A **Reg. No. :** | | | | | | | | | | | | |

**Question Paper Code: R4A05**

B.E. / B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Fourth Semester

Agricultural Engineering

R21UAG405 SURVEYING AND LEVELLING

(Regulation-R2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The surveys are to fix the boundaries of municipalities are CO1-U

   (a) Cadastral surveys (b) City surveying (c) Engineering surveys (d) Military surveys

2. The walking step of a man is considered equal to CO1-U

   (a) 80cm (b) 90cm (c) 100 cm (d) 75cm

3. In plane table surveying the operation which must be carried out is CO1-U

   (a) Resection (b) intersection (c) orientation (d) traversing

4. If the Magnetic Bearing of a Line is 48°24' and magnetic declination is 5°38' East, then the true bearing is CO2-App

   (a) 42°02' (b) 42°46' (c) 54°02' (d) 54°46'

5. What differential leveling is done in order to connect a bench mark to the starting point of the alignment of any road ,railway, canal project it is called CO1-U

   (a) Profile levelling (b) Cross-section levelling (c) Reciprocal levelling (d) Fly levelling

6. In an adjusted level, when the bubble is central, the axis of the bubble tube becomes parallel to CO1-U

   (a) Line of sight (b) Line of collimation (c) Axis of the telescope (d) None of these

7. In earthwork computations on a longitudinal profile the diagram prepared to work out the quantity of earthwork is CO1-U

   (a) double mass curve (b) mass haul diagram (c) mollier diagram (d) flow net

8. The simpson's rule for determination of areas is used when the number of offsets are CO1-U

(a) 2 (b) even (c) 3 (d) odd

9. What is the name of theodolite if its telescope can be resolved through 180 degree in a vertical plane about its horizontal axis? CO1-U

(a) Transit theodolite (b)Non- transit theodolite

(c) Horizontal axis theodolite (d) Vertical axis theodolite

10. During which year the project on GPS was launched? CO1-U

(a) 1970 (b) 1971 (c) 1972 (d)1973

PART – B (5 x 2= 10 Marks)

11. The length of a line measured with a 30m chain was found to be 450metres. Calculate the length of the line if the chain was 20 cm too long. CO2-App

12. What is resection in plane tabling? CO1-U

13. What is the datum adopted for GTS bench marks? CO1-U

14. Calculate the contour interval on a map having the scale of 1:40.000. CO3-App

15. Differentiate between latitude and departure CO1-U

PART – C (5 x 16= 80Marks)

16. (a) (i) A line was measured by a 20m chain which was accurate before starting the day's work. After chaining 900m,the chain was found to be 6 too long. After chaining a total distance of 1575m the chain was found to be 14cm too long. Find the true distance of the line. CO2-App (10)

(ii) The distance between two stations was 1200m when measured with a 20m chain. The same distance when measured with 30 m chain was found to be 1195m.if the 20m chain was 0.05m too long, what was the error in the 30m chain? CO2-App (6)

Or

(b) (i) An old map was plotted to a scale of 40m to 1cm. over the years, this map has been shrinking, and a line originally 20cm long is only 19.5 cm long at present. Again the 20m chain was 5cm too long. If the present area of the map measured by planimeter is 125.50 $cm^2$, find the true area of the land surveyed. CO2-App (6)

(ii) A 20m steel tape was standardized on flat ground at a temperature of$20^oC$ and under a pull of 15kg. The tape was used in catenary at a temperature of $25^oC$ and under a pull of P kg. The c/s area of the tape is $0.22cm^2$,and its weight per unit length is400g.$\alpha$ is 11 x $10^{-6}$ per$^oC$ and E for steel is 2.1 x $10^6$ $kg/cm^2$.compute the correct horizontal distance ,if P is equal to 12kg CO2-App (10)

17. (a) The bearing of size traverse A,B,C,D,E are as follows CO2-App (16)

| side | FB | BB |
|---|---|---|
| AB | 107°15’ | 287°15’ |
| BC | 22°00’ | 202°0’ |
| CD | 281°3□’ | 101°30’ |
| DE | 189°15’ | 9°18’ |
| EA | 124°45’ | 304°45’ |

Compute the interior angle of the traversing.

Or

(b) The following bearings were taken on a closed compass Traverse CO2-App (16)

| Line | FB | BB |
|---|---|---|
| AB | 80° 10’ | 259°0’ |
| BC | 120°20’ | 301° 50’ |
| CD | 170°50’ | 350°50’ |
| DE | 230° 10’ | 49° 30’ |
| EA | 310° 20’ | 130° 15’ |

Compute the interior angles and correct them for observational errors. Assuming the observed bearing of the line CD to be correct. Adjust the bearing of the remaining sides.

18. (a) The following consecutive readings were taken with a level and 5 meter levelling staff on continuously sloping ground at a common interval of 20 metres: 0.385, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625, 2.005, 3.110 and 4.485. The reduced level of the first point was 300.125 m. Calculate the reduced levels of the points by rise and fall method and also the gradient of the line joining the first and the last CO3-App (16)

point.

Or

(b) The following consecutive readings were taken with a dumpy along a chain line at common intervals of 15m.The first intervals was taken on a chaining 165m.The RL is 100.00.the instrument was shifted after the third, sixth and ninth readings
3.150, 20245, 1.125, 0.860, 3.125, 2.760, 1.835, 1.470, 1.965, 1.225, 2.390 and 3.035m.mark rules on a page of your notebook in the form of a level book page and enter on it the above readings and find the RL of all the points by The Rise and Fall method. CO3-App (16)

19. (a) A railway embankment of formation width of 8m and side slope 2:1 is to be constructed. The ground level along the centerline is as follows. The embankment has a rising gradient of 1 in 100, and then formation level at zero chaining is 115.0.assuming the ground is level across the center line ,compute the volume of earth work. CO4-App (16)

| chainage | 0 | 50 | 100 | 150 | 200 | 250 |
|---|---|---|---|---|---|---|
| GL(m) | 115.75 | 114.35 | 116.80 | 115.20 | 118.50 | 118.25 |

Or

(b) The following offsets were taken from a chain line to an irregular boundary line at an interval of 10m 0,1.50,2.50,3.50,4.60,3.20,0 m compute the area between the chain line the irregular boundary line and the end offsets by CO4-App (16)
(i) The mid-ordinate rule
(ii) The average ordinate rule
(iii) The trapezoidal rule
(iv) Simpsons rule

20. (a) Explain in detail about various components of a transit theodolite with neat sketches CO1-U (16)

Or

(b) Explain the permanent and temporary adjustment of theodolite with neat sketches? CO1-U (16)