KATHMANDU UNIVERSITY
End Semester Examination [C]
June/July 2024

Level : B.E. | Course : CIEG 207
Year : II | Semester : II
Exam Roll No. : | Time: 30 mins. | F. M. : 10
Registration No.: | Date 03 JUL 2024

SECTION "A"
[20Q. × 0.5 = 10 marks]

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

1. In a closed traverse, the number of omitted measurements should be
   a. ≥ 2 b. ≤ 2 c. ≥ 3 d. ≤ 3

2. In a closed traverse of 500 m total length, the closing errors in departure and latitude are respectively 0.6 m and 0.8 m. Then, the relative precision of the traverse is
   a. 1:850 b. 1:700 c. 1:625 d. 1:500

3. In angle and distance method for plotting the traverse, the most commonly applied approach is
   a. tangent method b. protractor method c. chord method d. radial method

4. The foremost objective of tacheometric surveying is to
   a. establish control points accurately b. plot the major traverse
   c. prepare contour map of the area d. prepare sectional drawing of the area

5. In tacheometric surveying, the distance between two points for inclined line of sight (angle of depression) with staff held normal is given by the relationship
   a. $D = (Ks + C)sin\theta - hcos\theta$ b. $D = (Ks + C)sin\theta - hsin\theta$
   c. $D = (Ks + C)cos\theta - hsin\theta$ d. $D = (Ks + C)cos\theta - hcos\theta$

6. The method of determining the elevation of a station from observed Zenithal angles and know horizontal distances is known as
   a. trigonometric levelling b. tacheometric levelling
   c. spot levelling d. spirit levelling

7. The angle of elevation to a target 2.5 m above the top of a tower taken by a theodolite was 15°25'. The horizontal distance between the instrument station and the target was 110 m. If RL of the trunnion axis of the theodolite was 654.622 m. Then, the RL of top of the tower will be
   a. 682.455 m b. 684.955 m c. 687.455 m d. 706.501 m

8. In a topographical map drawn to a scale of 1:10,000 with contour interval of 10 m, an alignment with contour gradient of 1 in 50 is to be drawn. Then, the horizontal equivalent between two points needs to be
   a. 10 cm b. 5 cm c. 4 cm d. 2 cm

9. In vertical hachures method of representing topography, relief are represented by set of parallel lines drawn in the direction_____ to direction in which water will flow on ground surface.
   a. parallel b. 45° c. 60° d. perpendicular

10. Which of the following methods of contouring is most suitable for the survey along a penstock alignment?
a. Direct method
b. Square method
c. Tacheometric method
d. Cross-section method

11. A right handed circular curve with radius of 200 m is inserted between two alignments with an angle of intersection of 146°. Then, the apex distance will be
a. 8.739 m
b. 9.138 m
c. 141.526 m
d. 484.060 m

12. Simple parabolic curve is a type of
a. vertical curve
b. compound curve
c. transition curve
d. simple curve

13. It is required to join two straights having a total deflection angle 22° right by a circular curve of 200 m radius, having transition curves at each end. If the length of the transition curve is 44 m. Then, the length of tangent of the combined curve will be
a. 484.060 m
b. 141.526 m
c. 102.968.739 m
d. 60.954 m

14. Which of the following step is carried out in order to prevent the accumulation of error in the lengths during the triangulation survey?
a. Providing subsidiary bases
b. Establishing pivot stations
c. Establishing laplace stations
d. Changing layout of triangulation

15. The appropriate type of signal to define the exact position of triangulation station during observation from other station which are more than 30 km part is
a. Opaque
b. Beacon
c. Target
d. Luminous

16. Which of the following EDM uses visible light for distance measurement?
a. Tacheometer
b. Tellurometer
c. Distomats
d. Geodimeter

17. In photogrammetry, the vertical angle between plumb line and the optical axis of the lens is termed as
a. swing
b. zenithal angle
c. tilt
d. plumb angle

18. Which type of photograph will be more suitable for covering greater area during the photogrammetric surveying?
a. high oblique
b. low oblique
c. tilted
d. vertical

19. The working mechanism of remote sensing system mainly depends up on the
a. frequency and energy of EMW
b. position and time of satellites
c. interaction of EMW with matter or object
d. principle of plane table surveying

20. In Global Positioning System satellites are placed in _____ circular orbital planes.
a. 8
b. 6
c. 4
d. 3

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Semester : II
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SECTION "B"

Attempt *ALL* questions. Elaborate the answer with the use of appropriate examples and figures.

1. The included angles of a closed traverse ABCDEA that was run anticlockwise are ∠A = 95°53′20", ∠B=75°03'20", ∠C = 159°05′10", ∠D=128°33'50" , and ∠E = 80°25′20". The bearing of AB is measured as 287°54'10". Compute the consecutive coordinates and correct them for any closing error. The lengths are: AB = 71.500 m, BC = 82.800 m, CD = 43.700 m, DE = 38.500 m and EA = 117.000 m. [6]

2. Determine the gradient from B to A from the following observation made with a tacheometer fitted with an anallatic lens with multiplying and additive constants of 100 and 0.2 respectively. The staff was held vertically at both the stations. [6]

Inst. Station	Staff Station	Bearing	Zenithal Angle	Staff Readings		
P	A	124°45'	79°28'	2.470	1.915	1.360
P	B	224°30'	84°54'	2.705	1.885	1.065

3. In order to determine the elevation of top of a tower A, two stations B and C were established in line with the top of the tower but at a very different levels. The angle of elevation from B to the top of tower was 26°32' and that from C to the top of the tower was 14°26'. The angle of elevation from C to a vane 1.25 m above the foot of the staff held at B was 9°25'. The heights of instrument at B and C were 1.85 m and 1.65 m respectively. The horizontal distance between B and C was 102 m and the RL of C = 348.840 m. Find the RL of the top of the tower and the horizontal distance from B to the tower. [5]

4. Tabulate the necessary data for setting out simple circular curve with the following data: [5]

   Angle of intersection = 156°, Radius of curve = 280 m
   Chainage of point of intersection = 1060 m
   The curve is to be set out by using tape and theodolite with pegs at every 20 m of through chainage.

5. A gradient of -1.5% meets a gradient of -5.5% at the intersection point B, the chainage and RL of which are 920 m and 778.80 m respectively. A vertical curve is to be inserted between the straights with recommended rate of change of grade as 0.5% per 25 m chain. Tabulate the chainages and R.L's of the station pegs for setting out the vertical curve. [6]

6. Explain any one of the method of contouring with its salient features. Explain any one of the graphical method of interpolation of contours. [3+3=6]

7. Write short notes on any two:
   a. Principles of triangulation and trilateration survey
   b. Principle of photogrammetric surveying and its limitations
   c. Applications of GPS system