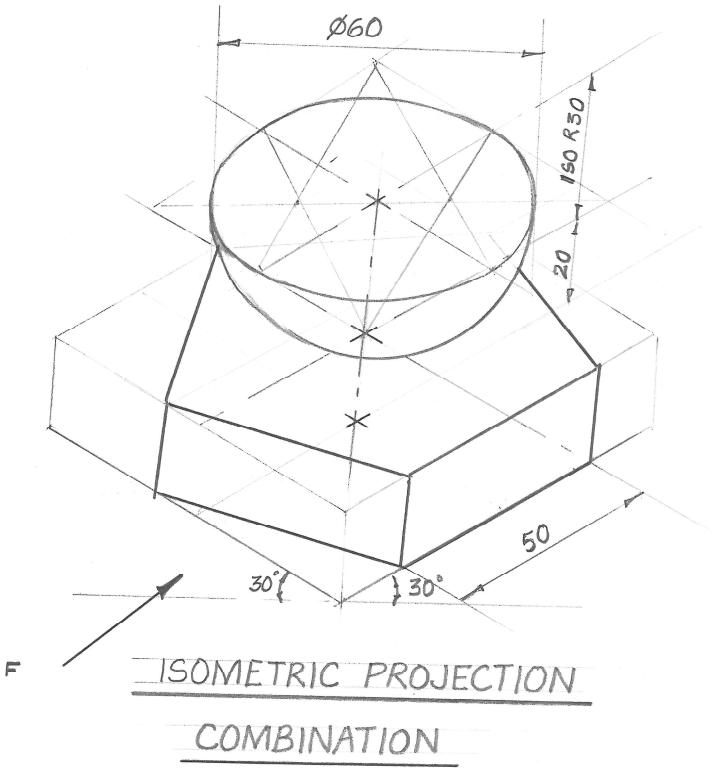
(ii) Drawing Isometric hemisphere 4

(iii) Drawing isometric pentagon with vertical lines 4

(iv) Common axis, dimensioning, direction of viewing 4



HELPING VIEWS



ISOMETRIC PROJECTION

COMBINATION

FIG – 2.3

Q3 (a) HEXAGONAL NUT : FIG – 2.4 **8**

(i) Drawing front view with details 3

(ii) Drawing top view with details 3

(iii) Dimensions and titles 2

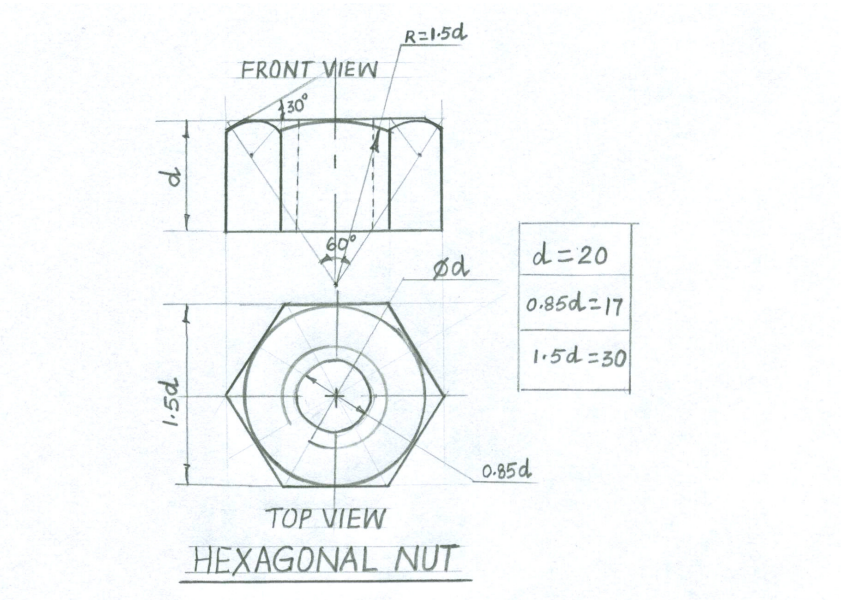


FIG – 2.4

OR

SQUARE HEADED BOLT : FIG – 2.5 **8**

(i) Drawing front view with details 3

(ii) Drawing side view with details 3

(iii) Titles and standard dimensions 2

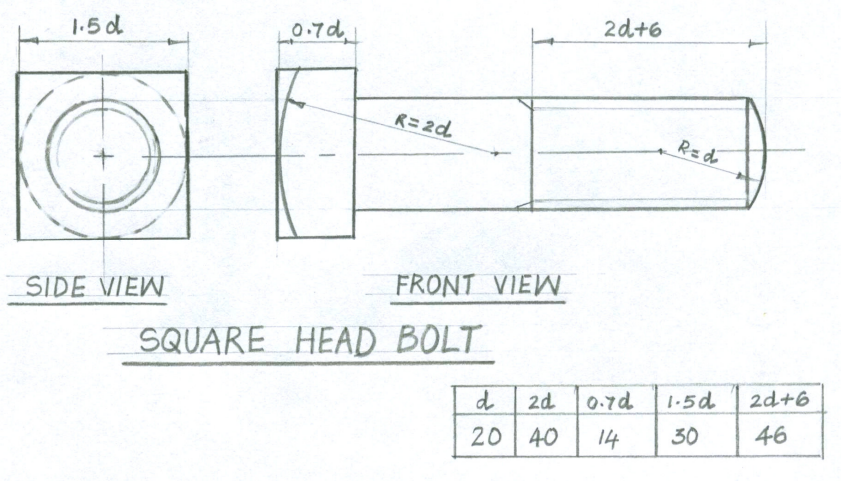


FIG – 2.5

Q3 (b) SNAP HEAD RIVET : FIG – 2.6 **5**

(i) Sketching the front view 2

