QP Code : **5344**

(3 Hours) [Total Marks : 80

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** question out of remaining questions.
(3) Illustrate answers with neat sketches wherever required.
(4) Attempt sub-question in order.
(5) Assume any suitable data if required and state the same clearly.
(6) **Figures** to **right** indicate **full** marks.

1. Write short notes on any five :– 20
   (a) Tacheometric contouring
   (b) Remote sensing and its applications
   (c) Elements of simple circular curve
   (d) Distance and gradient measurement with subtense bar
   (e) Grade stake & boning rod
   (f) Type of horizontal & vertical curves
   (g) Beaman's stadia arc

2. (a) A tacheometer was set up at an intermediate point on traverse PQ & 8
   the following observations were made on vertically held staff

Staff station	Vertical angle	Staff intercept	Axial hair reading
P	+9°30'	2.250	2.105
Q	+6°0'	2.055	1.875

   The instrument was fitted with an anallactic lense. Compute length PQ
   & RL of Q; if RL. of P is 350.50 m.

   (b) Derive an expression for distance & elevation formula for inclined line 7
   of sight & staff held vertical.

   (c) Determine tacheometric contants from the following data 5

Distance (m)	Lower stadia Reading (m)	Upper stadia reading (m)
202	2	4
302	1.5	5

   Also find distance when stadia wire readings are 1.5 m & 5.5 m.

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3. (a) Explain in detail how route surveying for canal is carried out   10

    (b) Explain setting out of culvert   6

    (c) State necessity of reverse curve & transition curve   4

4. (a) Explain setting out of curve by offsets from chords produced.   8

    (b) Two straights AB & BC intersect at a chainage of 4242 m. The   8
intersection angle being 140°. It is required to set out a 5° simple
circular curve to connect the straights. Calculate the data necessary to
set out the curve by method of offset from chord produced at an interval
of 30 m.

    (c) Write short note on Sight distance & stopping sight distance.   4

5. (a) A road 8 m wide is to deflect through an angle of 60° with radius of
300 m. The chainage of intersection point being 3605 m. A transition
curve is to be used at each end of the circular curve of such a length
to gain a radial acceleration of 0.5 m/s^3 when the speed is 50 kmph.
Find:–

        (1) Length of transition curve   1

        (2) Super elevation   1

        (3) Chainage of all the junction points   6

        (4) Offset at x=L/4; L/2, 3L/4 & L   2

    (b) A 3% rising gradient meets a 2% down gradient. A vertical curve of   10
200 m long is to be used. The peg interval being 20 m. Calculate the
curve points by tangent correction method and calculate the required
staff readings. RL of apex is 350 m & its chainage is 1000 m.

6. (a) Write short notes on :–

        (i) GPS & its applications   4

        (ii) Principle of EDM   4

        (iii) Elements of compound curve   4

    (b) List various modern instruments with their specific use. Describe in   8
detail working of total station.