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**Fourth Semester B.E. Degree Examination, June/July 2015**  
**Surveying – II**

Time: 3 hrs.

Max. Marks: 100

- Note:** 1. Answer any FIVE full questions, selecting atleast TWO questions from each part.  
 2. Draw neat sketches.  
 3. Missing data, if any, may be suitably assumed.

**PART – A**

- 1 a. Explain the following terms with reference to theodolite :  
 i) transiting ii) swinging iii) line of collimation (10 Marks)  
 iv) horizontal axis v) faceleft observation.  
 b. With a neat sketch and tabular column, explain the measurement of horizontal angles by repetition method. List the errors that are eliminated by this method. (10 Marks)
- 2 a. What are the permanent adjustments of a theodolite? Explain the spire test. (10 Marks)  
 b. The following observations were made during the testing of a dumpy level

Instrument	Staff Reading on	
@	A	B
P	1.702	2.244
R	2.146	3.044

Distance AB = 1500 meters.

Is the instrument in adjustment? To what reading should the line of collimation be adjusted when the instrument were at B? If RL of A = 432.052 m, what should be the RL of B? (10 Marks)

- 3 a. What is a total station? List out the advantages of total station. (04 Marks)  
 b. Derive the expressions for the horizontal distance, vertical distance and the elevation of an object by tacheometer plane method, when the base is inaccessible (08 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 meters apart, the stations P and R being in line with Q. The angles of elevation of Q at P and R were  $28^{\circ} 42'$  and  $18^{\circ} 6'$  respectively. The staff readings upon the benchmark of elevation 287.280 meters were respectively 2.870 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 meters. (08 Marks)
- 4 a. Derive the expressions for distance and elevation when the staff is held vertical and the line of sight is inclined. (10 Marks)  
 b. Determine the gradient from a point A to a point B from the following observations made with a tacheometer fitted with an anallactic lens. The constant at the instrument was 100 and the staff was held vertically.

Instrument station	Staff point	Bearing	Vertical angle	Staff readings
P	A	$134^{\circ}$	$+10^{\circ} 32'$	1.360, 1.915, 2.490
	B	$224^{\circ}$	$+5^{\circ} 6'$	1.065, 1.885, 2.705

(10 Marks)

## PART – B

- 5 a. What are the different methods of setting out a simple circular curve? (04 Marks)  
 b. Calculate the ordinates at 10 meters distances for a circular curve having a long chord of 80 meters and a versed sine of 4 meter. (06 Marks)  
 c. Two Tangents intersect at a chainage of 1000 meters, the deflection angle being  $28^\circ$ . Calculate all the data necessary to set out a simple circular curve of 250 m radius by Rankine's method and tabulate the results. Peg interval = 20 mt; Least count of theodolite = 20 second. (10 Marks)
- 6 a. Draw a neat labeled sketch of compound curve and giving the elements of a compound curve. Explain the method of setting out compound curve. (10 Marks)  
 b. A compound curve consisting of two simple circular curves of radii 350 m and 500 m is to be laid out between two straights  $T_1I$  and  $T_2I$ . PQ is the common tangent, at point of compound curvature, D. The angles  $IPQ$  and  $IQP$  are respectively  $55^\circ$  and  $25^\circ$ . Sketch and calculate the tangent lengths  $T_1I$  and  $IT_2$ . (10 Marks)
- 7 a. What is phase of a signal? Derive the expression for phase correction when the bright portion is bisected. (10 Marks)  
 b. From an eccentric station 'S', 12.25 meters to the west of the main station B, the following angles were measured  $\angle BSC = 76^\circ 25' 32''$  and  $\angle CSA = 54^\circ 32' 20''$ . The stations S and C are to the opposite sides of the line AB. Calculate the correct angle ABC if the lengths AB and BC are 5286.5 m and 4932.2 m respectively. (10 Marks)
- 8 a. A series of offsets were taken from a chain line to a curved boundary line at intervals of 15 meters in the following order:  
 0, 2.65, 3.80, 4.75, 4.65, 3.60, 4.95, 5.85 m  
 Calculate the area between the chain line, the curved boundary line and the end offset by :  
 i) Average ordinate rule  
 ii) Trapezoidal rule  
 iii) Simpson's rule. (10 Marks)  
 b. A railway embankment is 10 m wide with side slopes  $1\frac{1}{2}$  to 1. Assuming the ground to be level in a direction transverse to the centre line, calculate the volume contained in a length of 120 meters, the centre heights at 20 m intervals being in meters  
 2.2, 3.7, 3.8, 4.0, 3.8, 2.8, 2.5. (10 Marks)

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