(ii) Sketching the top view 1

(iii) Writing titles, standard values and axis 2

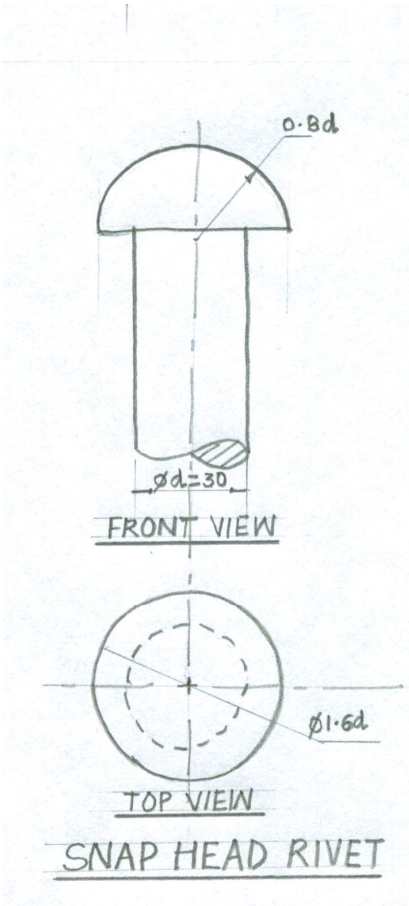


FIG – 2.6

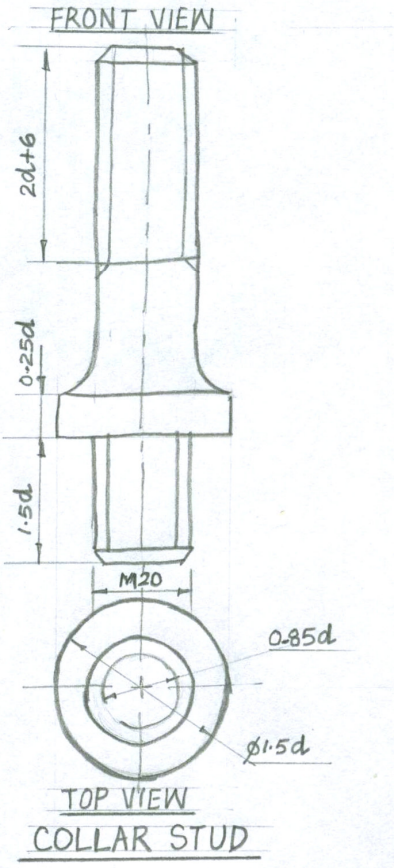


FIG – 2.7

OR

COLLAR STUD : FIG – 2.7 **5**

(i) Sketching stud with collar 2

(ii) Sketching the top view 1

(iii) Writing titles, standard values and axis 2

Q4 ASSEMBLY OF PROTECTED FLANGE COUPLING : FIG – 2.8 **28**

(a) FRONT VIEW

Drawing upper half in section. 9
Drawing Lower half without section. 4

(b) SIDE VIEW

Drawing six circles. 5
Drawing other details. 4

(c) OTHERS

Important Dimensions. 2
Titles, Symbol of Projection and Scale. 4

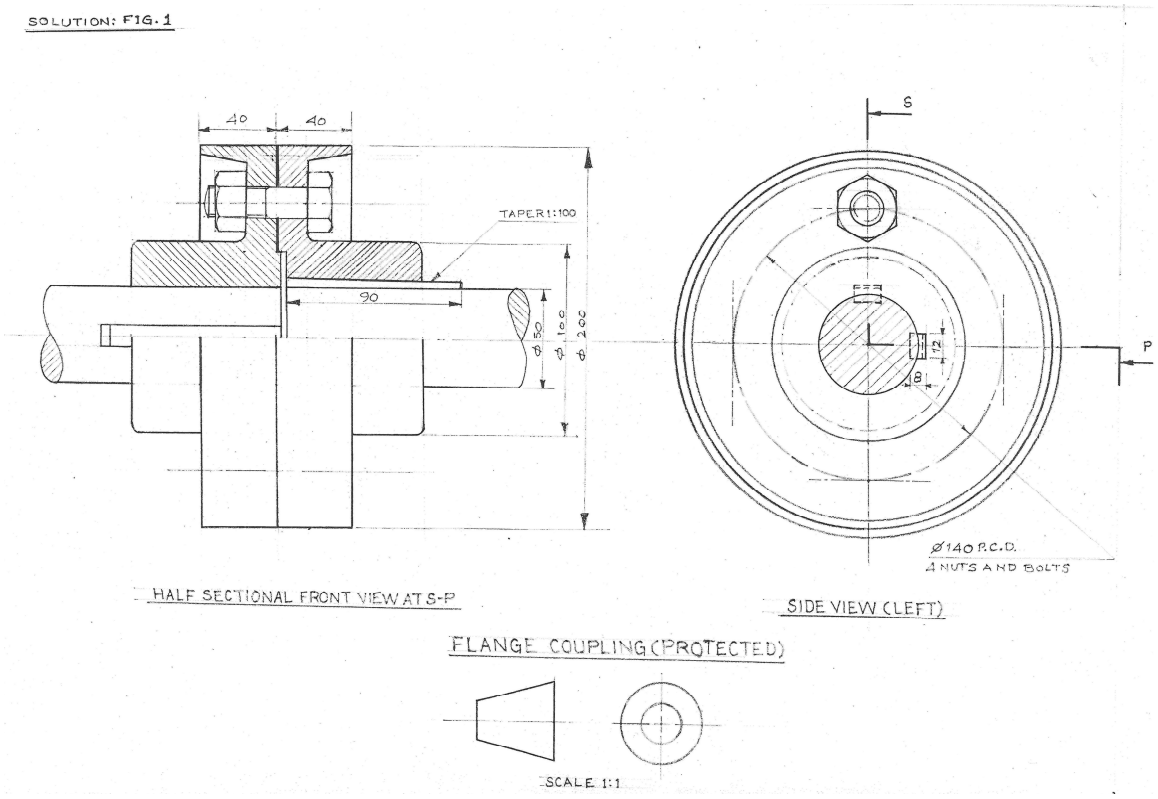


FIG – 2.8

OR

DIS-ASSEMBLY OF GIB AND COTTER JOINT : FIG – 2.9 **28**

