

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
FIRST SEMESTER 2023-2024
SURVEYING (Mid Semester Exam)

Course No: CE F213

Date: 10-10-2023 (Tuesday)

Duration: 90 Mins (Closed book)

Max. Marks: 70 (Weight: 35%)

I: Choose the best answers:

[10 x 1 = 10]

- 1) The type of compass which follows whole circle bearing is _____
- 2) In contour surveying, depressions between summits are known as _____.
- 3) The local attraction does not affect the included angle (True/False)
- 4) A 30 m chain is generally divided into _____ links and each link measures _____ cms.
- 5) Chain surveying is generally preferred when the ground surface is more or less level (True/False)
- 6) The most important line in the chain surveying is _____
- 7) The refraction curve is irregular because of varying atmospheric conditions (True/False)
- 8) The principle of levelling is _____
- 9) If the temperature in the field is more than the temperature at which the tape was standardized, the correction to the measured distance is positive (True/False).
- 10) In case of self-reading levelling staff, person who is holding the levelling staff is responsible for the readings (True/False)

II: Short answers:

[10 x 2 =20]

- 1) Define fore bearing and back bearing.
- 2) Define level surface.
- 3) What is the difference between arbitrary benchmark and temporary benchmark?
- 4) Define contour interval.
- 5) The magnetic bearing of a line is 135 deg 30 minutes. What is the true bearing if the declination is 5 deg 15 minutes east?
- 6) If a surveyor is standing in a hall with floor RL 673 m and the height of the hall is 3.5 m, how can surveyor verify experimentally that the RL of top of the headroom is 103.5 m using the principles of levelling? Proper use of level and levelling staff is expected.
- 7) Define perpendicular and oblique offsets.
- 8) Mention the expression for pull correction (one of the tape corrections).
- 9) What is the difference between open transverse and closed traverse?
- 10) What is the difference between spherical aberration and chromatic aberration?

III Long answers:

[4 x 10 = 40]

- 1) The following consecutive readings were taken with a dumpy level and a 4 m levelling staff. The level was taken on a continuously sloping ground (in particular direction) up to a chainage distance of 100 m and then ground profile starts continuously rising for the remaining stretch. The interval can be taken as 20 m

0.855 (Bench Mark at chainage 0 m), 1.550, 2.335, 3.115, 3.825, 3.900, 3.950, 2.055, 1.015, 1.000, 1.850, 1.500, 2.500, 2.000, 1.800, 1.200. The RL of BM is 100.00 m. Make entries in a level book and determine the RL of all staff positions and apply the usual checks. Use Rise and Fall Method. [10]

2 (a). The following notes refer to reciprocal levels taken with an auto level and levelling staff.

| Instrument near | Staff Readings (m) on | | Remarks |
|-----------------|-----------------------|-------|---|
| | P | Q | |
| P | 1.500 | 1.800 | Distance PQ = 1000; RL of P = 100.00 m |
| Q | 0.810 | 0.500 | |

Determine (i) True difference in level (ii) RL of Q; (iii) combined correction of curvature and refraction; (iv) correct staff reading at P and collimation error when the instrument is at Q. [7]

2 (b). Explain briefly the difference between simple levelling and fly levelling. [3]

3) Following is the data regarding a closed compass traverse ABCD taken in a clockwise direction.

Fore bearing and back bearing at station A = 50 deg and 130 deg

Fore bearing and back bearing of line CD = 206 deg and 26 deg respectively.

Included angles $\angle B = 100^\circ$ and $\angle C = 105^\circ$; Local attraction at C = $2^\circ W$

All the observations were free from all the errors except local attraction. From the above data, calculate (a) local attractions at A and D and (b) corrected bearings of all the lines. [10]

4) In a proposed hydro-electric project, a storage reservoir was required to provide storage of 4.50 million cubic meters between lowest draw down (LDD) and the top water level (TWL). The areas contained with the stated contours and up-stream faces of the dam were as follows.

| | | | | | | | | |
|--------------------|-----|----|----|----|----|----|----|----|
| Contour (m) | 100 | 95 | 90 | 85 | 80 | 75 | 70 | 65 |
| Area (in hectares) | 30 | 25 | 23 | 17 | 15 | 13 | 7 | 2 |

If the LDD was to be 67 m, calculate the TWL for 80% full storage capacity. Use Trapezoidal rule for computation of areas and volumes. [10]

=====XXXXXXXXXXXXXXXXXXXXXXXXXXXX=====