Code No: R2021014 **R20** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, December-2023
SURVEYING AND GEOMETRICS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
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UNIT-I

1 a) Define surveying and explain its importance in various fields. Highlight the key objectives of surveying. [7M]
b) List different methods of making linear measurements? Explain the principle on which chain survey is based. [7M]

OR

2 a) Discuss the role of surveying in modern technology and its applications in fields like civil engineering, land management, and geospatial data collection. [7M]
b) If in a length of one chain along a slope, the ground rises 3m, find the angle of slope and the hypotenusal allowance per chain when it is (i) 30m chain (ii) 20m chain [7M]

UNIT-II

3 a) Explain the concept of leveling in surveying. Differentiate between temporary and permanent adjustments in leveling, and why are they necessary in the field? [7M]
b) A reservoir has an irregular shape due to varying depths and slopes. Explain how you would calculate the capacity of this reservoir, considering different depth contours. [7M]

OR

4 a) Elaborate on the concept of refraction in leveling surveys. Why is refraction correction important, and how is it applied in the field? [7M]
b) In a trigonometric leveling survey, you measure the horizontal and vertical angles between two points and the distance between them. Explain the principle behind trigonometric leveling and how you would calculate the height difference between the two points. [7M]

UNIT-III

5 a) Discuss in detail the types of theodolites used in modern surveying and their specific applications, highlighting the advantages and limitations of each type. [7M]
b) You are using a theodolite to measure a horizontal angle of 95°20' between two remote points. If the instrument's collimation error is +10 seconds and the correction for curvature is -3 seconds, determine the corrected horizontal angle. [7M]

OR

6 a) Explain the essential computations and adjustments made during traversing, including latitude and departure calculations and corrections. How do these ensure the closure and accuracy of the traverse? [7M]
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b) You are using the repetition method to measure a horizontal angle. The first reading is 36°15' and the second reading is 36°20'. Calculate the corrected horizontal angle. [7M]

UNIT-IV

7 a) Explain the necessity of different types of curves in civil engineering and provide examples of situations where simple, compound, and reverse curves are used. [7M]

b) Given a road layout, calculate the parameters (radius, length, etc.) of a simple curve and compound curve that need to be incorporated into the design to meet specific requirements. [7M]

OR

8 a) Explain the tangential method of tachometry and its advantages in surveying. Provide a step-by-step procedure for conducting a tachometric survey using this method. [7M]

b) Design a surveying project that combines tachometry, total station, and GPS to accurately map a large area with diverse terrain and features. [7M]

UNIT-V

9 a) Define relief and tilt displacements in photogrammetry and discuss their significance in generating accurate 3D models from aerial imagery. [7M]

b) Explain the concept of map substitution and demonstrate how it can be applied to update an existing map with new aerial imagery. [7M]

OR

10 a) Explain the critical factors and considerations in flight planning for aerial photogrammetry surveys, including the choice of flight altitude and overlap. [7M]

b) Provide an overview of the historical development of photogrammetry, highlighting key milestones and technological advancements. [7M]

Code No: R2021014 **R20** SET - 2

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SURVEYING AND GEOMETRICS
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Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
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UNIT-I

1 a) Explain the fundamental principles and techniques used in compass surveying, leveling, and plane table surveying. [7M]

b) Convert the following whole circle bearings to quadrantal bearings. [7M]
(i) 350^0 12' (ii) 117^0 24' (iii) 68^0 51' (iv) 212^0 04'

OR

2 a) Discuss the methods for measuring linear distances in surveying, including approximate and direct methods. Provide examples of each. [7M]

b) The distance between two points A and B measured along a slope is 504m. Find the horizontal distance between A and B when (i) The angle of slope is 12^0 (ii) The slope is 1 in 4.5 and (iii) The difference in elevation of A and B is 65m. [7M]

UNIT-II

3 a) Describe the various types of leveling instruments commonly used in surveying, including their principles of operation and applications. [7M]

b) A series of readings were collected using a dumpy level and a 4m leveling staff on a continuously sloping terrain at 30m intervals. The readings are as follows: A(0.585, 0.930, 1.9555, 2.4840, 3.645, 0.960, 1.035, 1.680, 2.535) and B(0.950, 1.575, 3.015). Given that the benchmark elevation is 520.150m and the instrument was shifted after the 6th and 11th readings, determine the Reduced Level (RL) of point B and calculate the gradient of line AB. [7M]

OR

4 a) Discuss the methods of leveling used in surveying, such as differential leveling, trigonometric leveling, and barometric leveling. Highlight the advantages and limitations of each method. [7M]

b) Compare and contrast the methods of calculating the area of a land parcel with irregular boundaries using the coordinate method and the graphical method. Explain when each method is more suitable. [7M]

