


Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

	Course Title: ENGINEERING DRAWING-I		
	Credits (L:T:P) : 0:2:4	Total Contact Hours: 78	Course Code: 15CE12D
	Type of Course: Tutorials and Drafting	Credit : 03	Core/ Elective: Core
CIE- 25 Marks		SEE- 100 Marks	

(Common to all Civil Engineering (GL) / Civil Engineering (Draughtsman)/ Civil Engineering (Environmental)/ Civil Engineering (Public Health Engineering)/ Civil Engineering (Water Technology and Health Sciences) Programme)

Prerequisites: Basic Geometry in Secondary Education and zeal to learn the course.

Course Objectives:

1. The course is aimed at developing Basic Drawing skills.
2. Develop Skills in Preparation of Basic Drawings.
3. Skills in Reading and Interpretation of Engineering Drawings.

On successful completion of the course, the students will be able to:

Course Outcome		CL	Linked PO	Teaching Hrs
CO1	Acquire Knowledge to use the drawing instruments effectively and able to dimension the given figures and print letters	R/U/Ap	1,2,3,4,9	15
CO2	Appreciate the usage of engineering curves in solving civil engineering drafting problems and develop attitude of lifelong learning.	R/U/Ap	1,2,3,4,9	15
CO3	Develop a scale for any map and able to read it	R/U/Ap	1,2,3,4 5,6,8,9	6
CO4	Discover the concept of projection and acquire visualization skills related to projections of points, Lines and Planes.	R/U/Ap/ Ay	1,2,3,4 5,6,8,9,10	42
Total sessions				78

Legend- R: Remember U: Understand Ap: Application Ay: Analysis

Programme outcome Attainment Matrix

Course	Programme Outcome									
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
	Basic knowledge	Discipline knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & Sustainability	Ethics	Individual and Team work	Communication	Life long learning
ENGINEERING DRAWING-I	3	3	3	3	3	-	-	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

COURSE CONTENTS

UNITS	CONTENT	HOURS
1	INTRODUCTION TO ENGINEERING DRAWING AND LETTERING PRACTICE Drawing Instruments Standard Sizes of Drawing sheets-Layout of drawing sheets Types of lines and their applications Different types of lettering as per I.S.I; uppercase letters of vertical and slanting type as per I.S.I Numerical figures of vertical and slanting type as per I.S.I.	09
2	DIMENSIONING PRACTICE Introduction to Dimensioning, Elements of Dimensioning, Systems of Dimensioning, Methods of arrangements of Dimensioning Dimensioning of common features like diameters, radii, arcs and chords. Dimensioning of simple civil Engineering Objects.	06
3	GEOMETRICAL CONSTRUCTIONS AND CONIC SECTIONS Drawing of tangents to circles and arcs, Drawing a common tangent of given arcs to circles of equal or unequal radii. Inscribing a circle in a regular polygon -Inscribing circles touching each side of a regular polygon and its two adjacent circles. Inscribing circles touching two sides of polygon and two other circles - graded exercises. Division of a line into equal number of parts Introduction to conic sections-Types of conic section	15

	Construction of ellipse by Intersecting lines method (Rectangular and parallelogram methods) and Concentric circles method Construction of parabola by rectangle method, parallelogram method and tangential method.	
4	SCALES Construction of plain and diagonal scales and marking distances on scales constructed - exercises	06
5	ORTHOGRAPHIC PROJECTION AND PROJECTION OF POINTS Introduction to orthographic projection-Principal planes of projection-Four Quadrants- Concept of First angle & Third angle projection methods-Projection of points in all the four quadrant system.	12
6	PROJECTION OF LINES AND PLANES SURFACES (Only first angle projection) Projection of lines – Line Parallel to both HP and VP, Line parallel to one plane and Perpendicular to other-Line parallel to one plane and Inclined to the other, Line inclined to both HP and VP. Projection of plane Surfaces -Construction of polygons Plane surface parallel to one plane and Perpendicular to other two – Plane surface Perpendicular to one plane and inclined to the other- Plane surface inclined to both HP and VP	30

Total Hours= 78 Hours

Note: Grade exercises Plan in each unit should be as per table provided below.