(a) FORK END

(i) Front View

Drawing upper half in section 5
Drawing lower half without section. 3

(ii) Top View. 6

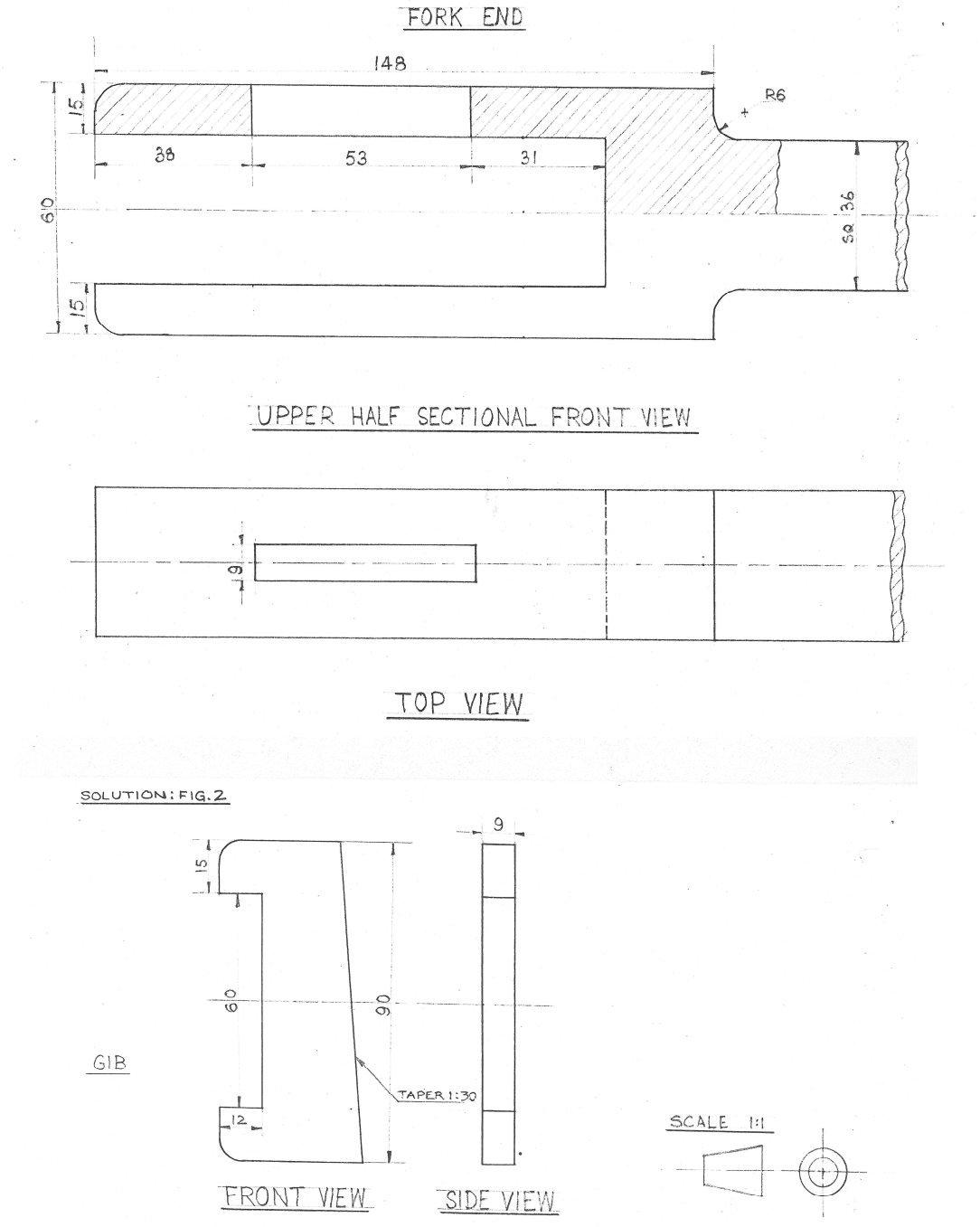
(b) GIB

(i) Front View, right half in section. 5
(ii) Top View. 3

(c) OTHERS

Important Dimensions. 2
Titles, Symbol of Projection and Scale. 4

SOLUTION: FIG.2



SOLUTION: FIG.2

FIG – 2.9

SAMPLE QUESTION PAPER – III

ENGINEERING GRAPHICS (046)

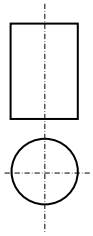
Time Allowed: 3 hours *Maximum Marks: 70*

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 2, are hidden edges or lines required.
(vii) In question 4, hidden edges or lines are to be shown in views without section.
(viii) Number your answers according to questions.

