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Fourth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Surveying – II

Time: 3 hrs.

Max. Marks: 100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Distinguish between:
 - i) Plunging and swinging of the telescope.
 - ii) Clamp screw and tangent screw.
 - iii) Transitting and line of collimation.
 - iv) Plate bubble and altitude bubble. (08 Marks)
- b. With neat sketches, explain measurement of a straight line by a theodolite in adjustment and theodolite not in adjustment. (08 Marks)
- c. List the errors eliminated by repetition method. (04 Marks)

- 2 a. What are the permanent adjustments of a theodolite? Explain the spire test. (08 Marks)
- b. Explain the procedure to lay off an angle with a greater precision than the least count of the instrument. (08 Marks)
- c. What is an 'index error'? Why it is necessary to be adjusted? (04 Marks)

- 3 a. Derive the expression for the horizontal distance, vertical distance and the elevation of an elevated object by double plane method, when the base is inaccessible. (07 Marks)
- b. List the advantages of total station over the conventional surveying instruments. (03 Marks)
- c. In order to ascertain the elevation of the top (Q) of the signal on a hill, observations were made from two instrument stations P and R at a horizontal distance 100 M apart, the stations P and R being line with Q. The angles of elevation of Q at P and R were 28°42' and 18°6' respectively. The staff readings upon the bench mark of elevation 287.280 M were respectively 2.870 M and 3.750 M when the instrument was at P and R, the telescope being horizontal. Determine the elevation of the foot of the signal if the height of the signal above its base is 3 M. (10 Marks)

- 4 a. Write a note on:
 - i) Anallactic lens. ii) Subtense diaphragm. (04 Marks)
- b. Explain the method of determining the constant of a tachometer, in the field. (06 Marks)
- c. A tachometer is setup at an intermediate point on a traverse course PQ and the following observations were made on a vertically held staff.

Staff station	Vertical angle	Staff intercept (M)	Axial Hair Reading (M)
P	+8°36'	2.350	2.105
Q	+6°6'	2.055	1.895

The instrument is fitted with anallactic lens and the constant is 100. Compute the length of PQ and reduced level of Q, that of P being 321.500 M. (10 Marks)

Important Note : 1. On completing your answers, carefully draw diagonal cross lines on the remaining blank portion of the answer sheet. 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

**PART – B**

- 5 a. Define degree of a curve. Establish the relationship between degree of curve and its radius. (05 Marks)
- b. Calculate the ordinates at 10 M for a circular curve, given that the length of long chord is 80 M and the versed sine is 4 M. (05 Marks)
- c. The chainage at the point of intersection of the tangents to a railway curve is 1250 M and the angle between them is 150° . Calculate all the data necessary for curve setting out a curve of radius 250 M by the deflection angle method. The peg intervals may be taken as 20 M. Also apply the arithmetic check. (10 Marks)
- 6 a. Distinguish between compound curve and reverse curve. (04 Marks)
- b. Derive the relationships between various elements of a reverse curve between two parallel straights. (08 Marks)
- c. Two parallel railway lines are to be connected by a reverse curve, each section having the same radius. If the lines are 12 M apart and the maximum distance between tangent points measured parallel to the straights is 48 M, find the maximum allowable radius. If both the radii are to be different, calculate the radius of the second branch if that of the first branch is 60 M. Also calculate the length of both the branches. (08 Marks)
- 7 a. What is a transition curve? Explain the requirements of a transition curve. (06 Marks)
- b. Why are vertical curves provided on highways? List the different types of vertical curves. (04 Marks)
- c. A transition curve is required for a circular curve of 200 M radius, the gauge being 1.5 M and maximum super elevation is restricted to 0.15 M. The transition is designed for a velocity such that no lateral pressure is imposed on the rails and the rate of gain of radial acceleration is 30 cm/sec^3 . Calculate the required length of curve and the design speed. (10 Marks)
- 8 a. What is "Zero circle" of a planimeter? Explain any one method of finding its area. (06 Marks)
- b. Calculate the area of a figure from the following using a planimeter with the point inside the figure.
Initial reading = 9.918
Final reading = 4.254
Constant M and C respectively are 100 cm^2 and 23.521. The zero mark of the disc crossed the index once in anticlockwise direction. (04 Marks)
- c. The areas enclosed by the contours in a lake are as follows:
- | Contour (M) | 270 | 275 | 280 | 285 | 290 |
|-----------------------|------|------|-------|-------|-------|
| Area (M^2) | 2050 | 8400 | 16300 | 24600 | 31500 |
- Calculate the volume of water between the contour 270 M and 290 M by the trapezoidal and prismoidal rule. (10 Marks)

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