Course Delivery: The course will be delivered through lectures with classroom practices and Power point presentations/ Video.

Course Assessment and Evaluation Scheme:

	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment method	CIE*	IA	Students	Graded Exercises (Average of marks allotted to each graded exercise)	25	Drawing Sheets	1,2,3,4
	SEE*	End Exam		End of the course	100	Answer scripts at BTE	1,2,3,4
Indirect Assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1, 2 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3,4,Effectiveness of Delivery of instructions & Assessment Methods

*CIE – Continuous Internal Evaluation

*SEE – Semester End Examination

Weightage of Marks and blue print of marks for SEE

Unit	Major Topics	Hours Allotted	Questions to be set for SEE				Marks weightage	weightage (%)	A*	B*
			Cognitive Levels							
			R	U	Ap	Ay				
1	Introduction to Engineering drawing and lettering practice	9	15%	45%	40.00%	0.00%	18	12	1	
			3	8	7	0				
2	Dimensioning practice	6	20%	60%	20.00%	0.00%	11	8	1	
			2	7	2	0				
3	Geometrical constructions and conic sections	15	25.00%	55.00%	20.00%	0.00%	29	19	3	
			7	16	6	0				
4	Scales	6	20.00%	40.00%	40.00%	0.00%	12	8		1
			2	5	5	0				
5	Orthographic projection and projection of points	12	15.00%	30.00%	30.00%	20.00%	22	15	1	1
			3	7	7	5				
6	Projection of lines and plane surfaces	30	15.00%	35.00%	30.00%	20.00%	58	38		4
			9	20	17	12				
Total		78	18.30%	44.20%	25.70%	5.70%	150	100	6	6

Legend- R; Remember U: Understand Ap: Application Ay: Analysis

A*-SEE QUESTIONS TO BE SET FOR (10 MARKS) in PART – A

B*- SEE QUESTIONS TO BE SET FOR (15MARKS) in PART – B

Questions for CIE and SEE will be designed to evaluate the various educational components such as:

Sl. No	Bloom's taxonomy	% in Weightage
1	Remembering and Understanding	63
2	Applying the knowledge acquired from the course	26
3	Analysis	11

Graded Exercise Plan

UNIT NO	NAME OF THE UNIT	SHEETS	TITLE OF THE DRAWING	MINIMUM NO OF EXERCISE
I	INTRODUCTION TO ENGINEERING DRAWING AND LETTERING PRACTICE	1	Use of drawing instruments	06
		3	Lettering	10
II	DIMENSIONING PRACTICE	3	Dimensioning	15
III	GEOMETRICAL CONSTRUCTIONS AND CONIC SECTIONS	2	Arc and line tangents	12
		2	Inscribing circles in polygon	10
		2	Ellipse and parabola	10

IV	SCALES	3	Plain and Diagonal scales	15
V	ORTHOGRAPHIC PROJECTION AND PROJECTION OF POINTS	2	Projection of Points	10
VI	PROJECTION OF LINES AND PLANE SURFACES	3	Projection of Lines	20
		3	Projection of Planes	20
	TOTAL	24		128



TEXT BOOK

1. K.R.Gopalakrishna "Fundamentals of Drawing" Subhas Publications, 2010.
2. K.R.Gopalakrishna "Engineering Drawing" (Vol. I & II), Subhas Publications, 2014.