Q1. Answer the following multiple choice questions. Print the correct choice on your drawing sheet. 5

(i) With respect to the elevation and plan given below, name the solid



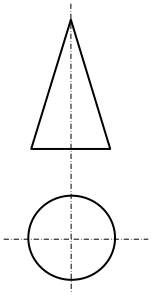
(a) Cone
(b) hexagonal prism
(c) cylinder
(d) hexagonal pyramid

(ii) A footstep bearing is a
a) journal bearing b) thrust bearing c) pivot bearing d) pedestal bearing

(iii) The angle between the flanks of B.S.W. thread is
a) 60^{o} b) 65^{o} c) 55^{o} d)75^{o}

(iv) Top view is projected on the
a) Vertical Plane b) Corner Plane c) Side Plane d) Horizontal Plane

(v) With respect to the front view and top view given below, name the solid



(a) Cone
(b) Cylinder
(c) Cube
(d) Frustum

Q.2 (a) Construct an isometric scale of length 70mm. 4

(b) Construct the isometric projection to isometric scale, of the frustum of a regular pentagonal pyramid of base edge 50mm and top edge 30mm, with its pentagonal end resting on the H.P. The height of the solid is 70 mm with its axis perpendicular to the H.P. One of the base edge, which is nearer the observer is parallel to the V.P. Draw the axis and indicate the direction of viewing. 7

(c) A cylinder of diameter 40mm and height 50mm is placed centrally on the top surface of a circular disc of diameter 60mm and height 20mm. The common axes are perpendicular to the H.P. Draw the isometric projection of the solids to isometric scale. Give all dimensions. 13

Q.3 (a) Draw to scale 1:1 the standard profile of a square thread and a knuckle thread, taking the enlarged pitch as 40mm. Give all the standard dimensions. 8

OR

Draw to scale 1:1, the sectional front view and top view of a single riveted lap joint for the plates of thickness 25mm. Give all the standard dimensions.

(b) Sketch free hand the front view and top view of a grub screw of diameter 25mm, keeping its axis vertical. Give all the standard dimensions. 5

OR

Sketch free hand the front view and side view of a plain stud of size M20, keeping its axis parallel to both V.P. & H.P. Give all the standard dimensions.

Q.4 Assemble the given parts of a Plummer Block as shown in Fig 1 and draw, to scale 1:1; 28

(a) Front View, left half in section.

(b) Give 8 important dimensions, Title, Projection symbol and Scale.

OR

Dis-assemble the Sleeve and Cotter Joint as shown in Fig 2, and draw the views of the following parts: 28

(a) SLEEVE

(i) Front View, Top half in section.

(ii) Side View, viewing from left.

