Birla Institute of Technology & Science, Pilani
Hyderabad Campus

First Semester 2022-2023

CE F213 Surveying

Comprehensive Examination

Weightage: 35%

Maximum Marks: 35 **Duration: 3 Hours**

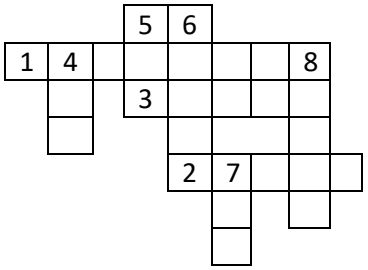
Date:22.12.2022 **Nature of Exam: Closed Book**

Instructions

- **Answer All Questions**
- **Draw diagrams wherever necessary**
- **Report the values up to 3 decimal points wherever is applicable**

Section-A

1. Complete the grid given below. **[8*0.25=2M]**



Along

1. Lines of equal longitude [8]
2. Lines of equal gravitational potential [5]
3. Example of a thematic map [4]

Down

4. Distance measurement in total station [3]
5. System for collection and analysis of geospatial data [3]
6. The metric in the GNSS survey tells us how well the satellites are distributed [4]
7. The model related to elevation measurement [3]
8. The operational name of the Indian GNSS [5]

2. Differentiate between the following. **[4*0.75 = 3 M]**

a) Resection vs Intersection
b) Tacheometric survey vs total station survey
c) Closed traverse vs closed loop traverse
d) Mid-ordinate length vs External distance of simple curve

Section-B

Answer the following

1. Explain UTM coordinate system and mark the origin of the coordinate system of UTM zone 44 N. Also show the control point (P) location which has Northing = 1941234 m and Easting = 82823 m **[2M]**

2. List any one of the advanced surveying techniques and discuss its two specific applications in the domain of Civil Engineering. Limit your answers to 2-3 sentences. **[2M]**
3. Explain the two theodolite method of setting out curves in the field with a proper diagram. **[2M]**
4. Explain the three-point problem with a case where the point lies within the great triangle and the great circle. Draw the corresponding figure. **[3M]**
5. Draw a compound curve and mark the elements of the compound curve. Write the expressions of the following based on the figure. **[3M]**
   i) Lengths of the first arc and second arc
   ii) Length of the common tangent
   iii) Length of the main tangent which connects the starting point of the first curve and point of intersection of the two straights.

Section-C

1. A chain line ABC crosses a river in such a way that B and C being near and far banks respectively. A point D is located 60 m from point B and line BD is perpendicular to AB. The respective bearings of C and A measured at D are 280° and 190°. The length of line AB is given as 32 m. Find the width of the river. Draw the corresponding figure. **[2M]**
2. Calculate the ordinates at every 10 m distances for a circular curve having a long chord of 80 m and a versed sine of 4 m. **[3M]**
3. Calculate the latitudes, departures, and closing error of the following traverse and calculate the corrected latitude and departure values by applying Bowditch's rule of traverse adjustment. **[5M]**

Line	Length (m)	WCB
AB	89.31	45° 10'
BC	219.76	72 ° 05'
CD	151.18	161 ° 52'
DE	159.1	228 ° 43'
EA	232.26	300 ° 42'

Show the calculated values in a table showing one sample calculation for latitude and departure and its corrections. Draw the corresponding rough diagram of the traverse.

4. A railway embankment 400 m long is 15 m wide at the formation level and has a side slope of 2 to 1 (Horizontal to Vertical). The ground levels at every 100 m along the centre line are given below.

Distance (m)	0	100	200	300	400
RL (m)	204.5	206.1	207.5	207.2	208.3

The formation level at zero chainage is 207 m and the embankment has a rising gradient of 1 in 100. The ground is level across the centre line. Calculate the volume of earthwork using trapezoidal rule. **[4M]**

5. The elevation of a point P is to be determined by observations from two adjacent stations of a tacheometric survey. The staff was held vertically upon the point and the instrument is fitted within an anallactic lens, the constant(k) of the instrument is 100 . Compute the elevation of point P (for both the cases) from the following data, taking both observations as equally trustworthy.

Instrument station	Height of axis	Staff position	Vertical angle	Staff readings (m)	Elevation of station (m)
A	1.42	P	2° 24'	1.23, 2.055,2.88	77.75
B	1.4	P	-3 ° 36'	0.785,1.8,2.815	97.135

Also, calculate the distance of A and B from P. **[4M]**

-------All the Best------