

PART B — (5 × 13 = 65 marks)

11. (a) (i) A chain line PQ intersects a pond. Two points A and B are taken on the chain line on opposite sides of the pond. A line AC, 250 m long, is set out on the left of AB and other line AD, 300 m long is set out on the right of AB. Points C, B and D are in the same straight line. CB and BD are 100 m and 150 m long respectively. Calculate the length of AB. (7)
- (ii) A traverse ABCDA is made in the form of a square taking in clockwise order. If the bearing of AB is $120^{\circ} 30'$, find the bearing of the other sides. (6)

Or

- (b) The following consecutive readings were taken with a levelling instrument at intervals of 20 m. The readings are 2.375, 1.730, 0.615, 3.450, 2.835, 2.070, 1.835, 0.985, 0.435, 1.630, 2.255, and 3.630 m. The instrument was shifted after fourth and eighth readings. The last reading was taken on a BM of RL 110.200 m. Find the RL of all the points. (13)
12. (a) The top (Q) of a chimney was sighted from two stations P and R at very different levels, the stations P and R being in line with the top of the chimney. The angle of elevation from P to the top of the chimney was $38^{\circ} 21'$ and that from R to the top of the chimney was $21^{\circ} 18'$. The angle of the elevation from R to a vane 2m above the foot of the staff held at P was $15^{\circ} 11'$. The heights of instrument at P and R were 1.87m and 1.64m respectively. The horizontal distance between P and R was 127 m and the reduced level of R was 112.78 m. Find the RL of the top of the chimney and the horizontal distance from P to the chimney. (13)

Or

- (b) The following observations were made using a tacheometer fitted with an anallactic lens.

Instrument station	Height of instrumentation	Staff station	WCB	Vertical angle	Stadia Hair readings	Remarks
O	1.550	A	$30^{\circ}30'$	$4^{\circ} 30'$	1.155, 1.755, 2.355	RL of O = 150.000 m
		B	$75^{\circ} 30'$	$10^{\circ} 15'$	1.250, 2.000, 2.750	

Calculate the distance AB, RL of A and B. Find also the gradient of line AB. (13)

13. (a) A satellite station S is 6.5 m from the main station A and the following observations were taken $A = 0^\circ 0'$; $B = 102^\circ 48'$; $C = 256^\circ 12'$; $D = 324^\circ 6'$. The length AB, AC and AD were computed to be 1895 m, 2277 m, 2522 m respectively. Determine the direction of the line AB, AC and AD. (13)

Or

- (b) The following angles were measured at a station O so as to close the horizon:

$$\angle AOB = 83^\circ 42' 28.75'' \quad \text{weight 3}$$

$$\angle BOC = 102^\circ 15' 43.26'' \quad \text{weight 2}$$

$$\angle COD = 94^\circ 38' 27.22'' \quad \text{weight 4}$$

$$\angle DOA = 79^\circ 23' 23.77'' \quad \text{weight 2}$$

Adjust the angle by method of correlates. (13)

14. (a) Explain the different coordinates systems by which the position of heavenly body can be specified. (13)

Or

- (b) Explain various sounding methods in detail. (13)

15. (a) (i) Explain the working principle of a total station. (8)
(ii) Discuss the different sources of errors in a total station. (5)

Or

- (b) Explain in detail about the different segments of GPS. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Discuss the field procedures involved in preparing a map of a proposed hospital building. (15)

Or

- (b) With a neat sketch, explain the types of surveying for the construction of highway include all possible measurements required.