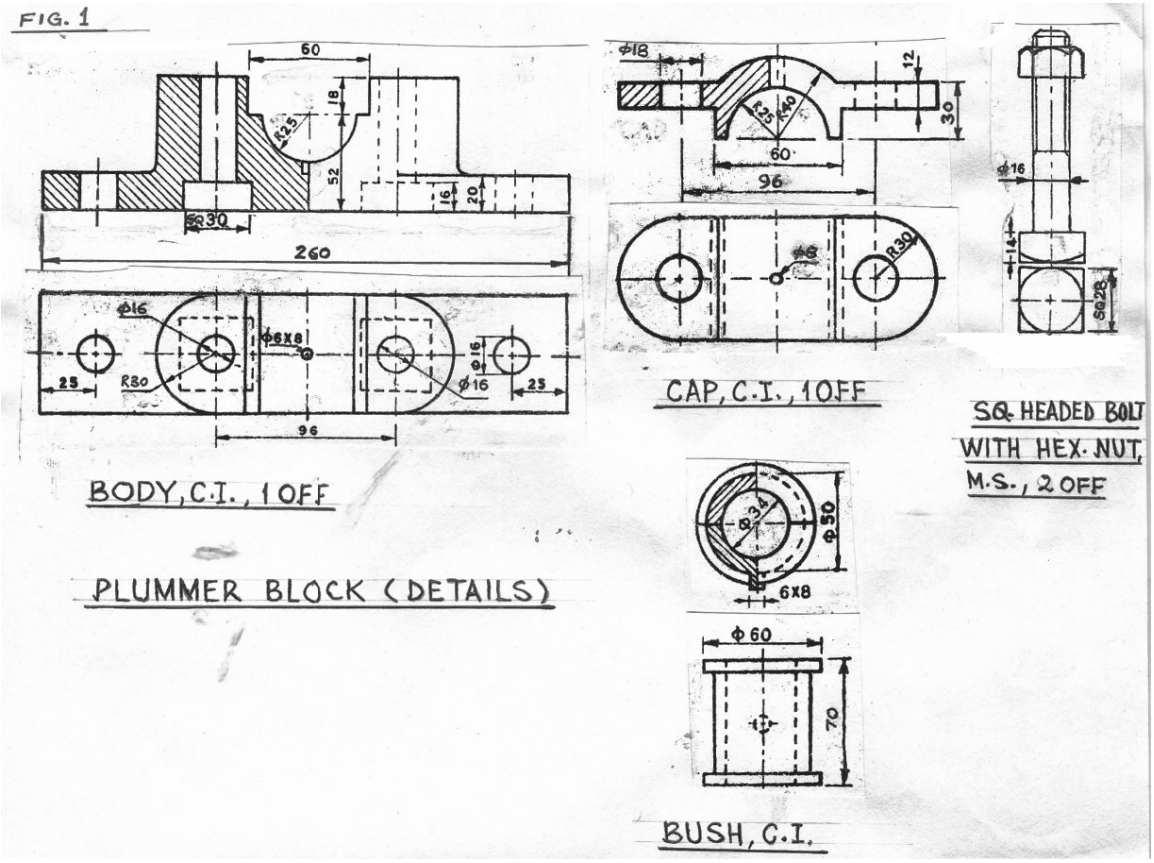
(b) COTTER

(i) Front View.

(ii) Top View.

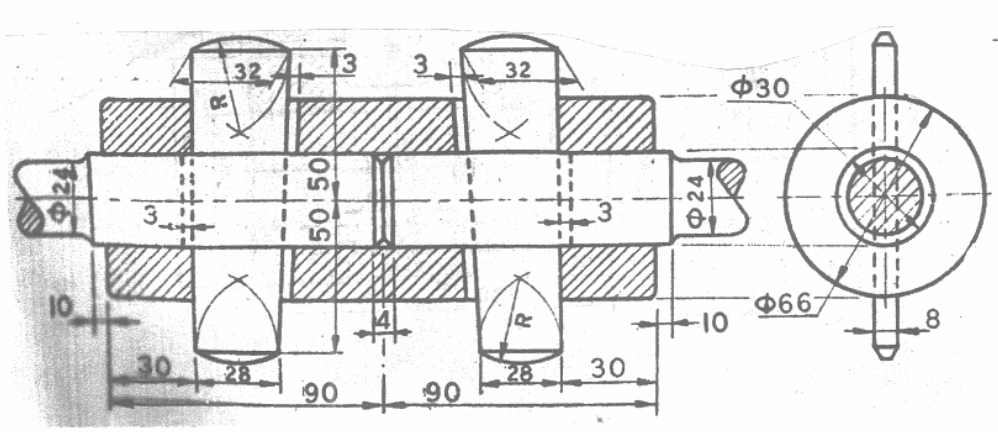
(c) Give 8 important dimensions, Title, Projection symbol and Scale.

FIG. 1



PLUMMER BLOCK (DETAILS)

FIG. 2



SLEEVE AND COTTER JOINT (ASSEMBLY)

SAMPLE QUESTION PAPER – III

VALUE POINTS

Q1 MULTIPLE CHOICE QUESTIONS

(i)	c	**1**
(ii)	c	**1**
(iii)	c	**1**
(iv)	d	**1**
(v)	a	**1**

Q2 (a) ISOMETRIC SCALE : FIG – 3.1 **4**