REFERENCES

1. R.K. Dhawan, "A text book of Engineering Drawing", S.Chand Publishers, Delhi, 2010.
2. G.S. Phull and H.S.Sandhu, "Engineering Graphics", Wiley Publications, 2014.
3. K.Venugopal and V.Prabhu Raja, "Engineering Graphics", New Age International Private Limited, 2008.
4. M.B.Shah and B.C.Rana, "Engineering Drawing", Pearson Education, 2005.
5. Dhananjay A.Jolhe, "Engineering Drawing with an Introduction to AutoCAD", Tata McGrawHill Publishing Company Limited, 2008.
6. Basant Agarwal and Agarwal.C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
7. IS 962 (1989) Code of practice for Architectural and Building Drawings

Model Question Paper

Code:15CE12D

I semester Diploma Examination ENGINEERING DRAWING-I

Time: 4 Hours][Max. Marks: 100

Note: Answer any **UR** questions from **Section-A& B**

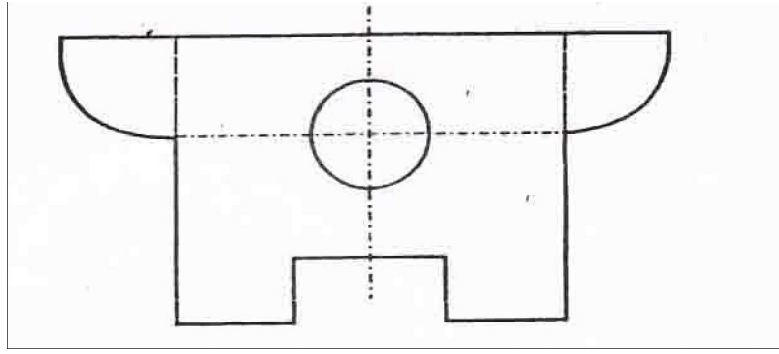
SECTION –A

1. Print the following Statement in single stroke vertical capital letters of height 22mm.
(10 Marks)

ANNUAL SPORTS MEET 2015

2. Draw the given sketch to 2:1 scale and dimension adopting aligned system with chain dimensioning method
(10 Marks)





3. Draw an arc of radius 90mm tangential internally to a circle of radius 30mm and externally to another circle of radius 15 mm the center of the two circles are 80mm apart.
(10 Marks)
4. Inscribe 6 equal circles in a regular Hexagon of side 60 mm so as to touch one side and two adjacent circles.
(10 Marks)
5. A shot thrown from the ground level reaches a maximum of 45mt and falls on the ground at a distance of 100mt from the point of projection. Trace the path of the stone in space, select scale of 1:1000.
(10 marks)
6. A point P is 40 mm in front of VP, 50 mm above HP and 30 mm in front of left PP. Draw the three principal views of the point.
(10 Marks)

(Turn over)

SECTION –B

7. An ellipse has the major and minor axes in the ratio 3:2. Draw the ellipse when the major axis is 120mm by concentric circles method.
(15Marks)
8. The distance between Bangalore and Chennai is 352km. On a map, it is represented by a length 70.4mm. What is the R.F. on which the map has been drawn? Draw a diagonal scale of this R.F. to read up to one km and long enough to measure 800km. Mark on the scale the distances 549km and 207km.
(15 Marks)
9. A line AB 80 mm long has one of its extremities 25 mm in front of VP and 30 mm above HP. The line is inclined at 30° to HP and 45° to VP. Draw its top and front views.
(15Marks)
10. A line AB 80 mm long is inclined at 45° to VP and parallel to HP. The end nearer to VP is 30mm in front of VP, 60 mm above HP and 100 mm in front of right PP. Draw the three

principal views of the line.

(15Marks)

11. An equilateral triangular lamina of side 50mm rests with one its sides on HP so that the surface of the lamina is inclined at 40° to HP. The side on which the lamina rests is inclined at 50° to VP. Draw the projections of the lamina.

(15Marks)

12. A hexagonal lamina of sides 30mm rests on one of its sides on HP so that the surface of the lamina is inclined at 30° to HP. The side on which the lamina rests is inclined at 45° to VP. Draw the top and front views of the lamina.

