B.E. CONSTRUCTION ENGINEERING SECOND YEAR FIRST SEMESTER EXAM 2024

SUBJECT: SURVEYING

Time : Three Hours   **Full Marks : 100**

Part I (50 Marks)

Use Separate Answer scripts.

	No. of Questions		Marks
		Answer Q. No. 1 and any TWO from the rest.	
CO2 & CO4	Q.1	Write short notes on the following: (i) Passive and Active sensors in Remote Sensing (ii) Different platforms in Remote Sensing (iii) Whole circle bearing and Quadrantal bearing (iv) Local attraction in Compass survey (v) Geodetic survey	2 x 5
CO2	Q.2a.	What is spherical excess? Deduce the expression for it in terms of the three angles of a spherical triangle.	10
	Q.2b.	Determine the spherical excess of the spherical triangle ABC on the earth's surface when the coordinates of the stations are as follows: Coordinate of A = 30^0N 45^0E Coordinate of B = 50^0N 60^0E Coordinate of C = Pole	10
CO3	Q.3a.	Name the various accessories required for plane table survey. Give suitable sketches wherever necessary.	3
	Q.3b.	State and explain the method of setting up of the plane table. What is orientation of a plane table? How this is accomplished?	7
	Q.3c.	Explain orientation by three point problem in detail.	10
CO2	Q.4a	State and explain Bowditch's rule for adjustment of a closed traverse.	6
	Q.4.b	A compass traverse PQRSTP was run anticlockwise and following readings were obtained. Local attraction was suspected. Determine the correct bearings of the traverse lines.	14

Line	FB	BB
PQ	$149^0 50^/$	$330^0 15^/$
QR	$78^0 53^/$	$255^0 43^/$
RS	$42^0 45^/$	$222^0 45^/$
ST	$301^0 53^/$	$124^0 53^/$
TP	$212^0 17^/$	$32^0 02^/$

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Different parts of the same question should be answered together.

PART-II (50 Marks)

CO1	Answer all questions from this block

1. (i) Explain the different methods used to run a line parallel to a chain line through a given point. (ii) Explain the different obstacles encountered in chain surveying.

(ii) The page of an old filed book shown below. Some readings are not clear. Determine these readings from the available data.

Staff station	Back sight	Intermediate sight	Foresight	Rise	Fall	Reduced level	Remarks
P	0.635					215.915	
Q					0.680		
R			0.865				BM RL 215.685
S		0.785		0.43			
T	0.935				0.32		
U						215.715	

OR

Sixteen readings were taken with a level, with the instrument being shifted after 3rd, 7th, 11th, and 14th readings. The last reading was to a benchmark of elevation 203.565. Find the reduced levels of the remaining points. The readings are as follows: 1.305,1.815,1.015,1.245,1.355,-2.015,0.805,2.015,1.085,1.315,0.985,1.305,1.415,1.565, and 1.685. Use the **rise and fall/ HI** method.   (2+2+8.5)

Answer all questions from this block

2. (i) The following readings refer to reciprocal levelling observations between two points A and B 1000 m apart. The reduced level of A is 193.835 m. Find the reduced level of B and the collimation error, if any, of the instrument.

Instrument at	Staff at A	Staff at B
A	1.279	2.918
B	1.110	2.739

(ii) To determine the distance across a river, a point A on the near side was taken and a perpendicular was set to one side of the chain line. A point C on the chain line behind A was located and a point D was chosen on the perpendicular such that <CBD is right angle, B being a point in continuation of the chain line OA on the far side of the river. If AC = 61.85 m and AD = 93.8 m, find the length AB.

OR

To continue a chain line OA beyond a pond, two lines AC and AD were set out on either side of the chain line such that CBD is a straight line. B is a point on the other side in continuation of OA. Find the length AB if AC = 321.8 M, AD = 228.7 m, BC = 124.5 m, and BD = 108.8 m. (6.5 +6.0)

CO4

Answer all question from this block

3. (i) Prepare Gale's traverse table using the data of the closed traverse given below. After checking and balancing the traverse. The bearing of line AB observed was **222°01'30"**

Line	AB	BC	CD	DA
Length	155.25	170.4	202.6	139.4
Station	A	B	C	D
Included angle	**101°39'30"**	**95°32'50"**	**75°15'30"**	**87°32'50"**

(ii) Derive the distance and elevation formulae for an inclined line of sight with an angle of elevation. **OR**
A tachometer was kept at station A and observations were taken on a stadia rod kept over station B. The vertical angle was 6°30' and the stadia readings were 1.375, 2.003, 2.631, the staff being held normal to the line of sight. Also the reading on a staff held at benchmark 878.55m was 1.875m. Find the distance AB and RL of point B. K = 100, C = 0. (7+5)

CO5	Answer all question from this block
	4. (i) Explain the requirements of a transition curve. Derive the fundamental equation of Transition curve. (ii) Explain the basis on which the length of a transition curve is decided. **OR** What are the five components of a GIS? Explain the following errors in GPS **(ANY ONE)** receivers: a) Ionospheic errors b) Tropospheric errors c) SA errors. (ii) Briefly narrate working principle of Total station. What are the major components of Total Station? Write short note on advantage and disadvantage of Total station. (iii) From the given data calculate all necessary data for setting out purpose of a transition curve (<u>**ONLY DEFLECTION ANGLE TABLE FOR TRANSITION CURVE**</u>) with **NECESSARY CHECKS**? Minimum peg interval = 2.0 m for transition curve and 5.0 m for Circular curve. Velocity = 65km/hr, Radius = **380m** α = rate of change of radial acceleration = 1.20 m/sec^3 Meterage at intersection point = 9000m, I=Intersection angle = $33°34'32''$. (6+6.5)

Course objectives:

CO1:   **Recognize** the importance of survey in the field of Civil Engineering and **associate** the basics of linear/angular/elevation measurement methods like chain survey, compass survey and levelling, Contouring etc. (K1 & K2)

CO2:   **Explain** the significance of geodetic survey and **demonstrate** abilities to solve problems in triangulation, trilateration and spherical trigonometry (K2 & K3)

CO3:   **Associate** importance of plane table survey to **perform** topographical survey and **operate** Total Station (K2 & S2)

CO4:   **Apply** the basics of theodolite and tacheometric surveying, setting out works, principles of Photogrammetry, Remote sensing etc. (K3)

CO5:   **Distinguish and generate** Horizontal and vertical Curves **and Recognize** various modern survey techniques including Basics of Geographical Information System (GIS) & Geographical Positioning System (GPS) (A1, K4 & K5)