(i) Drawing 45° inclined lines showing true lengths 1

(ii) Projections on 30° inclined line showing isometric length with one 1mm subdivisions 2

(iii) Writing titles, sub titles and angles 1

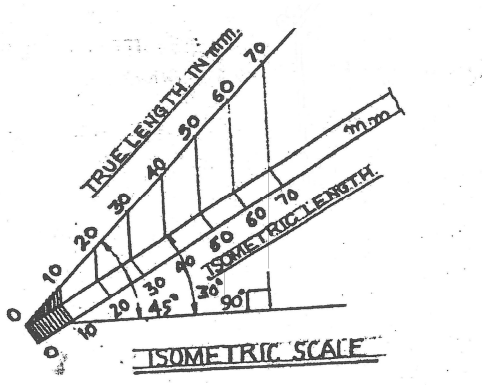


FIG – 3.1

(b) ISOMETRIC PROJECTION OF FRUSTUM OF PENTAGONAL PYRAMID : FIG – 3.2 **7**

(i) Helping view 1

(ii) Drawing Isometric pentagons 2

(iii) Drawing slant edges 2

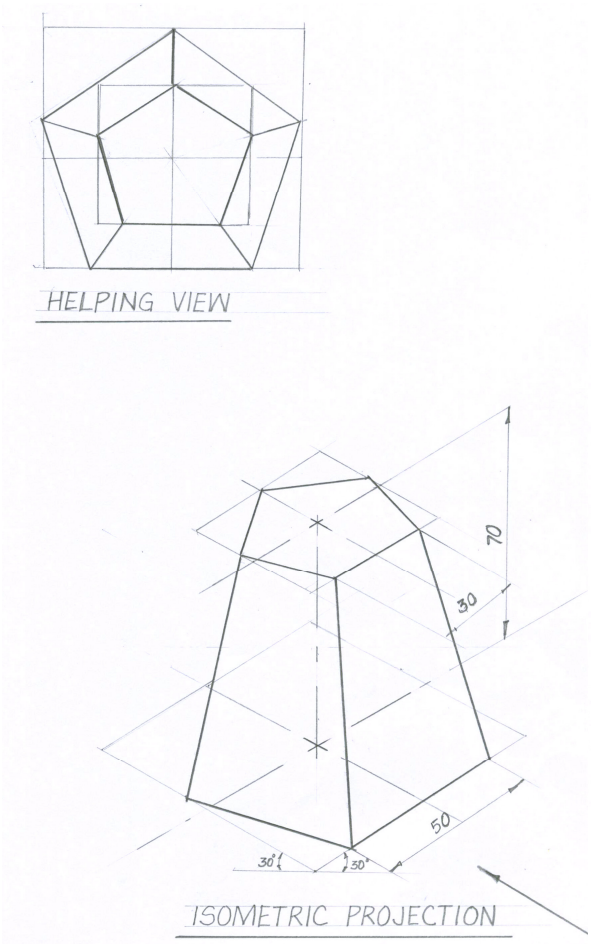
(iv) Axis, dimensioning, direction of viewing 2

