KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

Marks Scored:

Level : B.E.
Year : II

Course : CIEG 207
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

06 JUL 2023

Registration No.:

Date :

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Encircle the most appropriate answer.

1. In GPS, satellites are placed on_____ circular orbital planes.
   a. 12 b. 10 c. 8 d. 6

2. The most suitable method of contouring for preparing topographical map for long narrow strip of land is
   a. direct method b. square method
   c. cross-section method d. tacheometric method

3. For inclined plane surface, the value of horizontal equivalent in the contour map will
   a. be equal throughout the map b. increases at uniform rate in the map
   c. vary throughout the map d. have no relationship with the inclination

4. In a closed traverse, the algebraic sum of deflection angles of traverse legs will be
   a. $(2n-4)\ X\ 90^\circ$ b. $(2n+4)\ X\ 90^\circ$ c. 360° d. 180°

5. A left handed circular curve with radius of 450 m is inserted between two alignments with angle of deflection of 14°44'26". The angle between back tangent and long chord will be
   a. 7°22'13" b. 14°44'26" c. 29°28'52" d. 43°13'18"

6. In a topographical map drawn to a scale of 1 in 10,000 with contour interval of 10 m, it is required to draw an alignment with upward gradient of 1 in 50. The distance between points in consecutive contour lines should be _____ to set the required contour gradient on the map.
   a. 50 cm b. 15 m c. 10 cm d. 5 cm

7. The staff intercept is kept uniform in
   a. movable hair method b. tangential system
   c. fixed hair method with staff normal d. fixed hair method with staff vertical

8. The method of determining the elevation of a station from observed vertical angles and known horizontal distances is known as
   a. direct levelling b. reciprocal levelling
   c. trigonometric levelling d. spirit levelling

9. Principally there are_____ methods for measuring the distance between two given points.
   a. 5 b. 4 c. 3 d. 2

10. The theodolite was set up at M and the angle of depression to a target 2.25 m above the top of an electric pole CD was 10°40'26". The horizontal distance between M and D, the foot of the pole was 150.450 m. Determine the RL of the top of the electric pole, if the staff reading held on a BM (RL = 1500 m) was 1.563 m.
a. 1467.830 m b. 1470.956 m c. 1475.456 m d. 1532.170 m

11. The tacheometer used now a days are fitted with telescope having_____.
a. external focusing b. external focusing with anallatic lens
c. internal focusing with anallatic lens d. internal focusing

12. Target signal is a type of _____signal used during triangulation surveying.
a. night b. luminous c. sun d. opaque

13. The angle between optical axis of camera lens and the plumb line is known as
a. swing b. azimuth c. tilt d. dip

14. The bearing of the starting leg of an open traverse is 45°25'46". The deflection angles between the consecutive lines were measured with a theodolite and were as 21°06'59" (L), 10°45'36" (L) and 12°55'19" (R). Then the bearing of the last line will be
a. 64°23'02" b. 26°28'30" c. 16°18'30" d. 0°37'52"

15. Most common method employed for plotting details or feature of survey area is
a. independent coordinates b. interior angles and its distances
c. consecutive coordinates d. tangent methods of plotting

16. A simple circular curve with radius of 200 m is inserted between two alignments with angle of intersection of 155°. Then, its mid-ordinate will be
a. 381.262 m b. 243.288 m c. 156.712 m d. 18.738 m

17. The suitable method of setting out circular curve in an undulating ground is
a. Rankine's method of deflection angles b. Successive bisection of chords
c. Radial offsets d. Two theodolites method

18. In photogrammetry, principal line is the line joining
a. nadir point and principal point b. ground nadir point and ground principal point
c. exposure station and principal point d. exposure station and isocentre

19. The minimum number of GPS satellites necessary in order to fix the position of receiver on the surface of earth is
a. 6 b. 4 c. 3 d. 2

20. Which of the following layouts of triangulation is most suitable for covering large area?
a. Single chain of triangles b. Double chain of triangles
c. Braced quadrilaterals d. Centered figures

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SECTION "B"

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

1. Find the length of BC and bearing of EA from the given data below. [5]

Side	Length, m	Bearing
AB	282.2	61°30'
BC	-	151°24'
CD	324.7	201°02'
DE	381.6	280°14'
EA	359.6	-

2. The following observations were taken from two traverse stations by means of a tacheometer fitted with an anallactic lens. The constant of instrument being 100 and 0.25. [6]

Inst. Station	Staff Station	HI, m	Bearing	Zenithal Angle	Staff Readings, m
A	M	1.425	116°30'	82°45'	2.425, 1.595, 0.765
B	N	1.355	35°45'	99°45'	2.860, 1.840, 0.820

The coordinate of stations A and B are (221.525mN, 168.680mE) and (120.808mN, 10.420mW) respectively. Compute the gradient of line MN, if station A is 6.245 m lower than station B.

3. Two stations A and B were used to measure the elevation of an object P. The distance between the stations was 250 m and vertical angles observed to the object were 10°30' from A and 6°45' from B. The horizontal angles PAB and PBA were 82°30' and 38°40' respectively. Find the RL of station P if the readings were taken to a mark 4 m above the point P. [5]

4. List out the various factors to be considered in determining the contour interval for any topographical map. How would you draw the longitudinal section along an alignment from the topographical map? Explain the process in detail with the help of appropriate figures. [1+5]

5. It is required to join two alignments having a total deflection angle 16° right by a circular curve of 600 m radius having transition curves at each end. The design velocity of vehicle is 70 km/hr and rate of change of radial acceleration along the transition curve is not to exceed 20 cm/s^3, chainage at the point of intersection is 960.350 m. Assume peg interval along transition curve of 10 m and along circular curve is 20 m, calculate the necessary data required for setting out the transition curve located on the right side of the combined curve by using the theodolite having least count of 10". [6]

6. A 2 % rising gradient meets a 6 % rising gradient at a chainage of 1332 m, the RL of the point of intersection being 620.260 m. A vertical parabola is to be set out to connect the two grades with pegs at 20 m intervals. The rate of change of grade allowed is 0.4 % per 20 m chain. Tabulate the chainage and RL of the pegs for setting out the curve. [6]

7. Write short notes on *ANY TWO*. [3+3]
   a. Triangulation and its purpose
   b. Types of aerial photographs
   c. Segments of GPS