Ref. No. : Ex/CON/PC/B/TS/214/2024(S)

B.E. CONSTRUCTION ENGINEERING SECOND YEAR FIRST SEMESTEI
SUPPLEMENTARY EXAM 2024

SUBJECT: SURVEYING

(50 Marks for each Part)
Use separate answer script for each Part

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

Part I (50 Marks)

Use Separate Answer scripts for each Group

	No. of Questions		Marks
		Answer Q. No. 1 and any two from the rest.	
CO2 & CO4	Q.1 a)	(a) Two-point and three-point problems are methods of (i) Traversing (ii)Resection only (iii) Resection and orientation (iv) Orientation only. (b) The angle of dip at the pole is (i) 0^0 (ii) 90^0 (iii)45^0 (iv) none of the above (c) The graduations in a prismatic compass (i) are inverted (ii) have zero at south (iii) are from 0^0 to 360^0 (iv) all the above. (d) The whole circle bearing of a line is determined by a (i) Prismatic compass (ii) Surveyor's compass (iii) Celestial observations (iv) None of the above. (e) Napier's rule is applicable for the following triangles only (i) Obtuse angled (ii) Right angled (iii) Acute angled (iv) (i) and (iii) above.	1 x 5
	Q.1 b)	Write short notes on the following: (i) Spherical excess (ii) Method of included angles (iii) Isogonic and agonic lines (iv) Orientation in Plane Table survey (v) Geodetic survey	1 x 5

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Part I

Use Separate Answer scripts for each Group

	No. of Questions		Marks
CO2	Q.2a.	Deduce the relationship for 'Spherical excess'.	8
	Q.2b.	What is the geodetic area enclosed by 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 Assume radius of earth as 6378 km.	12
CO3	Q.3a.	Explain the principle of plane table surveying.	3
	Q.3b.	Mention the various methods of plane table traverse. Explain any one of them giving neat sketch.	7
	Q.3c.	Illustrate three point problem of resection with neat sketch.	10
CO2	Q.4a	What is magnetic declination? What are its variations?	7
	Q.4.b	In a closed traverse ABCDE, the bearing of the line AB was measured as $150^0 30'$. The included angles were measured as under: Angle A = $130^0 10'$ Angle B = $89^0 45'$ Angle C = $125^0 22'$ Angle D = $135^0 34'$ Angle E = $59^0 09'$ Calculate the bearings of all other lines.	13

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Subject: SURVEYING

Time: Three hours **Full Marks: 100**

Different parts of the same question should be answered together.

***PART-II* (50 Marks)**

CO1

Answer all questions from this block

1. (a) Explain the difference between contouring and levelling?

(b) Explain any five important characteristics of contours with neat sketches?

(c) The following ten readings were obtained during a levelling work with the instrument being shifted after the 5th and 8th readings:

1.315, 0.965,-2.345, 1.105, 0.875, 1.155, 1.305, 1.675, 1.345 and 1.875. Find the reduced levels of the remaining points if the RL of First turning point is 190.00m.

OR

The consecutive readings take during a levelling operation are as follows: **0.685, 1.315,-1.825,-0.635, 1.205, 1.235, 2.631, 1.355,-2.015.** The instrument was shifted after the third and sixth readings. The third readings were taken to a benchmark of assumed elevation 195.00. Find the reduced levels of other points. (2+4+6.5)

2. (a) Explain rise and fall method of reduction of levels?

(b) Explain the difference between the height of collimation method and the rise and fall method of reduction of levels.

(c) The following readings are reciprocal leveling observations across a river between two points A and B. Find the true difference in elevation between the two points.

Instrument at	Staff at A	Staff at B
A	1.441	2.613
B	1.772	2.950

OR

(a) Explain at least one method each to continue and measure the distance between points on either side of the obstacle in the case of (a) a pond (b) a river © a building

(b) Find the normal tension of a tape 30m long if calibrating pull was 100N. The weight of tape was 16N, its cross-section area was 6.0 mm^2, and E = 200GN/m^2.

(c) In order to find the width of a river, two points A and B were taken on one bank so that AB is approximately parallel to the river. A well-defined point C on the other side was marked. With an adjustable cross staff, <BAC =42° and <ABC =56° were measured. Find the width of the River if AB = 290m. (2+4+6.5)

CO4

Answer all question from this block

3. (a) The survey records of a closed traverse are given in the following table. Fill up the missing entries.

Line	AB	BC	CD	DE	EA
Length(m)	725	1060	1250	945	577.2
Bearing	S49°45'E	N62°30'E	N37°36'W	-	-

(b) Also find out the area of the traverse (ABCDE) Assume any arbitrary Bearing of Line BC

OR

(a) Derive the distance and elevation formulae for an inclined line of sight with an angle of elevation.

(b) Find the stadia constants from the data given below.

Instrument at	Staff at	Cross hair readings	Distance
o	P	1.135,1.285,1.435	OP = 30m
o	Q	1.025,1.324,1.625	OP = 60m

(7.5+5)

CO5

Answer all question from this block

4. (a) Briefly explain 'vertical curves' and 'shift of a transition curve'?

OR

State the relationship between the radius of a curve and the degree of the curve?

What is the intrinsic equation of transition curves?

(b) From the given data calculate **only the deflection angles of the Transition curve** for setting out purpose with **NECESSARY CHECKS**? Minimum peg interval = 2m Velocity = 60km/hr Radius = 150m α = rate of change of radial acceleration = 1.12m/sec^3 Meter age at intersection point = 320m I=Intersection angle = $32^0 34'20''$.

(c) What are the five components of a GIS? Explain the following errors in GPS receivers: a) Ionospheic errors b) Tropospheric errors c) SA errors.

(2+7+3.5)

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)