(15Marks)

Model Question Bank

1ST Semester Diploma in Civil Engineering

Course: **ENGINEERING DRAWING-I** Code: **15CE12D**

UNIT-I

10 Marks Questions

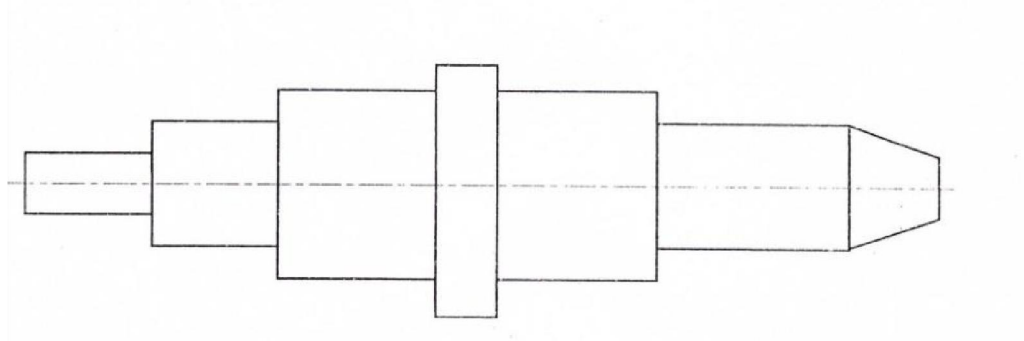
1. Print the following title to a height of 20mm single stroke vertical capital letters.
2. Print the following Statement in single stroke vertical capital letters of height 22mm.
3. Print the following statement in single stroke inclined capital case letters of height 18mm.
4. Print the following statement in single stroke inclined capital letters of height 16 mm
5. Print the following Statement in single stroke vertical capital letters of height 22mm.
6. (a) List the standard sizes of drawing sheets.
(b) Mention the types of lines and their applications.
7. (a) Illustrate the elements of dimensioning with the help of a sketch.
b) Illustrate the dimensioning of given common features: diameter, radius, chord, Arc and angle.
- 8 (a) Mention the uses of the following drawing instruments.
i) T-square ii) Set square iii) Bow compass iv) Clinograph v) Mini-drafter
b) Mention the uses of the following drawing instruments.
i) French curves ii) Protractor iii) Clips iv) Erasing Shield v) Drafting machine
9. Mention the types of lines and their applications



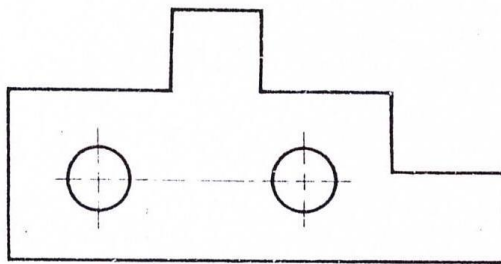
UNIT-II

(10 Marks questions)

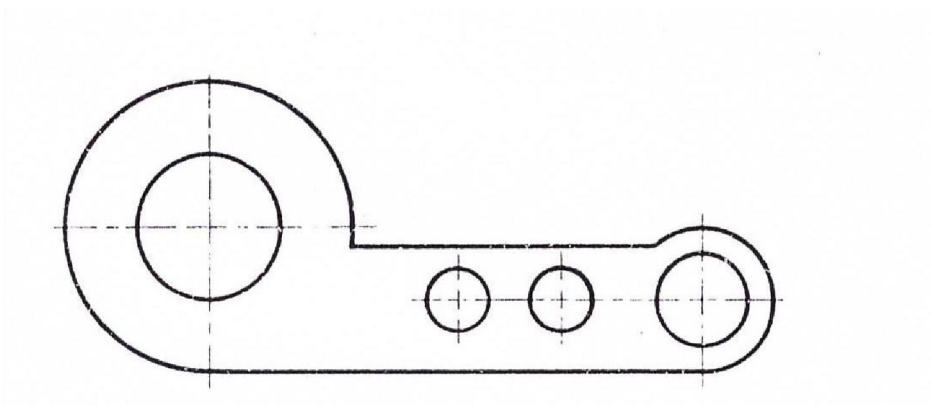
10. Copy the given sketch to 1:1 scale and dimension adopting aligned system with parallel Dimensioning method.



