

KATHMANDU UNIVERSITY
End Semester Examination
August/September, 2017

Mark scored :

Level : B. E.
Year : II

Course : CIEG 207
Semester: II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date SEP 10 2017

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Choose the most appropriate option.

1. A deflection angle in a traverse is equal to the
[a] Difference between the included angle and 180°
[b] Difference between 360° and the included angle
[c] Sum of the included angle and 180°
[d] Included angle
2. In first order traverse for horizontal control, the angular error of closure should not exceed
[a] $15''\sqrt{N}$ [c] $1''\sqrt{N}$
[b] $6''\sqrt{N}$ [d] $30''\sqrt{N}$
where, N = no. of angles
3. The projection of a traverse line on a line perpendicular to the meridian is known as
[a] Latitude of the line [c] Bearing of the line
[b] Departure of the line [d] Co-ordinate of the line
4. Which of the following statements is wrong?
[a] The distance measured parallel to the NS line is called latitude of the line
[b] The distance measured parallel to EW line is called departure of the line
[c] The latitude is +ve when measured downward or southward
[d] The departure is -ve when measured left or westward
5. When the whole circle bearing of a traverse line is between 90° and 180° , then
[a] The latitude is +ve and departure is -ve
[b] The departure is +ve and latitude is -ve
[c] Both the latitude and departure are +ve
[d] Both the latitude and departure are -ve
6. Contour lines cross ridge or valley lines at
[a] 30° [c] 60°
[b] 45° [d] 90°
7. In route surveys, the most suitable method of contouring is
[a] By square method [c] By cross sections
[b] By radial lines [d] By tacheometer
8. Suitable contour interval on a map of scale 1:50000 is
[a] 10m [c] 20m
[b] 5m [d] 15m
9. To the sum of the first and last areas, add twice the sum of the intermediate areas. The total sum thus obtained is multiplied by the common distance between the areas. One-half of this product gives the required volume. This rule of finding the volume is called
[a] Mid-ordinate rule [c] Trapezoidal rule
[b] Average ordinate rule [d] Prismoidal rule

10. The focal length of the object glass is 25cm, horizontal distance from optical center to the vertical axis of the theodolite is 15cm and the stadia interval is 2mm. The multiplying constant for the given theodolite will be
 [a] 125 [c] 75
 [b] 0.4 [d] 200
11. A theodolite may be used as a tachometer if it is provided with a diaphragm containing horizontal hairs.
 [a] 1 [c] 3
 [b] 2 [d] 4
12. The perpendicular offset from a tangent to the junction of transition curve and circular curve is equal to
 [a] $L/6R$ [c] $L^2/6R$
 [b] $L/24R$ [d] $L^2/24R$
 where, L = length of the transition curve
 R = Radius of the circular curve
13. A reverse curve consists of
 [a] a single curve of a circle connecting two straights
 [b] two arcs of different radii bending in the same direction
 [c] two arcs of equal radii bending in the same direction
 [d] two arcs of equal or different radii bending in the opposite directions
14. When the length of a chord is less than the peg interval, it is called
 [a] Small chord [c] Sub chord
 [b] Short chord [d] Abnormal chord
15. Two theodolite method of setting out a curve involves
 [a] Linear measurements only
 [b] Angular measurements only
 [c] Both linear and angular measurements
 [d] Triangulation
16. The distance between the midpoint of the long chord and the midpoint of the curve is equal to
 [a] $R(1 - \sin\Delta)$ [c] $R(1 - \sin\Delta/2)$
 [b] $R(1 - \cos\Delta)$ [d] $R(1 - \cos\Delta/2)$
 where, Δ = deflection angle
17. A simple circular curve is designated by the
 [a] Radius of the curve
 [b] Curvature of the curve
 [c] Angle subtended at the center by a chord of any length
 [d] Angle subtended at the center by a chord of particular length
18. In a tilted photograph angle formed by camera axis with the vertical usually is
 [a] $> 3^\circ$ [c] $> 5^\circ$
 [b] $< 3^\circ$ [d] Any of these
19. No observations are made from
 [a] Satellite station [c] Pivot station
 [b] Eccentric station [d] False station
20. In case of an ideal centered polygon no angle should be less than
 [a] 30° [c] 45°
 [b] 40° [d] 35°

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SECTION "B"

Attempt *ANY EIGHT* questions (**Q.NO. 6 is mandatory**). Assume suitable data if necessary.