UNIT-III

5 a) Explain the concept of temporary adjustments in theodolites, including the process of leveling, centering, and plumbing. How do these adjustments ensure accurate measurements. [7M]

b) A traverse survey with a theodolite was conducted. The horizontal angles at three consecutive stations: A to B = 97°20', B to C = 105°45', and C to A = 157°15' was measured. Calculate the total interior angles at each station and check if they form a closed traverse. [7M]

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6 a) Compare and contrast the principles and procedures of measuring horizontal angles using the repetition method and the reiteration method with their respective advantages and disadvantages. [7M]

b) The reiteration method was used to measure a horizontal angle. The initial reading is 75°30', and after several repetitions, the final reading is 75°32'. Calculate the corrected horizontal angle and explain the significance of multiple repetitions in the reiteration method. [7M]

UNIT-IV

7 a) Discuss the elements of a compound curve in detail. How does a compound curve differ from a simple curve? Provide an example of a situation where a compound curve is preferred. [8M]

b) A GPS receiver reports a horizontal accuracy of 2 meters and a vertical accuracy of 3 meters. What is the 95% confidence interval for the position in both the horizontal and vertical dimensions? [6M]

OR

8 a) Compare and contrast the stadia and tangential methods of tachometry. When is each method preferred, and under what conditions might one be more accurate than the other? [8M]

b) In a tachometric survey, you measure a horizontal distance of 100 meters with a stadia interval of 0.2 meters. Determine the mean stadia intercept and calculate the actual distance. [6M]

UNIT-V

9 a) Describe the essential elements and terms used in photogrammetry, such as stereoscopy, parallax, and scale.

b) Evaluate the accuracy of an aerial triangulation solution, considering the residuals between observed and computed ground control point coordinates.

OR

10 a) Discuss the use of stereoplotting instruments in photogrammetry mapping and their advantages over traditional methods.

b) Explain the steps involved in generating orthophotos from aerial imagery and discuss their significance in cartography and GIS.

Code No: R2021014 **R20** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, December-2023
SURVEYING AND GEOMETRICS
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit
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UNIT-I

1 a) What is the magnetic dip, and how does it affect compass readings? Explain the practical implications of magnetic dip in surveying. [7M]

b) The true bearing of a tower observed from a station A is 350^0 30′ and the magnetic bearing of the tower is 2^0 30′. The back bearing of the line AB when measured with a prismatic compass was found to be 330^0 30′. What is the true bearing of the line AB? [7M]

OR

2 a) Describe the QB (Quadrantal Bearings) system of locating bearings. How is it different from other systems, and why is it used in surveying? [7M]

b) Explain the Bow ditch rule for adjusting a compass traverse, with neat sketches. [7M]

UNIT-II

3 a) Define contour lines and explain their characteristics. Describe how contour lines are represented on a topographic map and their significance in land surveying. [7M]

b) In a leveling survey, a series of consecutive readings was taken using a dumpy level. The recorded readings are: 1.895, 1.500, 2.020, 2.410, 1.865, 2.520, 2.570, 2.960, 2.990, and 3.115. The level's position was adjusted after the fourth, sixth, and ninth readings. The initial point had an established Reduced Level (R.L.) of 30.500. Reserve one page of your answer book for creating a level book with appropriate columns. Employ the collimation system and conduct standard checks. Additionally, specify the highest and lowest points encountered during the survey. [7M]

OR

4 a) Compare and contrast the methods of contour surveying, including direct contouring, indirect contouring, and the use of aerial photographs. Highlight the advantages and disadvantages of each method. [8M]

b) Provide an in-depth explanation of Fly Levelling and Differential Levelling, shedding light on the principles and practical applications of these surveying techniques. [6M]

UNIT-III

5 a) Describe the temporary adjustments that need to be made to a theodolite before taking measurements in the field. [8M]

b) In a traverse survey, the following angular measurements were obtained: A = 87°20'30", B = 122°45'15", C = 64°10'45", and D = 105°55'20". Calculate the total interior angles of the traverse. [6M]

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6 a) Compare and contrast the repetition and reiteration methods for measuring horizontal angles using a theodolite. [8M]

b) In a trigonometric leveling problem, the horizontal distance to a point is 300 meters, and the vertical angle is 3°15'. Calculate the height difference between the instrument and the point. [6M]

UNIT-IV

7 a) Discuss the types of EDM instruments available in modern surveying. Provide examples of specific instruments and their respective applications in surveying. [8M]

b) A Total Station instrument is used to measure the coordinates of a point. The instrument reports the horizontal angle as 65 degrees and the slope distance as 150 meters. Calculate the X, Y, and Z coordinates of the point. [6M]