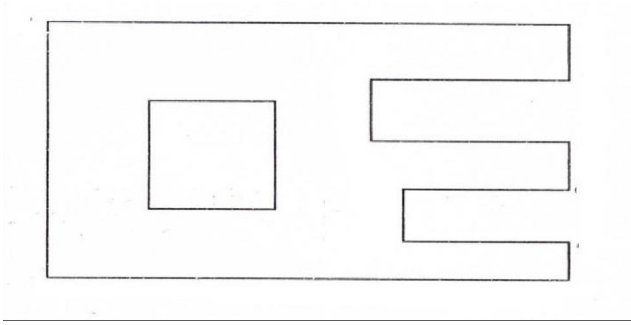
11. Copy the given sketch to 1:1 scale and dimension adopting aligned system with progressive dimensioning method.



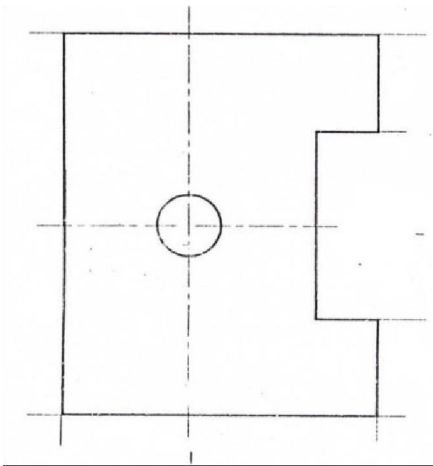
12. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with chain dimensioning method.



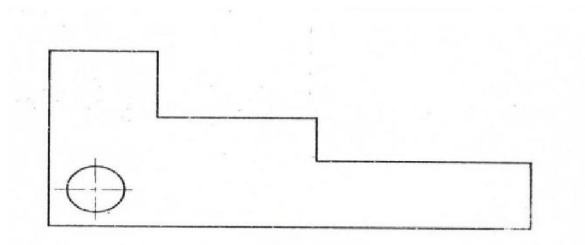
13. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with combined dimensioning method.



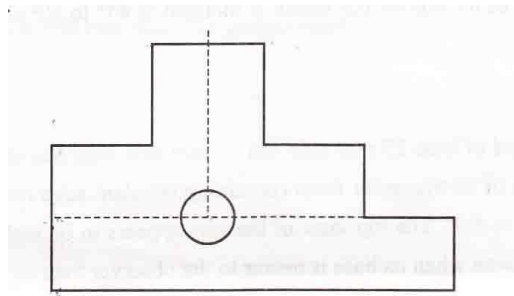
14. Copy the given sketch to 1:1 scale and dimension adopting unidirectional system with parallel dimensioning method.



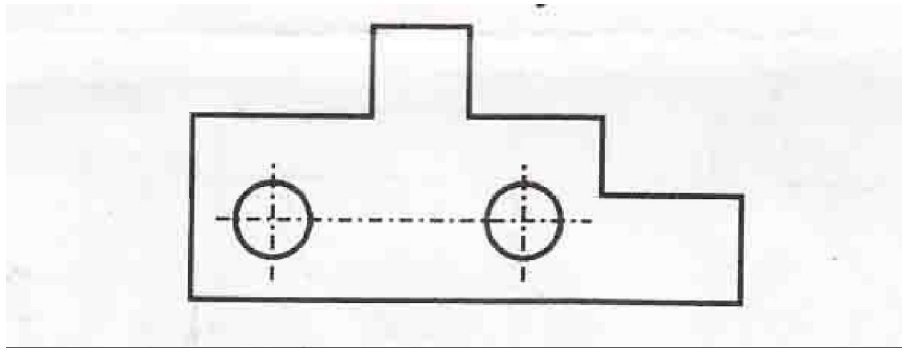
15. Copy the given sketch to 1:1 scale and dimension adopting aligned system with chain dimensioning method.



