KATHMANDU UNIVERSITY
End Semester Examination
July/August 2024

Level : B.E.
Year : II
Time : 2 hrs. 30mins.

11 AUG 2024

Course : GEOM 202
Semester : I
F. M. : 40

SECTION "B"
[6Q. × 4 = 24 marks]

Attempt *ANY SIX* questions. Assume the suitable value if necessary.

1. What do you mean by Well-Conditioned Triangle in Triangulation? Describe about fundamental lines of theodolite along with their geometrical properties. [1+3]

2. There are two stations P and Q at elevations of 210 m and 920 m, respectively. The distance of Q from P is 102 km. If the elevation of a peak M at a distance of 39 km from P is 298 m, determine whether Q is visible from P or not. If not, what would be the height of scaffolding required at Q so that Q becomes visible from P? [4]

3. The following notes refer to the reciprocal levels taken with one level. Find
   a. True RL of B [1]
   b. Combined correction for curvature and refraction [1]
   c. The error in collimation adjustment of the instrument [2]

Instrument station	**Staff readings on**		**Remarks**
	A	B	
A	1.13	1.730	Distance AB= 900m
B	1.05	1.640	RL of A=460.66 m

4. Define EDM and discuss about its principle. Shortly describe different functionalities of Total stations. [2+2]

5. Calculate the linear and linear accuracy from the following closed traverse sheet and balance the traverse using Transit rule. [1+1+2]

Line	Length	WCB
AB	89.31	45°10'
BC	219.76	72°05'
CD	151.18	161°52'
DE	159.10	228°43'
EA	232.26	300°42'

P.T.O.

6. Write short notes on ***ANY TWO*** [2+2]
   a. Danger circle
   b. Specification for Triangulation survey (Bluebook)

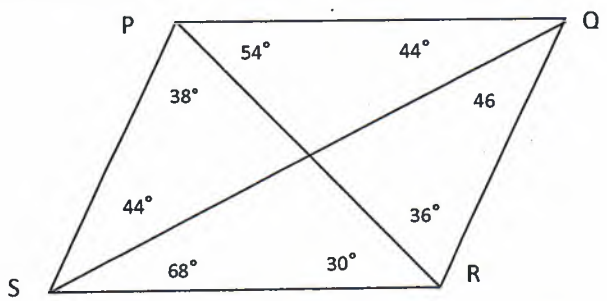
7. Differentiate between: [2+2]
   a. H.I method Vs Rise and Fall Method
   b. Bowditch vs Transit Rule

SECTION "C"

[2Q. × 8 = 16 marks]

Attempt *ANY TWO* questions.

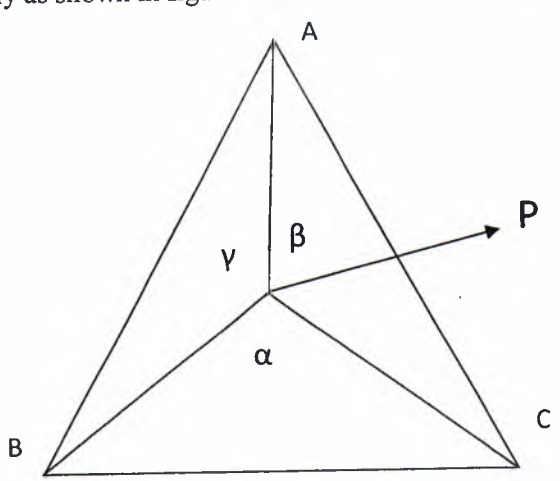
8. Differentiate between Triangulation and Trilateration. Compute the strength of the figure PQRS for all the routes by which the length RS can be computed from the known side PQ and identify the best route Assume that all the stations were occupied. [2+6]



9. **Compare and contrast the methods of Intersection and Resection.** For a point P where resection has been performed, the following horizontal angles were measured relative to three known control points—A, B, and C. The coordinates of these known points are:

STATIONS	EASTING	NORTHING
Station A	356594.193	3056702.009
Station B	356523.057	3056415.328
Station C	356771.7905	3056346.355

The horizontal angles observed at Point P are α=95.54 gon, β=152.74 gon, and γ=151.72 gon, respectively as shown in figure. Determine the coordinates of Point P. (2+6)



