



- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Due credit will be given to neatness and adequate dimensions.
  9. Assume suitable data whenever necessary.
  10. Illustrate your answers whenever necessary with the help of neat sketches.
  11. Use of non programmable calculator is permitted.

1. a) What is the principle of surveying? Explain in detail. 5
- b) The following bearings were observed in running a compass traverse. Calculate the interior angles and correct them for observational error, find corrected bearing of all the remaining sides:- 8

Line	Fore Bearing	Back Bearing
AB	75°5'	254°20'
BC	115°20'	296°35'
CD	165°35'	345°35'
DE	224°50'	44°5'
EA	304°50'	125°5'

**OR**

2. a) Describe the construction of optical square and explain how to use it in field. 6
- b) A line was measured with a steel tape which was exactly 30m at a temperature of 20°C and a pull of 100N. The measured length was 1620m. The temperature during measurements was 30°C and the pull applied was 150N. Find the true length of line if the cross sectional area of the tape was 0.025cm<sup>2</sup>. The Co-efficient of thermal expansion of the material of the tape is  $3.50 \times 10^{-6} / ^\circ\text{C}$  & modulus of elasticity of the tape material is  $2.1 \times 10^7 \text{ N/cm}^2$ . 7
3. a) Define visible horizon distance and derive the expression for it. 5
- b) The following consecutive readings were taken with the help of a level and 4m levelling staff at common interval of 30m. 1.904, 2.650, 3.905, 4.025, 1.965, 1.705, 1.595, 1.265, 2.545, 2.005, 3.145. The instrument was shifted after the fourth and seventh reading. The first reading was taken on the B.M. of reduce level 101.00m. Calculate R.L. of other points in a level page and apply arithmetic check. 8

**OR**

4. a) What are the temporary adjustments of dumpy level? How it is done? 6
- b) The following notes refer to the reciprocal levels taken with one level:- 7

Instrument station	Staff Reading at		Remarks
	A	B	
A	1.029	1.634	Distance between A & B = 800m R. L of A = 421.543m
B	0.943	1.542	

Find :-

- i) True RL of point B.
  - ii) Combined correction for curvature and refraction.
  - iii) Error in line of Collimation.
5. a) Explain the procedure of indirect levelling. 6
- b) A level was tested by the two-peg method and following results were observed. Calculate staff readings on A & B to give a horizontal line of sight. 7

Instrument at	Staff Reading at		Remark
	A	B	
C	1.150	1.795	Distance AB = 100m. C is exactly mid-way between A & B. D lies on BA & 20m behind pt. 'A'
D	1.538	1.933	

**OR**

6. a) Define contouring and explain various uses of contour map. 6
- b) A theodolite was set-up at a distance of 300m from a tower, and the angle of elevation to its top was  $10^{\circ}50'$ . The staff reading on B.M. of R.L. 80.20m with the telescope horizontal was 0.955. Find the R.L. of the top of tower. 7
7. a) What are the permanent adjustments of theodolite? Explain any one adjustment in detail. 6
- b) Following notes refer to theodolite surveying calculate Latitudes, Departures and closing error using Bowditch's rule. 8

Line	Length (m)	W.C.B.
AB	89.31	$45^{\circ}10'$
BC	219.76	$72^{\circ}05'$
CD	151.18	$161^{\circ}52'$
DE	159.10	$228^{\circ}43'$
EA	232.26	$300^{\circ}42'$

**OR**

8. a) Distinguish between consecutive & independent Co-ordinates of traverse station. 6
- b) Find area of closed traverse having following data, by Co-ordinate method.

Side	Latitude (m)	Departure (m)
AB	+ 225.50	+ 120.50
BC	- 245.00	+ 210.00
CD	- 150.50	- 110.50
DA	+ 170.00	- 220.00

9. a) Define orientation of plane table and explain various method of orientation. **6**
- b) A road in cutting has a formation width of 9m, side slopes of 1.5:1 & Centre line depths at chainages tabulated below. **7**

Chainage (m)	0	30	60	90	120	150	180
Depth (m)	0.3	0.45	0.36	0.60	1.20	1.11	0.15

Calculate earthwork by prismatic formula.

**OR**

10. a) Explain three point problem in plane table surveying. **7**
- b) Explain Trapezoidal and Simpson's rule for area calculation. **6**
11. a) What is meant by sounding? Explain any one method of locating sounding. **7**
- b) What are the equipment required for sounding? Explain the use of each equipment. **7**

**OR**

12. Write short note on **any three**. **14**
- i) EDM.
- ii) GPS.
- iii) Uses of Hydrographic survey.
- iv) Procedure of transferring the levels underground.

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