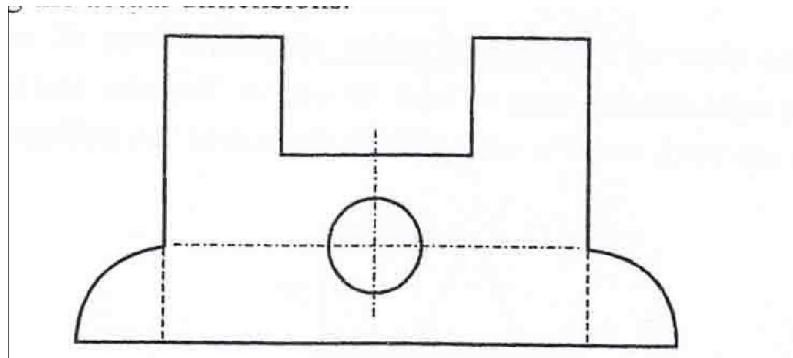
16. Copy the given sketch to 2:1 scale and dimension adopting aligned system with chain dimensioning method



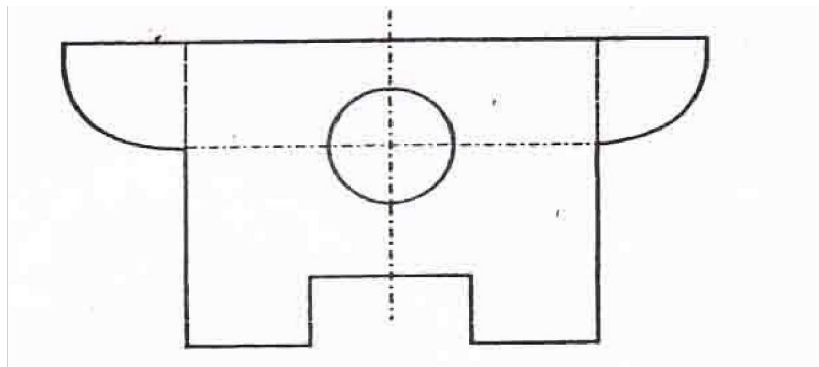
17. Copy the given sketch to 1:2 scale and dimension adopting aligned system with chain dimensioning method



18. Draw the given sketch to 1:2 scale and dimension adopting aligned system with chain dimensioning method



19. Draw the given sketch to 1:2 scale and dimension adopting aligned system with chain dimensioning method



UNIT-III

(10 MARKS)

20. Draw an arc of radius 50mm tangential external to two circles of radii 30mm and 20mm and having their centers 90mm apart.
21. Draw an arc of radius 80mm tangential internally to two circles of radii 35mm and 25mm and having their centers 100mm apart.
22. Draw a common external tangent to two circles of radius 40mm and 20mm whose centers are 90 mm apart.

23. Draw an arc of radius 90mm tangential internally to a circle of radius 30mm and externally to another circle of radius 15 mm the center of the two circles are 80mm apart.
24. Draw a common external tangent to two circles of equal radii 30mm and having their centers 80mm apart.
25. Draw a common internal tangent to two circles of diameters 60mm and 40mm having their centers 100mm apart.
26. Inscribe 5 equal circles in a regular Pentagon of side 60mm so as to touch each side and two adjacent circles.
27. Inscribe 6 equal circles in a regular Hexagon of side 60 mm so as to touch one side and two adjacent circles.
28. Inscribe 5 equal circles in a regular Pentagon of side 50 mm so as to touch two sides and two adjacent circles.
29. Inscribe 6 equal circles in a regular Hexagon of side 50 mm so as to touch two side and two adjacent circles.
30. Inscribe 3 equal circles in a regular Hexagon of side 60 mm so as to touch two side and two adjacent circles.
31. Inscribe 3 equal circles in a regular Hexagon of side 60 mm so as to touch one side and two adjacent circles.

