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Fourth Semester B.E. Degree Examination, Feb./Mar.2022 Advanced Surveying

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Derive relationship between degree and radius of the curve. With figures discuss on different types of curves. (10 Marks)
- b. Two tangents intersect at chainage of 8800 metres, the deflection angle between them being $50^{\circ}30'$. Calculate the necessary data for setting a simple circular curve by deflection angle method. Radius of the curve = 300 m, Peg interval = 30 m. (10 Marks)

OR

- 2 a. List the requirement of a transition curve? Draw a combined curve and explain how it is set on the ground. (10 Marks)
- b. Two parallel straights are connected by a reverse curve in which each curve is having same radius. If the lines are 12 metres apart and maximum distance between the tangents measured parallel to the straights is 48 metres, find the maximum allowable radius. If the radii are different then obtain the radius of the second branch if that of the first branch is 60 m. Also calculate the length of both the branches. (10 Marks)

Module-2

- 3 a. Write a note giving the factors to be considered for selection of base line site. (10 Marks)
- b. In measuring angles from a triangulation station B, it was found necessary to set the instrument at a satellite station 'S' due south of the main station B and at a distance of 12.2 metres from it. The line BS approximately bisects the exterior angle $\hat{A}BC$. The angles $\hat{A}SB$ and $\hat{B}SC$ were observed to be $30^{\circ}20'30''$ and $29^{\circ}45'6''$ respectively. When the station B was observed, the angles $\hat{C}AB$ and $\hat{A}CB$ were observed to be $59^{\circ}18'26''$ and $60^{\circ}26'12''$ respectively. The side AC was computed to be 4248.5 meters from the adjacent triangle. Determine the correct value of angle ABC. (10 Marks)

OR

- 4 a. Define the terms:
 - (i) Probable error.
 - (ii) Station Adjustment
 - (iii) Most probable value
 - (iv) Normal equation
 - (v) Figure adjustment (10 Marks)
- b. Adjust the following angles closing the horizon:

$\hat{A} = 110^{\circ}20'48''$ weight 4	$\hat{B} = 92^{\circ}30'12''$ weight 1	$\hat{C} = 56^{\circ}12'00''$ weight 2
$\hat{D} = 100^{\circ}57'04''$ weight 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 following with sketches:
 (i) Hour angle of a star (ii) Altitude of a star (iii) Declination of a star
 (iv) Latitude of a place (v) Azimuth of a star (10 Marks)
- b. Find the shortest distance between two places A and B given that the Latitudes of A and B are 15°N and $12^{\circ}6'\text{N}$ and their longitudes are $50^{\circ}12'\text{E}$ and 54°E respectively. (05 Marks)
- c. Determine the azimuth and altitude of a star from the following data:
 Latitude of observer = 48°N , Hour angle of the star = 43° , Declination of star = $18^{\circ}20'\text{N}$. (05 Marks)

OR

- 6 a. What are circum polar stars? Find the Zenith distance of a star in the following cases and state which star is circumpolar star:

Star	S ₁	S ₂	S ₃	S ₄	S ₅
Latitude (θ)	$50^{\circ}15'\text{N}$	$55^{\circ}30'\text{N}$	$37^{\circ}30'\text{N}$	$46^{\circ}15'\text{N}$	$46^{\circ}15'\text{S}$
Decination (δ)	$22^{\circ}30'\text{N}$	$20^{\circ}30'\text{S}$	$62^{\circ}30'\text{N}$	$48^{\circ}30'\text{N}$	$60^{\circ}15'\text{S}$
Condition of Culmination	Upper	Upper	Upper	Lower	Lower

- (14 Marks)
- b. Derive the relationship that Latitude of a place is equal to altitude of the poles. (06 Marks)

Module-4

- 7 a. With figure discuss on : (i) Principal point (ii) Plumb point (iii) Isocentre
 (iv) Principal line and plane (v) Swing angle
 A vertical photograph was taken at an altitude of 1200 metres above msl. Determine the scale of the photograph, if the terrain elevation varies from 80 m to 300 m, focal length of lens = 15 cm. (10 Marks)
- b. With sketch write a note on relief displacement in vertical photograph and derive formula for relief displacement? Discuss on stereo parallax. (10 Marks)

OR

- 8 a. Explain with sketches the procedure for carrying out aerial survey and preparing the data for flight plan. (10 Marks)
- b. An area of 30 kms lane, N-S direction and 24 kms in E-W direction is to be photographed with a lens of 30 cms focal length for constructing mosaic. "The size of photo is 20 cm \times 20cm. The scale of photograph is 1 : 12,000 effective at an elevation of 400 m above datum. Longitudinal overlap = 60%, Side overlap = 30%, Ground speed of aircraft = 200 kmph. The flight lines are to be laid in N-S direction on an existing map of 1 : 60000 and outer flight lines are to coincide with the east and west boundaries of the area. Determine the details for flight plan? (10 Marks)

Module-5

- 9 a. Mention the advantages of total station. Discuss on the working principles of total station. (06 Marks)
- b. What is spectral signature? Give its significance. (06 Marks)
- c. What is digital image processing? Write a note on image interpretation. (08 Marks)

OR

- 10 a. Discuss on the basic principles of GPS and its application in surveying. (06 Marks)
- b. What is spatial and attribute data? What is meant by attribute and spatial query? (06 Marks)
- c. Define GIS. Give the components of GIS. Write a note on integration of Remote Sensing with GIS. (08 Marks)

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