OR

8 a) Explain the concept of Differential GPS (DGPS). How does it enhance the accuracy of standard GPS measurements, and what are its primary applications? [8M]

b) A reverse curve on a highway has a radius of 150 meters and an angle of deflection of 30 degrees. Calculate the tangent distance between the two curves. [6M]

UNIT-V

9 a) Discuss the principles of perspective geometry as they apply to aerial photographs and explain how it influences the interpretation of features. [7M]

b) Define bundle block adjustment in photogrammetry and elaborate on its role in refining the geometric relationships between aerial photographs. [7M]

OR

10 a) Compare and contrast terrestrial photogrammetry with aerial photogrammetry. Provide examples of when each approach is more suitable. [7M]

b) Discuss the legal and ethical issues that may arise in photogrammetry projects, such as privacy concerns and intellectual property rights. [7M]

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Answer any **FIVE** Questions each Question from each unit
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UNIT-I

1 a) Explain the use of chains and tapes in surveying for measuring linear distances. Discuss the advantages and disadvantages of each. [7M]

b) A 30 m tape measures 29.985 m when supported at the two ends only, with the temperature at 30°C and a tension of 70 N. the tape weighs 12N and has a cross sectional area of 0.04 cm^2. If the field temperature is also 30°C, what tension shouldbe applied so that the tape measures exactly 30m when supported at the two ends. [7M]

OR

2 a) What are tape corrections, and why are they necessary in surveying? Provide examples of situations where tape corrections are required. [7M]

b) The degree of precision in angular and linear measurement in theodolite traverse for different circumstances. A four-sided traverse ABCD, has the following lengths and bearings: [7M]

Side	length in m	Bearing.
AB	500	Roughly East
BC	245	178°
CD	Not obtained	270°
DA	216	10°

Find the exact bearing of the side AB.

UNIT-II

3 a) In earthwork calculations, describe the procedure for determining the volume of earthwork in a cutting and embankment for a level section. Additionally, explain how to calculate the volume of borrow pits and the capacity of reservoirs in surveying projects. [7M]

b) Determine the distance between the instrument station P and the staffstation Q from the following data: [7M]
R.L of the instrument axis =200.150m
Vertical angle=$-3^0 45'$
Sta readings =1.450, 0.900, 0.350 m
Also determine the R.L of Q. Take k=100 and c=0.0.

OR

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4 a) Differentiate between determining the area of a land parcel with irregular boundaries and one with regular boundaries. Describe the steps involved in computing the area for each case. [7M]

b) You conducted a leveling survey with a dumpy level, collecting a series of consecutive readings: 1.895, 1.500, 2.020, 2.410, 1.865, 2.520, 2.570, 2.960, 2.990, and 3.115. The dumpy level's position was changed after the fourth, sixth, and ninth readings. The initial point was established with a Reduced Level (R.L.) of 30.500. Allocate one page in your answer book as a level book, configuring the columns accordingly. Utilize the collimation system and perform standard checks. Additionally, denote the survey's highest and lowest points. [7M]

UNIT-III

5 a) Explain the process of trigonometric leveling when the base is inaccessible and provide examples of situations where this method is useful. [8M]

b) Given the following traverse measurements: AB = 150.5 meters, BC = 200.3 meters, CD = 180.7 meters, and DA = 220.4 meters, calculate the traverse's total length. [6M]

OR

6 a) Explain the concept of omitted measurements in traversing, and why are they sometimes necessary in surveying projects? [8M]

b) In a traverse, the latitude and departure of each line are as follows: AB (N=250, E=180), BC (N=150, E=250), CD (N=200, E=100), and DA (N=100, E=150). Calculate the closing error in the traverse. [6M]

UNIT-IV

7 a) Describe the various components of a typical GPS receiver. Explain their roles and functions in obtaining accurate position information. [8M]

b) Given a compound curve with radii of 200 meters and 300 meters, find the distance between the points where the tangents intersect the circular curves. [6M]

OR

8 a) Define a Total Station in surveying. Enumerate the advantages of using Total Stations in surveying and provide examples of its applications in the field. [8M]

b) Conducting a topographic survey using an EDM instrument with a prism constant of 30 mm. If the instrument reads 3200.5 meters, what is the actual distance to the prism? [6M]

UNIT-V

9 a) Explain the fundamental principles and applications of photogrammetry in surveying and mapping. [7M]

b) Describe what DEMs are and how they are derived from photogrammetric data. Discuss their applications in terrain analysis and modeling. [7M]

OR

10 a) Discuss the principles of perspective geometry as they apply to aerial photographs and explain how it influences the interpretation of features. [7M]

b) Compare lidar technology with photogrammetry for collecting elevation data. Highlight their respective strengths and weaknesses. [7M]

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