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## Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Advanced Surveying

Time: 3 hrs.

Max. Marks: 80

*Note: Answer any FIVE full questions, choosing one full question from each module.*

### Module-1

- 1 a. With the help of a neat sketch of a simple circular curve? Explain:
  - i) Tangent length; ii) Length of long chord; iii) Length of curve; iv) Summit distance; v) Vertex distance; vi) Intersection angle. (06 Marks)
- b. Two tangents intersect at a chainage (59 + 60), the deflection angle being  $50^{\circ}30'$ . Calculate the necessary data for setting out a curve of 15 chains radius to connect the two tangents, if it is intended to set out the curve by Rankine's method of deflection angles. Take the peg interval equal to 100 links, the length of the chain being 20m (100 links). Draw the curve table. (10 Marks)

OR

- 2 a. With the help of neat sketch, explain the elements of a compound curve. (06 Marks)
- b. A road bend which deflects  $80^{\circ}$  is to be designed for a maximum speed of 100km per hour, a maximum centrifugal ratio  $1/4$  and a maximum rate to the change of acceleration of  $30\text{cm/sec}^3$ , the curve consisting of a circular arc combined with two spirals. Calculate:
  - i) The radius of circular arc ii) The required length of transition iii) The total length of composite curve and iv) The chainages of the beginning and end of transition curve, and of the junctions of the transition curves with the circular arc, if the chainage of the point of intersection is 42862 metres. (10 Marks)

### Module-2

- 3 a. Explain orders of triangulation. (06 Marks)
- b. Explain any four points to be kept in mind while selecting triangulation stations. (04 Marks)
- c. From an eccentric station S, 12.25 metres to the west of the main station B, the following angles were measured.  $\angle BSC = 76^{\circ}25'32''$ ,  $\angle CSA = 54^{\circ}32'20''$ . The stations S and C are to the opposite sides of line AB. Calculate the correct angle ABC if the lengths of AB and BC are 5286.5 and 4932.2m respectively. (06 Marks)

OR

- 4 a. Explain: i) Observed value of a quantity; ii) Most probable value; iii) Observation equation; iv) Conditioned equation; v) Indirect observation; vi) Normal equation. (06 Marks)

- b. Adjust the following angles closing horizon.

$\angle A = 110^{\circ} 20' 48''$  \_\_\_\_\_ wt 4

$\angle B = 92^{\circ} 30' 12''$  \_\_\_\_\_ wt 1

$\angle C = 56^{\circ} 12' 00''$  \_\_\_\_\_ wt 2

$\angle D = 100^{\circ} 57' 04''$  \_\_\_\_\_ wt 3

(10 Marks)

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

Module-3

- 5 a. Define the terms:
- The Zenith and Nadir
  - The celestial poles and equator
  - The sensible horizon
  - The visible horizon
  - The altitude ( $\alpha$ )
  - Co-latitude. (06 Marks)
- b. Find the shortest distance between two points A and B given that the latitudes of A and B are  $15^{\circ} 0' N$  and  $12^{\circ} 6' N$  and their longitudes are  $50^{\circ} 12' E$  and  $54^{\circ} 0' E$  respectively. Find also the direction of B on the great circle route. Radius of Earth = 6370 km. (10 Marks)

OR

- 6 a. State that properties of a spherical triangle. (05 Marks)
- b. Show that one nautical mile is equal to 1.852 km. (04 Marks)
- c. Calculate the distance in kilometers between two points A and B along the parallel of latitude given that:
- Latitude of A,  $28^{\circ} 42' N$ ; longitude of A =  $31^{\circ} 12' W$   
Latitude of B,  $28^{\circ} 42' N$ ; longitude of B =  $47^{\circ} 24' W$
  - Latitude of A,  $12^{\circ} 36' S$ ; longitude of A =  $115^{\circ} 6' W$   
Latitude of B,  $12^{\circ} 36' S$ ; longitude of B =  $150^{\circ} 24' E$ . (07 Marks)

Module-4

- 7 a. Define the terms: i) Camera axis; ii) Picture plane; iii) principal plane; iv) print ; v) Fuducial axis; vi) Film base. (06 Marks)
- b. Three points A, B and C were photographed and their coordinates with respect to the lines joining the collimation marks on the photograph are:

| Point | x        | y        |
|-------|----------|----------|
| a     | -35.52mm | +21.43mm |
| b     | +8.48mm  | -16.38mm |
| c     | +48.26mm | +36.72mm |

The focal length of lens is 120.80mm. Determine the azimuths of the lines OB and OC if that of OA is  $354^{\circ} 30'$ . The axis of camera was level at the time of exposure at the station O. (10 Marks)

OR

- 8 a. Derive a relation for the scale of a vertical photograph. (06 Marks)
- b. A vertical photograph was taken at an altitude of 1200 metres above the mean sea level. Determine the scale of photograph for terrain lying at elevation of 80 metres and 300 metres, if the focal length of camera is 15cm. (10 Marks)

Module-5

- 9 a. Enumerate three types of measurement of distance with instruments used. (06 Marks)
- b. With sketches explain properties of electromagnetic waves and electromagnetic spectrum. (10 Marks)

OR

- 10 a. Explain the components of GIS. (08 Marks)
- b. Explain the applications of remote sensing in civil engineering. (08 Marks)

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