KATHMANDU UNIVERSITY
End Semester Examination
February, 2025

Marks Scored:

Level : B.E.
Year : II

16 FEB 2025

Course : CIEG 207
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date :

SECTION "A"

[20 Q. × 0.5 = 10 marks]

Choose and encircle the most appropriate option from each set of choices

1. Method of tacheometry in which the interval on levelling staff is variable and stadia hair intercept is fixed is known as _____
   a. movable hair method. b. fixed hair method.
   c. tangential hair method. d. subtense bar method.

2. The intercept of staff is_____
   a. minimum if the staff is held truly normal to the line of sight.
   b. maximum if the staff is held truly normal to the line of sight.
   c. decrease if the staff is titled away from normal.
   d. increase if the staff is titled from normal.

3. The angle of intersection between two straights is 140^0. The spiral angle for each transition curve is 5^0. If the radius of the main curve is 400 m, calculate the length of the circular curve is_____
   a. 349.06 m b. 279.250 m c. 209.44 m d. 69. 81 m

4. Calculate the length of a vertical curve if an upgrade of 1.4% is followed by downgrade of 0.6%. Assume the recommended rate of change of grade as 0.1 % per 20 m chain.
   a. 160 m. b. 260 m. c. 200 m. d. 400 m.

5. The stations where observation are not made but the angles at the station are used in triangulation is known as_____
   a. satellite station b. tertiary station c. pivot station d. main station

6. The stadia readings with horizontal sight on a vertical staff held 50 m away from a tacheometer were 1.284 and 1.780. The focal length of object glass was 25 cm. The distance between the object glass and trunnion axis of the tacheometer was 15 cm. Calculate the stadia interval.
   a. 2.5 mm b. 4.5 mm c. 5.5 mm d. 5 mm

7. The point where a plumb line dropped from the front nodal point strikes the photograph is known as_____
   a. principal point b. nadir point c. iso-centre d. perspective center

8. For circular curve with radius six times the length of transition curve, the spiral angle will be_____
   a. $\frac{1}{12} radian$ b. $\frac{1}{24} radian$ c. $\frac{1}{6} radian$ d. $\frac{1}{3} radian$

9. The vertical distance between any two consecutive contours is known as_____
   a. contour line
   b. horizontal equivalent
   c. contour interval
   d. Contour gradient

10. A series of closed contour lines on the map with higher to lower values inside them represents_____
    a. hill
    b. ridge
    c. depression
    d. steep slope

11. In first order traverse for horizontal control, the angular error of closure should not exceed_____
    a. $15''\sqrt{N}$
    b. $6''\sqrt{N}$
    c. $1''\sqrt{N}$
    d. $30''\sqrt{N}$
    Where, N = number of angles

12. If the intercept on a vertical staff is observed as 0.75 m from a tacheometer with the line of sight horizontal, fitted with an analytic lens, the horizontal distance between the tacheometer and the staff station is_____.
    a. 75 m
    b. 0.75 m
    c. 7.5 m
    d. 750 m

13. Calculate the length of a transition curve to be inserted between a straight and a circular curve such that a super elevation of 15 cm over a circular curve may be attained. Assume the rate of attaining super elevation as 2.5 cm per second and average speed of the vehicle as 60 km/hour.
    a. 200 m
    b. 250 m
    c. 100 m
    d. 150 m

14. The minimum horizontal distance between any two consecutive contours is known as_____.
    a. horizontal equivalent
    b. contour line
    c. contour interval
    d. contour gradient

15. If the radius of the circular curve is 100 m and the angle of intersection of backward tangent and forward tangent is 85^0, the length of backward tangent is_____
    a. 91.631 m
    b. 1143.000 m
    c. 109.131 m
    d. 100.000 m

