Marks Scored:

KATHMANDU UNIVERSITY
End Semester Examination[C]
July, 2017

Level : B.E.
Year : II

Course : GEOM 202
Semester : I

Exam Roll No. :

Time :30 mins.

F. M. : 10

Registration No. :

Date : JUL 11 2017

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Choose the best alternatives among the given choices:

1. The sensitiveness of a level tube decreases by
   a. Increasing internal radius of the tube
   b. Decreasing surface tension of the liquid
   c. Increasing viscosity of the liquid
   d. Decreasing roughness of the wall

2. Which of the following is represented by 103-092.1?
   a. First order replaced TBM
   b. First order PBM
   c. First order replaced PBM
   d. First order destroyed PBM

3. The most accurate method of plotting a theodolite traverse is by:
   a. Consecutive coordinates
   b. Independent coordinates
   c. Included angle
   d. Tangent method

4. The following records refer to an operation involving reciprocal levelling.

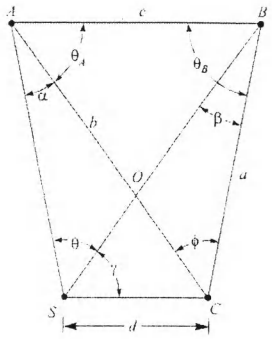
Instrument at	Staff reading on		Remarks
	A	**B**	
A	1.155	2.595	Distance AB = 500m
B	0.985	2.415	RL of A = 525.500m

   Then the true difference of level between A and B is:
   a. 1.435m (Fall from A to B)
   b. 1.435m (Fall from B to A)
   c. 1.4232m
   d. 1.435m

5. The angle between true north and grid north which varies depending on position and distance from the chosen projection origin is called:
   a. Magnetic Declination
   b. Grid Convergence
   c. Grid Divergence
   d. Magnetic bearing

6. While measuring horizontal angles by T_2 and T_{16} theodolites, if the closing error is not exactly 200 grade , the difference is known as :
   a. The collimation error
   b. The index error
   c. The Zenithal error
   d. The Swing error

7. Which of the following equation gives the value $\emptyset$ of when the satellite station S is to the left of the main station C as shown in figure?



a. $\emptyset = \theta + \alpha - \beta$
b. $\emptyset = \theta - \alpha + \beta$
c. $\emptyset = \theta - \alpha - \beta$
d. $\emptyset = \theta + \alpha + \beta$

8. A backsight reading on a BM=100 m was 3.250m. The inverted staff reading to the bottom of the girder was 1.250m. The RL of bottom of the girder is:
a. 101.250m
b. 102.000m
c. 104.500m
d. 103.250m

9. The maximum number of PBMs in one alignment and the maximum distance an alignment can be is
a. 999, 888km
b. 9999, 8888km
c. 888, 999km
d. 8888, 9999km

10. When a level is in adjustment, the line of sight of the instrument is
a. Perpendicular to vertical axis of instrument and parallel to the bubble tube axis.
b. Perpendicular to the vertical axis of instrument and bubble level axis
c. Perpendicular to the bubble tube axis and parallel to the vertical axis
d. Perpendicular to the bubble tube axis

11. During resection, which of the following fails when the four points lie in the circumference of the same circle
a. Danger circle
b. Great circle
c. Strength of accuracy
d. Strength of fix

12. If the whole circle bearing of a line is 300°. It's quadrantal bearing is:
a. N60°W
b. W30°N
c. N30°W
d. W60°N

13. A cylindrical signal of diameter 4 m, was erected at station B. Observations were made on the signal from station A. The phase corrections when the observations were made on the bright portion provided that sun makes an angle of 280° with AB is
a. 348.3″
b. 34.83″
c. 69.66″
d. 3.483″

14. Relationship between line of collimation and line of sight in theodolite is:
a. Independent
b. Perpendicular
c. Coinciding
d. Parallel

15. The process of rotating theodolite in horizontal plane about vertical axis is called
a. Transiting
b. Face right
c. Face left
d. Swinging

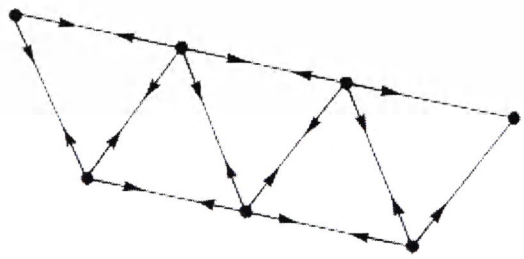
16. The signal of wavelength 20.000 m leaves the EDM at 0°phase, goes through 10 number of full phases on its way to reflector, and returns to the EDM at an angle creating a partial wavelength 4.584m, then the distance between EDM and reflector is
    a. 204.584m
    b. 102.292m
    c. 20.000m
    d. 4.584m

17. Pick out the incorrect statement regarding the geometry of theodolite.
    a. The axis of plate level should be parallel to the vertical axis.
    b. The line of collimation should be perpendicular to the plate level axis.
    c. The axis of the altitude level must be perpendicular to the line of collimation
    d. The vertical axis should be parallel to the line of collimation.

18. Number of internal checks in centered polygon in trilateration and triangulation is:
    a. 4, 6
    b. 6, 4
    c. 4, 1
    d. 1, 4

19. Which of the following is not correct?
    a. R.O. should be situated in the north of survey area.
    b. The R.O. must always be clearly visible.
    c. Reference Object (R.O.) is used as starting object of a round of observation.
    d. All of the above statements are incorrect.