1. a. Define consecutive coordinates. [2]
- b. Two Points P_1 and P_2 are to be located on line AB such that $AP_1 = 50$ m and $P_1P_2 = 150$ m. The co-ordinates of stations A and B are: [3]

Station	Easting (m)	Northing (m)
A	500	800
B	800	1200

Calculate the co-ordinates of P_1 and P_2 .

2. a. Compare between direct method and indirect method of contouring. [2]
- b. At the site of a reservoir, areas enclosed between the dam and the contours are as follows:[3]

Contour level (m)	Enclosed area (m ²)
95	552
97	6350
99	52600
101	78000
103	368000

Calculate the capacity of the reservoir by *Trapezoidal formula*.

3. a. State the principle of tacheometry. [1]
- b. Two observations were taken upon a vertically held staff by means of a theodolite whose trunnion axis is 1.856m above a BM whose RL is 857.750m above MSL. For the first observation, the line of sight is directed to give a staff reading 1.000m and the angle of elevation is $5^{\circ}36'$. In the second observation the staff reading is 3.500m and the angle of elevation is $6^{\circ}18'$. Compute the RL of the staff station and its horizontal distance from the instrument station. [4]
4. a. What are the instruments used in tacheometric surveying. [2]
- b. Describe different systems of tacheometric measurements. [3]
5. A tacheometer is set up at an intermediate point on a traverse course PQ and the following observations are made on a vertically held staff: [5]

Staff Station	Vertical Angle	Staff Intercept	Middle Hair Reading
P	$+ 9^{\circ}30'$	2.250	2.105
Q	$+ 6^{\circ}00'$	2.055	1.875

The instrument is fitted with an anallatic lens and the multiplying constant is 100. Compute the length PQ and the RL of Q if the RL of P is 350.500 m.

6. To ascertain the RLs and the horizontal distance between two inaccessible hill tops A and B, the following observations were made by a theodolite from the ends of base CD 150 m long. [5]

$$\angle ACD = 90^{\circ}$$

$$\angle BCD = 50^{\circ}$$

$$\angle ADC = 40^{\circ}$$

$$\angle BDC = 78^{\circ}$$

Angle of elevation to A from C = 22°

Angle of elevation to B from C = 19°

RL of station C = 248.00m

Height of the instrument at C = 1.40m

Calculate the RLs of A and B and also the horizontal distance AB.

7. Describe any ten elements of a simple circular curve with neat diagram. [5]
8. a. Why do we need to introduce a transition curve? [1]
b. Two straights intersect at a chainage 425.80 m having angle of deflection of 40° . These two straights are to be connected by a circular curve of radius 220 m and two transition curves, the length of each being 50 m. Calculate the chainage at the beginning and at the end of the combined curve. [4]
9. A gradient of +1% meets a gradient of +4% at the intersection point C, the chainage and RL of which are 500m and 261.30m respectively. A 100 m long vertical curve is to be inserted between the straights. Calculate the necessary levels on the curve at 25 m intervals. [5]
10. Following observations were made from two inter-visible stations C and D to stations A (E 15000, N 8000) and B (E 15600, N 8800). [5]
 $\angle ACD = 50^{\circ}26'10''$
 $\angle CDA = 30^{\circ}00'00''$
 $\angle ADB = 15^{\circ}00'00''$
If the bearing of CA is $63^{\circ}26'00''$ and point D is roughly southeast of C, calculate the co ordinates of C.
11. Write short notes on *ANY TWO*: [2 × 2.5 = 5]
a. Uses of GPS
b. Remote Sensing and its types
c. Aerial Photographs
d. Purpose of triangulation surveys