10. Following readings were taken with a level and staff.
2.150,1.385,1.835,1.365,2.105,1.950,0.985,1.305,1.185,1.305,2.105,1.385,1.005.
First reading was taken on BM of RL 1312.455m and the level instrument was shifted after 4th, 6th and 8th readings. Calculate reduced level of all staff stations using rise and fall method and apply usual checks. Also show the turning points. [5+2+1]

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Marks Scored:

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Exam Roll No. :
Time: 30 mins.
F. M. : 10

Registration No.:
Date : 17 AUG 2024

SECTION "A"
[20Q. × 0.5 = 10 marks]

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

1. The Bowditch rule assumes that the probable error in length of a traverse leg is proportional to:
   a. l b. $\sqrt{l}$ c. l^2 d. 1/l

2. Which of the following is a key requirement for performing theodolite resection?
   a. Three known points and distances between them.
   b. Two known points and one unknown point.
   c. Three known points and the angles between them
   d. One known point and the distance to the unknown point

3. If the linear accuracy of a traverse is 1:10000, corresponding angular accuracy is:
   a. 20.63" b. 41.25" c. 3'26" d. 2"

4. Two points A and B are in distance of D km. If reading is taken with level instrument placed in point A and staff in point B, what would be the curvature correction that needs to be applied to staff reading?
   a. $0.112\ D^2$ b. $0.0785D^2$ c. $0.06735D^2$ d. $0.00112D^2$

5. What is the primary purpose of profile levelling?
   a. To determine the elevation difference between two points
   b. To determine the elevation across the line to determine earth works
   c. To find the elevation along a line for construction projects
   d. To measure vertical angles

6. The distance of visible horizon D at a height of H is:
   a. $D = 0.0675 * H^2$ b. $D = 0.0675 * H$
   c. $D = \sqrt{\frac{H}{0.0673}}$ d. $D = \sqrt{\frac{H}{0.673}}$

7. The recommended distance between two stations in third order triangulation is:
   a. 3-7 km b. 9-15 km c. 0.2-2 km d. 20-30 km

8. How do reflectorless total stations measure distances?
   a. By using GPS signals
   b. By reflecting laser beams off natural surfaces
   c. By using radio waves
   d. By calculating time delays of sound waves

9. Stations at which no observations are made but the angles at them are used for the continuity of the triangulation series are known as
   a. Pivot stations
   b. Subsidiary stations
   c. Satellite stations
   d. Laplace stations

10. In a traverse survey, what is a 'closing error'?
   a. An error in measuring angles
   b. An error in measuring distances
   c. The discrepancy when the start and end points don't coincide
   d. The difference in elevation between two points

11. Which method involves measuring horizontal distances from known points to determine an unknown position?
   a. Intersection
   b. Triangulation
   c. Traverse
   d. Trilateration

12. Why is refraction correction necessary in leveling?
   a. To account for the bending of light rays in the atmosphere
   b. To correct for the curvature of the earth
   c. To measure distances more accurately
   d. To adjust for instrument calibration errors

13. Which of the following statement is **FALSE**?
   a. Axis of plate level must be perpendicular to Vertical axis.
   b. Line of Sight must be perpendicular to Horizontal axis.
   c. Horizontal axis must be perpendicular to Vertical axis.
   d. Axis of altitude level must be perpendicular to Line of Sight.

14. Which of the following is the method of adjusting a closed traverse?
   a. Departure Method
   b. Axis Method
   c. Tangential method
   d. Tienstra Method

15. While doing construction work, which among the following is most suitable?
   a. Rise and Fall method
   b. Height of Instrument (H.I) Method
   c. Traversing
   d. Compass survey

16. Why is the danger circle problematic in resection?
   a. It causes significant errors in angle measurement
   b. It causes the instrument to lose its calibration
   c. It requires more complex mathematical calculations
   d. It makes it difficult to accurately determine the instrument's position

17. What is the primary purpose of balancing a traverse?
   a. To ensure all measurements are precise
   b. To adjust for errors and ensure the closure of the traverse
   c. To measure angles more accurately
   d. To simplify the data collection process

18. For the distance of 160km, the total number of permanent benchmarks required is .....
   a. 160
   b.142
   c. 180
   d. 320

19. Which angle is generally considered too large for a well-conditioned triangle?
    a. Angles greater than 90°
    b. Angles greater than 100°
    c. Angles greater than 120°
    d. Angles greater than 130°

20. Which type of EDM instrument is known for providing very high accuracy over long distances?
    a. Infrared EDM
    b. Acoustic EDM
    c. Optical EDM
    d. Microwave EDM