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3 Hours / 100 Marks   Seat No. ⬚⬚⬚⬚⬚⬚⬚

Instructions –   (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible,

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any SIX of the following:**   **12**

   (i)   Define the term interpolation of contours.

   (ii) Define zero circle.

   (iii) State Bowditch rule.

   (iv) Define Transiting.

   (v)   State the constants of tacheometer.

   (vi) Enlist the uses of total station in surveying.

   (vii) Define compound curve and reverse curve.

   (viii) Enlist type of curves used in road and railway alignment.

Marks

b) **Attempt any TWO of the following:** 8

   (i)   Describe the method of locating contours by square method.

   (ii) State the procedure of measurement of horizontal angle by repetition method using transit theodolite.

   (iii) State the practical applications of remote sensing in civil engineering project.

2. **Attempt any FOUR of the following:** 16

   a) State any four uses of contour.

   b) Draw the contours for the following features:

      (i)   Hill

      (ii) A saddle

      (iii) Valley

      (iv) Overhanging cliff

   c) Give the desired relationship between the fundamental axis of transit theodolite.

   d) Explain temporary adjustment required for theodolite.

   e) State the errors eliminated by repetition method.

   f) What are the checks applied in case of closed traverse?

3. **Attempt any FOUR of the following:** 16

   a) State the application of total station.

   b) State components of one second micro-optic theodolite.

   c) What is meant by grade contour? How it will be located in field?

   d) State the classification of electronic distance meter.

   e) Draw a neat sketch of simple circular curve showing all elements.

   f) State any four applications of digital theodolite.

Marks

4. Attempt any FOUR of the following: 16

a) Explain principle of tacheometry survey.

b) State the uses of Global positioning system (GPS)

c) The following particulars were noted while measuring the area of a figure with planimeter.

(i) IR and FR were 8.652 and 6.798 respectively

(ii) $M = 100$ cm^2 and $C = 20$

(iii) The zero of dial passed the Index once in anticlockwise direction.

(iv) Scale of map is 1 cm $= 10$ cm.

(v) Anchor point was inside the figure, calculate the area of the figure.

d) State the advantages and limitations of remote sensing.

e) List any four essential characters of Tacheometer.

f) Explain the setting of curve by Rankine's deflection angle method.

5. Attempt any TWO of the following: 16

a) Following are the observations taken while running closed traverse by theodolite. Find co-ordinates points using Bowditch rule.

Line	Length in (m)	Bearing
AB	335	180°-20′
BC	850	90°-20′
CD	408	357°
DA	828	265°

Marks

b) Following are the lengths and bearings of a closed traverse ABCDA.

Line	Length in (m)	Bearing
AB	260	341°
BC	240	295°
CD	250	147°
DA	?	?

Determine length and bearing of line DA.

c) A tacheometer fitted with an anallatic lense and multiplying constant equal to 100 was used and following were observed on a staff held vertical.

Inst. Station	H.I.	Staff at	Vertical angle	Stadia reading
P	1.30	M	+ 2° 30′	1.2, 1.4, 1.6
P	1.30	Q	− 3° 30′	1.70, 1.95, 2.20

RL of station M=100. Calculate RL of P and Q and distance of PQ.

6. **Attempt any TWO of the following:** 16

a) Find the quantity of water, from the contour map of a reservior, the following contour areas were recorded by planimetered; the top water level is 200 m and lowest point in the reservior is 180 m.

Contours (m)	200	195	190	185	180	175
Area in m^2	3850	3450	2600	800	450	200

b) Calculate the ordinates of 25 m interval to set out a circular curve having a long chord 300 m and versed sine of 10 m.

c) State the procedure of traversing by using total station.

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