Q.P.Code: 21775

(3 hours) [Total Marks-80]

Question No.1 is compulsory. Attempt any three out of remaining questions.

Assume any suitable data if required, state the same clearly.

Figures to the right indicate full marks.

Attempt sub questions in order.

1. Attempt any four from following:

   a. Explain field procedure of determination of tacheometer constants. (05)

   b. Write detailed note on Beaman's Stadia arc. (05)

   c. What is vertical curve? Sketch various types of vertical curves stating their application. (05)

   d. Calculate the ordinate at 10m intervals for a circular curve if the length of long chord is 80m and radius of curve is 200m (05)

   e. Write detailed note on application of GIS and remote sensing in the field of civil engineering. (05)

2. a. List various methods of setting out of horizontal curves. Explain setting out of curve by two theodolite method. (06)

   b. Explain procedure for calculating data and setting out of vertical curve by chord gradient method. (08)

   c. A 20m chain is used to set out a simple circular curve. Two tangents intersect at chainage 1192m, the deflection angle being 50°. Calculate the necessary data for setting out of a curve of radius 280m using linear method of offsets from chords produced. Take peg interval as 20m. (06)

3. a. A tachemoeter fitted with annallactic lens is set up at an intermediate point on a traverse course PQ & following observations are made on a vertically held staff: (10)

Staff Station	Staff intercept	Vertical Angle	Axial hair Readings	Remarks
P	2.350	+8° 36' 0"	2.105	R L of P is 321.50m
Q	2.055	+6° 6' 0"	1.895	

   Find length PQ and RL of Q.

   b. Explain how to calculate the R L of top of tower whose base is inaccessible, with one plane method. (05)

   c. Derive an expression for calculating horizontal and vertical distance for line of sight inclined and staff held vertical. (05)

TURN OVER

4 a. Calculate the data required for setting out composite curve. It is proposed to insert a   (10)
right hand 50m radius circular curve with a cubic parabola of 20m length at each end.
The chainage of intersection point is 80m, the deflection angle being 50º. The peg
interval for circular curve & transition curve is 5m. Tabulate the required data if LC of
instrument used is 20".

   b. Define reverse curve, its necessity and disadvantages of providing reverse curve.   (05)

   c. Write detailed note on errors in stadia surveying   (05)

5 a. A 8m wide road is to deflect through an angle of 60º with the centre line radius 300m,   (12)
the chainage of point of intersection being 3600m. A transition curve is to be used at
each end of the circular curve of such a length the rate of gain of radial acceleration is
$0.5m/s^3$, when the speed is 50kmph. Find: (1) Length of transition curve. (2) chainages
of all the junction points.

   b. Explain how surface survey is connected to underground survey and transfer of levels   (08)
while setting out a tunnel.

6 a. A 0.6% rising gradient meets - 0.7% down gradient. The chainage of and RL of   (08)
intersection points are 550m and 375m respectively. Calculate the RLs of the points on
the vertical curve using tangent correction method. The rate of change of grade is 0.1%
per peg. The peg interval is 20m. Tabulate the results.

   b. Explain in detail how to carry out a route survey for a road connecting two states?   (08)

   c. Write short note on EDM, its principle and working.   (04)

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