

# 17419

**21415**

**3 Hours / 100 Marks**

Seat No.

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- 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:
    - 1) Contour and
    - 2) Contour line
  - (ii) Define the terms:
    - 1) Transiting and
    - 2) Swingingin relation with theodolite surveying.
  - (iii) State any four uses of transit theodolite.
  - (iv) Define the terms - Latitude and Departure.
  - (v) State the essential characteristics of a tacheometer.

P.T.O.

- (vi) Enlist the types of curves used in road or railway alignment.
- (vii) What is meant by the term 'remote sensing'?
- (viii) State two applications of GPS.

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

**8**

- (i) Draw a neat sketch of contour for the following:
  - 1) Hill
  - 2) Valley
  - 3) Gentle slope
  - 4) Ridge line
- (ii) How is the layout done using total station?
- (iii) Explain the method of measuring vertical angle with a theodolite. Also draw the typical format of observation table for the same.

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

**16**

- a) State the methods of contour interpolation and explain any one.
- b) What are the uses of contour maps?
- c) What is contour interval? State and explain in brief the factors affecting contour interval.
- d) What is meant by grade contour? How to locate a grade contour?
- e) Find the area of an irregular area which was measured with planimeter, keeping the anchor point inside the figure. The following readings were noted:  
IR = 8.395  
FR = 3.425 ; The zero crossed the index once in clockwise direction. If  $M = 100$  sq. cm. and  $C = 24.20$ .
- f) State the trapezoidal and prismoidal formula for volume computation, stating each term used in the formula.

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

- List all the components of a polar planimeter.
- Define zero circle. How it is found out?
- Explain the temporary adjustments that are carried out in a transit theodolite.
- State and explain the principle of tacheometry with a neat sketch.
- What is meant by 'permanent adjustment' of a theodolite? Enlist any two such adjustments.
- How is the accuracy of field work checked in the following cases:
  - Closed traverse by measurement of included angles and
  - Closed traverse by deflection angles.

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

- The co-ordinates of two points  $x$  and  $y$  are as under

Point	Co-ordinates	
	N	E
$x$	980.50	800.00
$y$	1200.00	500.00

Find the length and bearing of  $xy$ .

- State the errors that are eliminated by the method of repetition in the measurement of horizontal angle by a transit theodolite.
- What are the sources of errors in stadia surveying? Briefly explain.
- Following are the length and bearings of a theodolite traversing:

Line	Length	Bearing
AB	258.00 m	30°
BC	321.00 m	140°
CD	180.00 m	210°
DA	?	?

Find the missing data.

- e) State the component parts of a micro-optic theodolite. How is it superior to a transit theodolite?
- f) State the uses of a digital theodolite.

**5. Attempt any FOUR of the following:**

**16**

- a) Mention any four built - in programmes in a total station.
- b) State the practical application of remote sensing in civil engineering project.
- c) State the advantages and disadvantages of GPS.
- d) What is GIS? State the components of GIS.
- e) The following are the observations made with a tacheometer. Determine the constants of tacheometer.

Instrument station	Staff reading	Distance (M)	Stadia reading	
			TOP	Lower
O	A	100	2.500	1.490
O	B	150	2.000	0.600

- f) A tacheometer fitted with anallatic lens was set up at station O and the following readings were taken on a staff held vertical.

Inst Stn	Staff Stn	Vertical angle	Stadia readings
O	BM	+7° 30'	0.900, 1.200, 1.500
O	B	- 2° 30'	1.100, 1.350, 1.600

Find the horizontal distance 'OB' and RL of 'B' if RL of BM is 50.000 m. Take the constant of tacheometer as 100.

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

- a) The WCB of a straight portion AB and BC of a railway line are  $120^\circ$  and  $150^\circ$  respectively. The chainage of intersection point B is 1000 m. These two are to be connected by a circular curve of radius 300 m. Calculate all the necessary data for setting out this curve by tangential angle method. Peg interval may be taken as 30 m.
- b) (i) What is a simple curve? Describe with neat sketch denoting all important features.
- (ii) Calculate the ordinates at 25 m interval to set out a circular curve having long chord of 300 m and versed sine of 10 m.
- c) Write short notes on any two:
- (i) Uses of digital level.
- (ii) Salient features of total station (any four).
- (iii) Use of micro-optic theodolite for measurement of vertical angles.
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