(c) ISOMETRIC PROJECTION OF COMBINATION OF SOLIDS : FIG – 3.3 **13**

(i) Drawing four elliptical curves 6

(ii) Drawing generators 4

(iii) Common axis, dimensioning 3



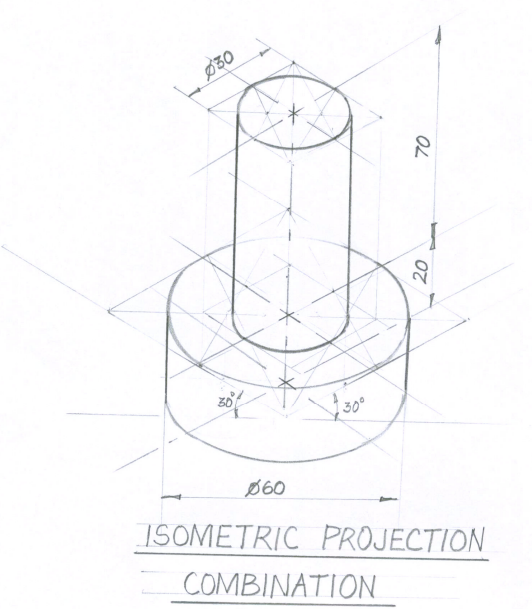


FIG – 3.3

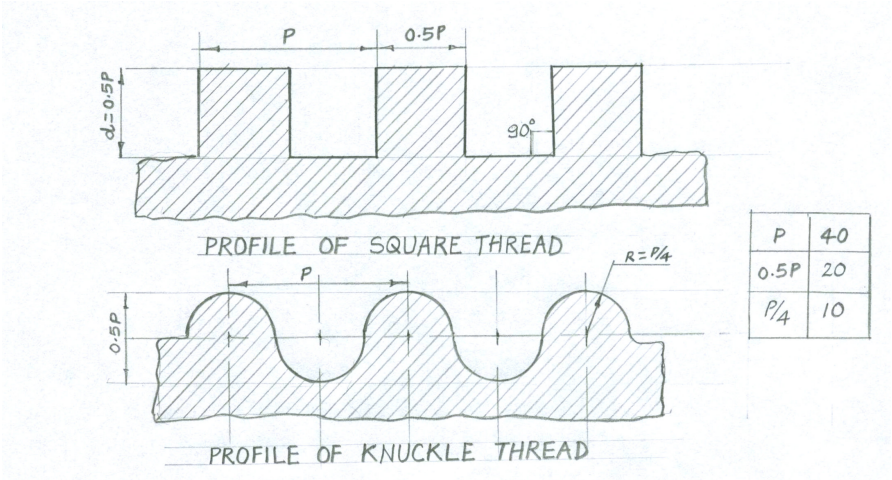
FIG – 3.2

Q3 (a) SQUARE THREAD AND KNUCKLE THREAD : FIG – 3.4 **8**

(i) Drawing the square profile 3

(ii) Drawing the knuckle profile 3

(iii) Dimensions and titles 2



OR

SINGLE RIVETED LAP JOINT : FIG – 3.5 **8**

(i) Front view with details 3

(ii) Top view with details 3

(iii) Dimensions and titles 2

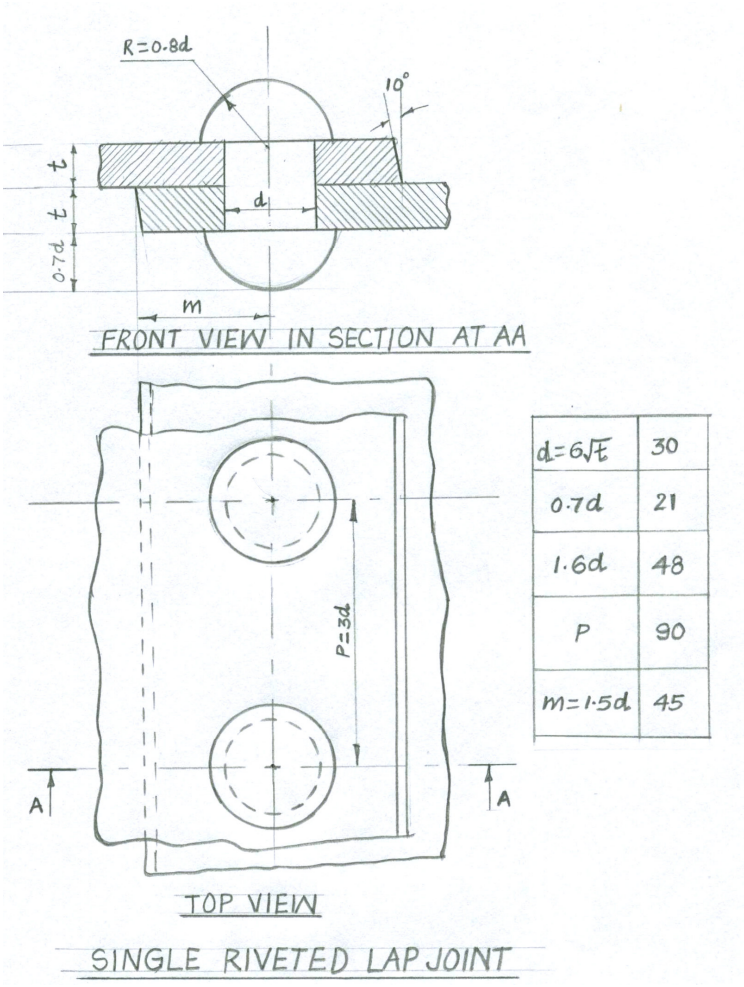


FIG – 3.5

Q3 (b) GRUB SCREW : FIG – 3.6 **5**

(i) Front view with its axis 2

(ii) Top view 2

(iii) Dimensions 1

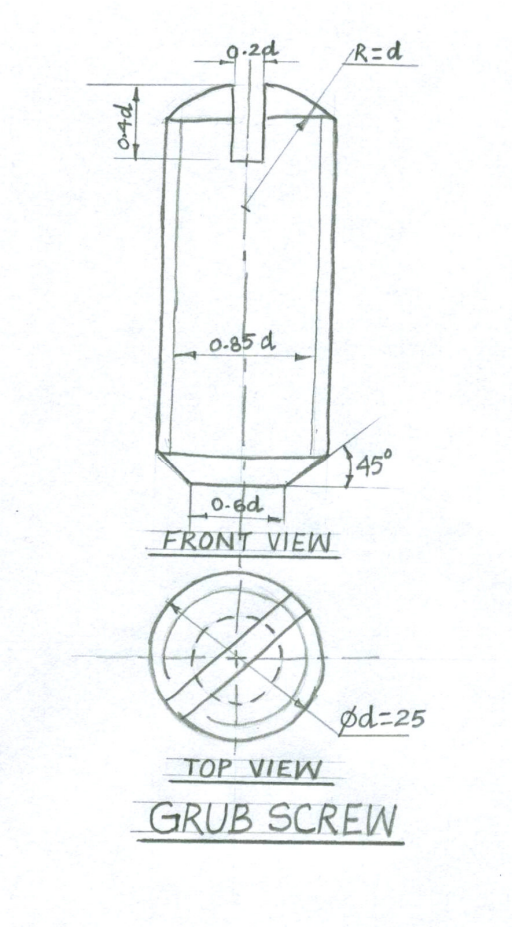


FIG – 3.6

OR

PLAIN STUD : FIG – 3.7 **5**

(i)	Sketching the front view	2
(ii)	Sketching the side view	1
(iii)	Writing the titles and standard values	2