UNIT-III

(15 marks Questions)

32. Inscribe an ellipse in a rectangle of side 150mm and 120mm.
33. A parallelogram has sides 130 mm and 90mm at an included angle of 65° . Inscribe an ellipse in the parallelogram. Find the major axes and minor axes of the ellipse.
34. An ellipse has the major and minor axes in the ratio 3:2. Draw the ellipse when the major axis is 120mm by concentric circles method.
35. Inscribe parabola in a rectangle of side 120mm and 80mm.
36. Inscribe parabola in a parallelogram of side 100mm and 70mm and having included angle 55° .
37. A shot is discharged from the ground level at an inclination of 55° to the ground which is assumed to be horizontal. The shot returns to the ground at a point 75m distance from the point of discharge. Trace the path of the shot. Take scale 1:1000.
38. A shot thrown from the ground level reaches a maximum of 45mt and falls on the ground at a distance of 100mt from the point of projection. Trace the path of the stone in space, select scale of 1:1000.

39. Construct a diagonal scale of $RF = \frac{1}{20,000}$ to show kilometers and decimals of kilometer. Mark on the scale a distance of 2.37 kilometer and 3.42 kilometer.
40. On building plan a line 10cm long represents a distance of 5m. Construct a diagonal scale for the plan to read up to 6m. Show, meters, decimeters and centimeters indicate on the scale the length 4.54m and 5.37m.
41. The distance between Bangalore and Chennai is 352km. On a map, it is represented by a length 70.4mm. What is the R.F. on which the map has been drawn? Draw a diagonal scale of this R.F. to read up to one km and long enough to measure 800km. Mark on the scale the distances 549km and 207km.
42. Construct a plain scale to show kilometer and hectometer when $R.F = 1:40000$ and long enough to measure 6 km. Mark on the scale 3.2km and 4.3 km on the scale.
43. Construct a plain scale to read centimeter and decimeter and long enough to measure 6 decimetre. $RF=1/4$. Show on it a distance of 4.9 decimetre.

UNIT-IV

(10 marks Questions)

44. A point P is 40 mm in front of VP, 50 mm above HP and 30 mm in front of left PP. Draw the three principal views of the point.
45. A point P is 30 mm above HP, 50 mm behind VP and 45 mm in front of left PP. Draw the three principal views of the point
46. Draw the three principal views of a point P lying 40 mm behind VP, 60 mm below HP and 30 mm behind the right PP.
47. Draw the three principal views of a point P lying 60 mm below HP, 50 mm in front of VP and 45 mm in front of the left PP.

UNIT-V

(15 Marks questions)

48. Draw the three principal views of a line 90 mm long placed parallel to VP and perpendicular to HP. The line is 60mm in front of VP and 50mm in front of right PP. The lower end of the line is 40mm above HP.
49. Draw the three principal views of a line 90 mm long when it is placed parallel to both HP & VP. One of the ends of the line is 60 mm above HP, 30 mm in front of VP and 40mm in front of the right PP.