20. The value of $\frac{D-C}{D}$ for the triangulation figure where arrow represent the direction of observation is:
    a. 0.56
    b. 0.78
    c. 0.67
    d. 0.68



KATHMANDU UNIVERSITY
End Semester Examination[C]
July, 2017

JUL 1 1 2017

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

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

SECTION "B"
[6Q. × 4 = 24 marks]

Attempt *ANY SIX* questions. Assume suitable data if necessary.

1. Define sensitivity of level tube. Derive an expression to show that the sensitivity of level tube depends upon the radius of curvature 'R', and is expressed in terms of angle 'θ' per unit division 'd' of the bubble scale.
A bubble tube of a level has a sensitiveness of 20″ per 2mm division. Find the error in the reading on the staff held at a distance of 100m from the level when the bubble is deflected by two divisions from the center. [1+2+1]

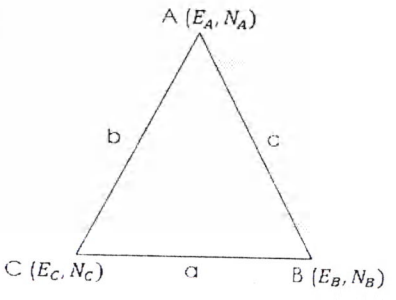
2. Explain Tienstra method of theodolite resection with suitable figure, mathematical expression and a way to check the coordinate of the unknown point P. [2+2]
Find the coordinates of a point R from the following data using the concept of bearing:

Coordinates of P= E1200 m, N1200 m; Coordinates of Q= E400 m, N1000 m
Bearing of PR= 62°13′40″; Bearing of QR= 38°46′25″

3. The following perpendicular offsets or ordinates at 12m intervals from a survey line AB (96m) to an irregular boundary line. Find the area between the survey line and the irregular boundary by average ordinate rule, trapezoidal rule and Simpson's rule. The offsets at A is 2.5 m followed by 2.2, 3.3, 3.5, 3.8, 3.0, 3.7, 3.3 and 2.7m at B respectively.
What do you think the reason behind the change in area from different approach?
[1+1+1+1]

4. Define Geoid. Prepare detail specification for control point establishment through theodolite traversing for the purpose of topographical surveying at the scale of 1:1000 using analogue theodolite J2-2 Model. [1+1+2]

5. Define trilateration. Mention the steps of adjustment of the whole trilateration system. If A (E_A, N_A) and B (E_B, N_B) are the known points in a trilateration network as in figure, write general solution for the coordinate of C. [1+2+1]



6. What do you mean by Satellite station? Derive the condition on how to reduce the horizontal angle in case of satellite station. [1+3]

7. A closed-loop traverse ABCDA was run around an area and the followingobservations were made:

Station		Length (m)	Included angle	W.C.B.
At	To			
A	B	187.4	86°30′02″	140°11′40″
B	C	382.7	80°59′34″	
C	D	106.1	91°31′29″	
D	A	364.8	100°59′15″	

Adjust the angular error, if any, and calculate the whole circle bearing of the traverse leg. Briefly explain the graphical method of adjusting the closed traverse. [2+2]

8. Define the following terms used widely in control survey: [1+1+1+1]
   a. EDM
   b. Strength of Fix
   c. Agonic line
   d. Nadir

SECTION "C"

[2Q. × 8 = 16 marks]

Attempt *ANY TWO* questions. Assume suitable data if necessary.

9. a. The Geodetic Survey control networks of Nepal established through triangulation methods has been displaced after the massive 7.8 magnitude earthquake that hit Nepal on 25 April2015. Survey Department of Nepal is planning to update at least the first order control point network. Being a Geomatics Engineering student what approach do you suggest to update the control points network? [4]

   b. Define spherical excess. In a geodetic survey, the mean angles of a triangle ABChaving equal weights,are as below:
   ∠A=50°22′32.5″
   ∠B=65°40′47.5″
   ∠C=63°56′46.5″.
   The length of the base BC was 37.5 Kmand by measuring on map the area of the triangle was found to be 1350. 21sq Km. Assuming the radius of the Earth as 6367 Km, calculate the spherical excess and determine the values of spherical and plain angles. [1+3]

10. a. How do objects appear due to curvature and refraction during levelling survey? Mention one advantage of equalizing backsight and foresight distances. Derive the formula for curvature correction in levelling survey. [1+1+2]

b. The following consecutive readings were taken with a dumpy level by the students of civil engineering during their survey camp, the instrument having been shifted after the second, fourth, and seventh readings:
0.900, 1.250, 2.400, 1.375, 2.945, 3.125, 3.725, 0.100, 1.975, 2.025 and 1.775.
The first reading was taken with a staff held on a benchmark of elevation 100.000m. Enter the readings in a level book form and reduce the levels by the Height of instrument method. Also apply the usual checks. [3+1]

11. a. The Geodetic Survey Branch of Survey Department of Nepal has published a book often called Blue book, in which specifications fordifferent order of control points established through triangulation has been given. Complete the following table with the respective values:

Order	***Set to set discrepancy (cc)***	***Recommended side length (km)***	***Allowed horizontal misclosure (cc)***	***Triangular misclosure (cc)***
First				
Second				
Third				
Fourth				

b. A braced quadrilateral in a triangulation net was observed as follows. Adjust the individual angles by the method of equal shift.Your adjustment method must satisfy both the angle and the side conditions. [2+6]

$\theta_1 = 50°42'27''$
$\theta_2 = 66°47'54''$
$\theta_3 = 41°24'32''$
$\theta_4 = 21°05'06''$
$\theta_5 = 74°13'36''$
$\theta_6 = 43°16'49''$
$\theta_7 = 18°36'14''$
$\theta_8 = 43°53'30''$