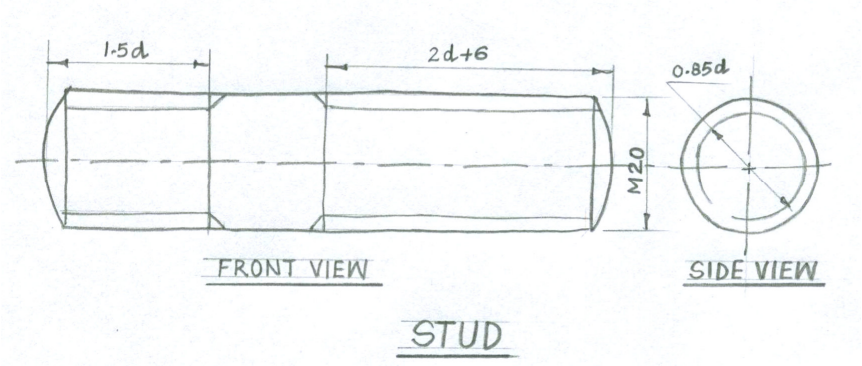


FIG – 3.7

Q4 ASSEMBLY OF PLUMMER BLOCK : FIG – 3.8 **28**

(a) FRONT VIEW

Drawing left half in section	12
Drawing right half without section	10

(b) OTHERS

Important Dimensions	2
Titles, Symbol of Projection and Scale	4

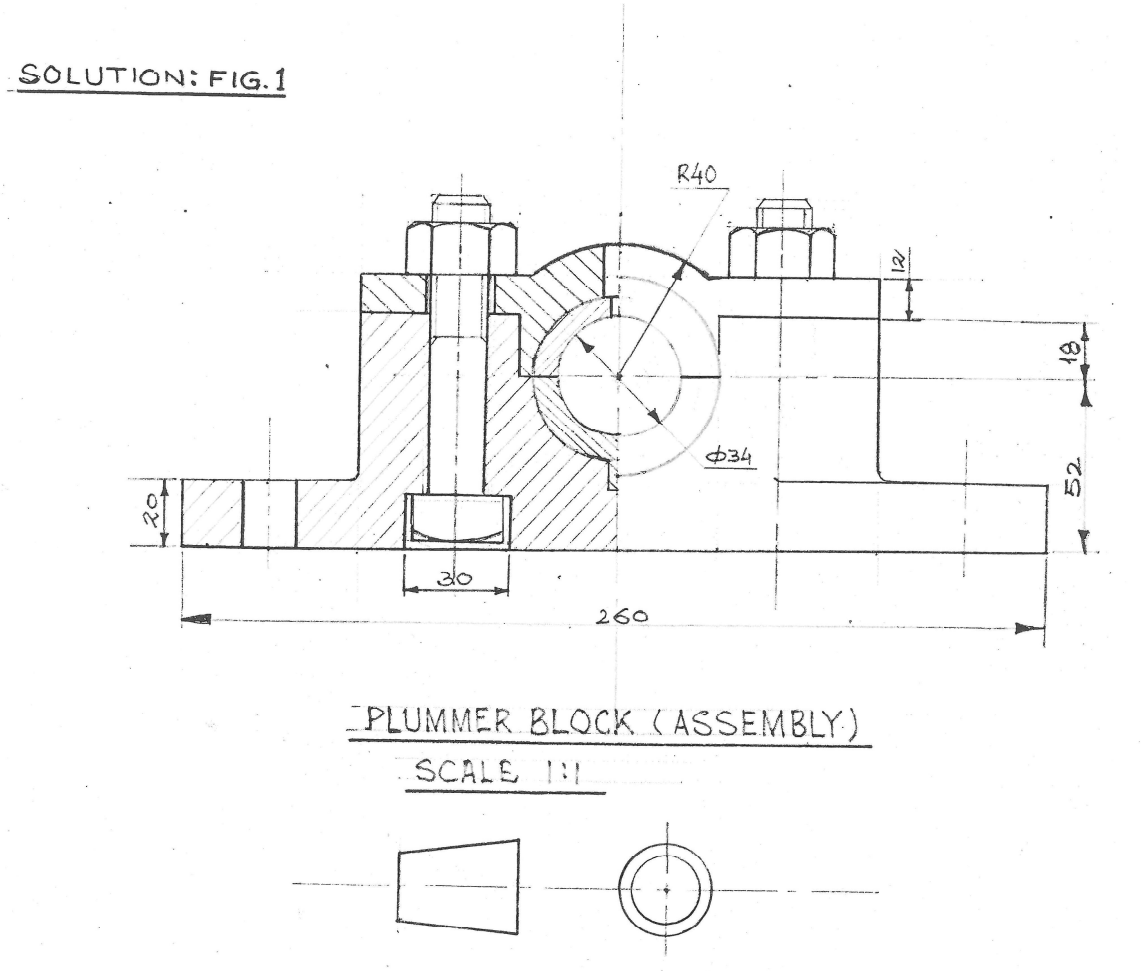


FIG – 3.8

OR

DIS-ASSEMBLY OF SLEEVE AND COTTER JOINT : FIG – 3.9 **28**

(a) SLEEVE

(i) Front View, upper half in section.

Drawing upper half in section.	6
Drawing right half without section.	3

(ii) Side View 7

(b) COTTER

(i) Front View	3
(ii) Top View	3

(c) OTHERS

Important Dimensions	2
Titles, Symbol of Projection and Scale	4

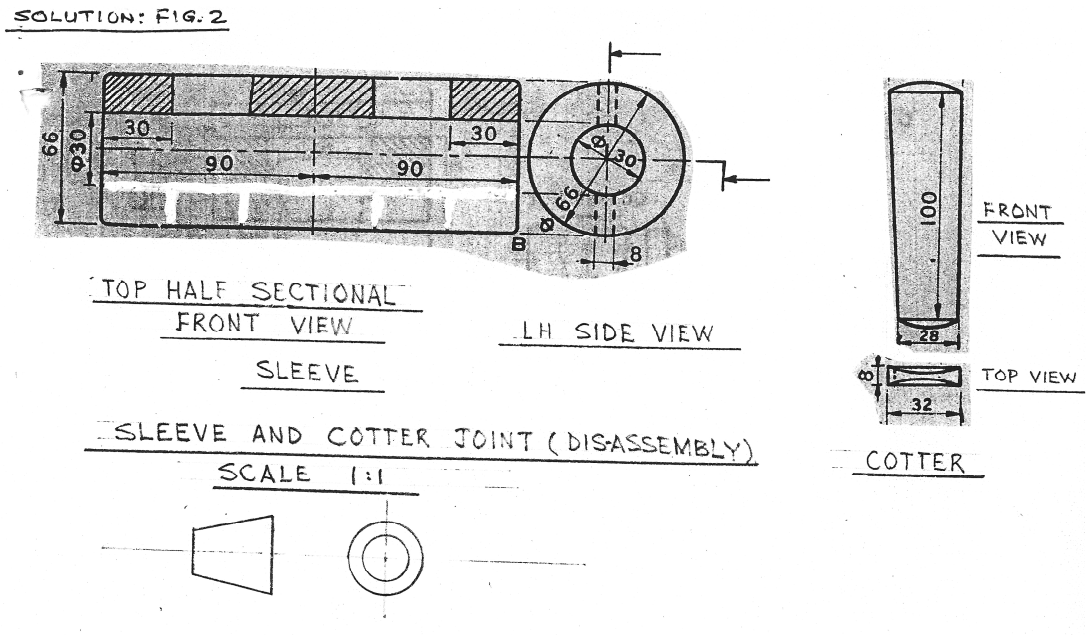


FIG – 3.9