16. An instrument was set up at A and angle of elevation of the top of an electric pole BC was 24^0 36'. The horizontal distance between A and B, the foot of pole was 600 m. Determine the reduced level of the top of the pole, if the staff reading held on B.M (R.L 100 m) was 2.532 m with the telescope in horizontal plane.
    a. 274 .702 m
    b. 277.34 m
    c. 300.702 m
    d. 377.233 m

17. The long chord and tangent length of a circular curve of radius R will be equal if the angle of deflection is_____
    a. 120^0
    b. 30^0
    c. 60^0
    d. 150^0

18. Axis method for balancing consecutive co-ordinates in the closed traverse is used when_____
    a. angles are measured more accurately compared to lengths
    b. lengths are measured more accurately compared to angles
    c. both angles and lengths are measured with same accuracy
    d. both lengths and angles are measured with less precision

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19. The maximum number of omitted measurement that can be calculated from latitudes and departures of a closed traverse is_____
    a. three b. two c. four d. one

20. The system that uses the sun as a source of electromagnetic energy and records the naturally radiated and reflected energy from the object is called_____
    a. active remote sensor b. natural remote sensor
    c. passive remote sensor d. global positioning system

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SECTION "B"

Attempt *ALL* questions. Assume suitable data if necessary.

1. Explain briefly consecutive coordinate and independent coordinate. The following observations were made for a closed traverse round an obstacle. Due to obstruction, lengths of lines DE and EA could not be measured. Find out the missing lengths. [2+4]

Line	Length (m)	Bearing
AB	500	$98^0\,30'$
BC	620	$30^0\,20'$
CD	468	$298^0\,30'$
DE	?	$230^0\,00'$
EA	?	$150^0\,10'$

2. State a principle of tacheometry. In tacheometer survey made with an instrument whose constants are 100 and 0.5, the staff was inclined so as to be normal to the line of sight for each reading. Two sets of readings were as given below. Calculate the gradient between the staff stations P and Q and the reduced level of each if that of R is 41.800 m. [1+4]

Instrument station	Height of instrument axis (m)	Staff station	Bearing	Vertical angle	Stadia Reading (m)
R	1.600	P	85^0	$+\,4^0\,30'$	1.000, 1.417, 1.833
		Q	135^0	$-\,4^0\,00'$	1.000, 1.657, 2.313

3. A 3% rising gradient meets a 2% down gradient at a chainage of 2600m, the R.L of the point of intersection being 1300 m. A vertical parabola is to be set out to connect two grades with pegs at 20 m interval. The rate of change of grade allowed is 0.5% per 20 meter chain. Tabulate the chainage and RL of the station pegs for setting out the vertical curve. [5]

4. What is meant by shift of a curve? Two tangents intersects at chainage 1192 m, the defection angle being $50^0\,30'$. Calculate and tabulate all the necessary data for setting out a curve of 300 m radius to connect the two tangents if it is intended to set out the curve by Rankine's method of tangential deflection angle with the peg interval 20 m. [1+4]

P.T.O.

5. Explain briefly different factors affecting the contour interval? Describe briefly methods of interpolation of the contour. [2+4]

6.

a. The top (Q) of a chimney was sighted from two stations P and R at very different levels, the stations P and R being in line with top of chimney. The angle of elevation from P to the top of chimney was 36^0 12' and that from R to the top of the chimney was 16^0 48'. The angle of elevation from R to a vane 1 m above foot of the staff held at P was 8^0 24'. The height of instrument at P and R were 1.85 m and 1.65 m respectively. The horizontal distance between P and R was 100 m and the R.L of R was 248.260 m. Find the RL of the top of the chimney and the horizontal distance from P to the chimney. [4]

b. Derive the expression to find out the elevation of the top of the object if the base of the object is inaccessible and instrument stations and the elevated object are not in the same vertical plane. [3]

7. Write a short notes on [***ANY THREE***] [2+2+2]

a. Aerial photographs and its types.
b. Layout of triangulation.
c. Remote sensing and its application in civil engineering.
d. Plotting traverse by coordinate.