KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

Marks Scored:

Level : B.Arch.
Year : II

Course : CIEG 242
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date : 06 JUL 2023

SECTION "A"
[20Q. × 0.5 = 10 marks]

Encircle the most appropriate option among the given choices.

1. Tacheometry is best suited_____.
   a. where chaining is impossible
   b. for populous areas
   c. in broken ground
   d. for extremely accurate survey

2. At what angle does a ridge line intersect contours?
   a. $45^0$ b. $30^0$ c. $90^0$ d. $0^0$

3. A tacheometer is an instrument like a _____ fitted with a stadia hairs.
   a. Level b. Theodlite c. Clinometer d. Telescope

4. The instrumental error of a total station may vary between _____.
   a. ±2 mm to ±10 mm
   b. ±2 mm to ± 5mm
   c. ±5 mm to ± 10 mm
   d. ±1 mm to ±2 mm

5. A series of closely spaced contour lines represents a _____.
   a. steep slope
   b. uniform slope
   c. horizontal surface
   d. gentle slope

6. Setting out is done _____.
   a. prior to the preparation of plans
   b. along with the preparation of plans
   c. after the preparation of plans
   d. if obstruction is present

7. The lines joining the points of equal elevation on the surface of the earth are known as_____.
   a. isohytes b. isogonics c. agonics d. contours

8. Which of the following is the principle of tacheometry?
   a. The base angles of triangle are equals.
   b. The ratio of perpendicular to base is constant.
   c. The ratio of two sides and included angle are equivalent.
   d. The ratio of one side and the base is constant.

9. Pegs or stakes are not generally fixed at the exact corners of the buildings because _____.
   a. it is difficult to set them there
   b. they might be lost during the excavation
   c. they are not required at corners
   d. they are made of wood and may rot

10. If the focal length of the objective glass is 20 cm and distance from object glass to the trunion axis is 12 cm, the additive constant is _____.
    a. 0.80 m b. 0.40 m c. 0.20 m d. 0.32 m

11. Which of the following is **NOT** a characteristic of contour lines?
    a. A contour line must close on itself.
    b. Two contours cannot unite to form one.
    c. One contour could split into two.
    d. Generally two contours never intersect each other.

12. Which area is suitable for square method of indirect contouring?
    a. Large
    b. Heavy undulating
    c. Small and low undulating
    d. Hilly

13. The multiplying constant of a theodolite is _____.
    a. $f/i$
    b. $f^2/i$
    c. $f + d$
    d. $\frac{f}{i} + d$

14. Contour lines look to cross each other in case of _____.
    a. an overhanging cliff
    b. a dam of vertical face
    c. a steep hill
    d. a deep valley

15. The intercept of staff _____.
    a. is maximum, if the staff is held truly normal to line of sight.
    b. is minimum, if the staff is held truly normal to the line of sight.
    c. decrease, if the staff is titled away from normal.
    d. decreases, if the staff is tilted towards normal.

16. Generally, while selecting contour intervals, the relation between the map scale and contour interval is kept _____.
    a. proportional
    b. inversely proportional
    c. similar
    d. change by a factor of 2

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

18. Subtense bar is used for _____.
    a. levelling
    b. measurement of horizontal distance in undulated area
    c. measurement of horizontal distance in almost flat area
    d. measurement of angles

19. Setting out is sometimes referred to as the reverse of surveying because _____.
    a. it transfers data from plans and drawing onto the site
    b. all instruments are set in a reverse manner
    c. it nullifies all the work done by surveying
    d. it is to be done from both sides

20. Which unit in total station processes data collected?
    a. Data collector
    b. EDM
    c. Storage system
    d. Microprocessor

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SECTION "B"

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

1. Define Tacheometry and state its principle. Mention any four uses of tacheometry surveying? [2+2]

2. Write short notes on (*ANY TWO*): [2×2 = 4]
   a. Parallel line method of interpolation of contour
   b. Centering in Total Station
   c. Method of determination of multiplying and additive constant in tacheometry
   d. Fixed hair method and moveable hair method of tacheometric measurement.

3. List out the characteristics of contour interval. What factors affect the contour intervals? [2+2]

4. Explain in detail principle of total station and its application in engineering. [2+2]

5. Derive the relation for horizontal and vertical distance for an inclined line of sight when the staff is kept vertical to the ground level. List the sources of errors during tacheometric survey. [5+1]

**OR**

Define horizontal equivalent. From the topographical map, the area enclosed within the contour lines and along the face of a proposed dam are as given below:

| Contour (m) | Area (SQ. METER) |
|---|---|
| 300 | 29750 |
| 295 | 26850 |
| 290 | 21050 |
| 285 | 18500 |
| 280 | 13440 |
| 275 | 8750 |
| 270 | 5180 |
| 265 | 735 |
| 260(Bottom) | 30 |

Calculate the volume of water in the reservoir when the water level is at an elevation of 30 m using both Trapezoidal and Prismoidal formula. [1+5]

6. Define contour. Explain in detail the methods of indirect contouring along with sketches. [1+4]

7. The following tacheometric observations were made with an anallatic telescope having a multiplying constant 100 on a vertically held staff: [8]

| Instrument Station | Height of Instrument | Staff Station | Vertical Angle | Station readings | | |
|---|---|---|---|---|---|---|
| | | | | B | M | T |
| A | 1.480 | BM | $-1^0 54'$ | 1.02 | 1.72 | 2.42 |
| A | 1.480 | P | $+2^0 36'$ | 1.22 | 1.825 | 2.43 |
| Q | 1.500 | P | $+3^0 06'$ | 0.785 | 1.61 | 2.435 |

8. Explain in detail setting out by rectangles formed by the center lines for the building with suitable example. [5]