50. A line AB 95 mm long is inclined at 40° to HP and parallel to VP. The line is 90 mm in front of VP. The lower end A is 35 mm above HP, 110 mm in front of the right PP and is away from it than the higher end. Draw the three principal views of the line.
51. A line AB 80 mm long is inclined at 45° to VP and parallel to HP. The end nearer to VP is 30mm in front of VP, 60 mm above HP and 100 mm in front of right PP. Draw the three principal views of the line.
52. Draw the projections of a line AB, 80 mm long inclined at 30° to HP and parallel to VP. The line is 40 mm in front of VP. The lower end A is 20 mm above HP.
53. The length of a line is 100 mm long and is inclined at 45° to VP and parallel to HP. The line is 15 mm above HP and one end of the line is 10 mm in front of VP. Draw the projections of the line and measure top and front views.
54. A line AB 80 mm long has one of its extremities 25 mm in front of VP and 30 mm above HP. The line is inclined at 30° to HP and 45° to VP. Draw its top and front views.
55. A line AB measuring 70 mm has its end A 15 mm in front of VP and 20 mm above HP. The other end B is 60 mm in front of VP and 50 mm above HP. Draw the projections of the line with HP & VP.
56. A line PQ has its end P 15 mm above HP and mm in front of VP. The end Q is 55 mm above HP and the line is inclined at 30° to HP. The distance between the end projectors of the line when measured parallel to the line of intersection of HP & VP is 50 mm. Draw the projections of the line and find its inclinations with VP.
57. The distance between the end projectors passing through the end points of a line AB is 40 mm. The end A is 20 mm above HP and 15 mm in front of VP. The line AB appears as 65 mm long in the front view. Complete the projections. Find the true length of the line and its inclinations with HP & VP.

UNIT-VI

(15 marks Questions)

58. An equilateral triangular lamina of side 50mm rests with one its sides on HP so that the surface of the lamina is inclined at 40° to HP. The side on which the lamina rests is inclined at 50° to VP. Draw the projections of the lamina.
59. An equilateral triangular lamina of sides 40mm is resting with one of its corners on HP, The surface of the lamina is inclined at 50° to HP and the side opposite to the corner on which the lamina rests is inclined at 40° to VP. Draw the projections of the lamina.

60. A square lamina of 40mm side rests with one of its sides on HP so that the surface of the lamina is inclined at 30° to HP. The side on which the lamina rests is inclined at 45° to VP. Draw the top and front views of the square lamina in this position.
61. A square lamina of 40mm sides rests with one of its corner on HP. The diagonal passing through this corner is inclined at 45° to VP and Lamina appears to be inclined at 35° to HP. Draw its projections.
62. A square lamina of side 40mm rests with one of its corner on HP. The diagonal passing through this corner is inclined at 55° to HP and 30° to VP. Draw its projections.
63. A hexagonal lamina of sides 30mm rests on one of its sides on HP so that the surface of the lamina is inclined at 30° to HP. The side on which the lamina rests is inclined at 45° to VP. Draw the top and front views of the lamina.
64. A hexagonal lamina of side 30mm is resting with one of its corner on HP so that the diagonal passing through that corner is inclined at an angle of 45° and appears to be inclined at 30° to VP. Draw the top and front views of the lamina.
65. A square lamina of ABCD of 40mm side rests on the corner C such that diagonal AC appears as at 35° to the VP in the top view. The two sides BC and CD containing the corner C make equal inclinations with the HP. The surface of the lamina makes 40° with HP. Draw its top and front views.
66. A pentagonal plane lamina of edges 30mm is resting on HP with one of its corner touching it such that plane surface makes an angle of 50° with HP. The two of the base edges containing the corner on which the lamina rests make equal inclinations with HP. If the edge opposite to this corner makes an angle of 40° with the VP, draw the top and front views of the plane lamina in this position.
67. A hexagonal lamina of 40mm sides rests on HP on one of its sides. The side which is on HP is perpendicular to VP and the surface of the lamina is inclined to HP at 45° . The lamina is then rotated through 90° such that the side on HP is parallel to the VP, while the surface is still inclined to HP at 45° . Draw the front view and the top view of the lamina in its final position.
68. A circular lamina of 65mm diameter rests on HP such that the surface of the lamina is inclined at 40° to HP. The diameter through the point on which the lamina rests on HP appears to be inclined at 50° to the VP in the top view. Obtain its projections.

