TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2082 Chaitra

Exam.	Regular (New Course)		
Level	BE	Full Marks	60
Programme	BCE	Pass Marks	24
Year / Part	II / I	Time	3 hrs.

Subject: - Engineering Survey II (*ENCE 203*)

- ✓ *Candidates are required to give their answers in their own words as far as practicable.*
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

LIBRARY

1. Why is a traverse necessary in surveying? Explain the central alignment process of a traverse on a grid by manual plotting, using assumed values and a suitable scale of your choice. Why is the coordinate method considered so versatile for area computation, and how is the area calculated using this method? [1+3+2]

2. A link traverse was run between two stations A and F. Calculate independent coordinates of stations B, C, D and E. Find the direction and magnitude of misclosure and adjust it. [6]

Station	line	Length (m)	Consecutive coordinates		Remarks
			L	D	
A					A: (1995.70 mN, 1650.15 mE)
B	AB	207.15	122.72	166.88	
C	BC	192.40	140.81	131.13	
D	CD	324.16	-265.97	185.31	
E	DA	310.10	-277.26	-135.84	F: (1662.58 mN, 2206.57 mE)
F	EF	215.82	-53.66	209.04	

3. Define contour and list the four major characteristics of contour. Find the elevation of the top of tower with following observations: The instrument axes and elevated objects are at same vertical plane. RL of Bench Mark is 1248.362 m. [3+3]

Inst. Station	Staff Reading on Bench Mark (m)	Angle of elevation	Remarks
A	1.266	10°48'	Distance between Inst Station = 50 m.
B	1.086	7°12'	

4. What are the Map projection system of Nepal? The coordinates of three unknown station A, B and C and horizontal angle to these known coordinate points from instrument station are given in the table below. Calculate the coordinate of station P. [2+4]

Station	Horizontal angle	Easting (m)	Northing (m)
A	∠APB = 38°45'15"	5210.450	8120.660
B	∠BPC = 105°12'30"	7340.110	6540.220
C	∠CPA = 216°02'10"	5450.330	2310.880

5. Based on which relationship can it be assumed that the chord length is approximately equal to the arc length of circular curve? Why transition curve is provided at the both end of circular curve? [3+1]

6. For the 8° of curve and fixed arc length 25 m the highway alignment deflection angle is 56°. The chainage of IP is 3+500.00 km. The peg interval is 30 m. Prepare the setting out table. Also find the total deflection angle for middle of curve. Use nearest multiple of 5 for the radius value. [6]

7. Derive the general equation of parabolic curve and establish the relationship between its parameters. A grade of (-) 2.75% meets another grade of 3.5%. The elevation and chainage of IP are 2470.00 m and 2800.00 m respectively. Field condition requires that the vertical curve should pass through a point of elevation 2471.25 m at a chainage of 2800.00 m. Compute a suitable equal tangent vertical curve including lowest chainage and full station elevation. Take peg interval = 30 m. [2+4]

8. Explain about the relief displacement in photogrammetry. Describe the Drone regulation in Nepal and flight permission of drones. What are the uses of drone in Civil Engineering? [2+4]

9. How DGPS is better for mapping and surveying than normal GPS? What is the application of remote sensing in Civil engineering? [2+3]

10. What are the uses of hydrographic surveys in civil engineering? Explain the method of echo sounding. [5]

11. Explain the linear method of building layouts with suitable examples. Why is the gyroscope used in the tunnel alignment? [4]

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1. What do you mean by angular misclosure and relative closing error? While balancing traverse the relative precision violated how can you manage such a condition in the field describe your answer. [1+1+2]

2. The closed traverse and its consecutive coordinates are as follows. Compute the independent coordinates with required action, balance the traverse using transit method and calculate the area by DMD method. [6+2]

Line	Length (m)	Latitude (m)	Departure (m)	Remarks
AB	84.22	0.00	405.85	A (2500mN, 3500 mE)
BC	94.78	182.00	0.00	
CD	105.33	87.59	-151.66	
DE	102.10	-85.50	-148.10	
EA	150.33	-184.00	-106.20	

3. Explain about the reciprocal trigonometric leveling with neat sketch. What is contour? Why contouring is necessary? Explain about the index contour and minor contour. You are drawing the contours how can you use the surveying principle working from whole to part. If map scale is 1:50,000 can you estimate the contour interval for general topography. [2+4]

4. Describe about the use of Astronomy in surveying and mapping. The following are the coordinates of three known station points whose directions are observed from the unknown instrument station P. If observed horizontal angles are APB= 47°20'16" and BPC= 64°30'18" and CPA = 248°09'16". Calculate the coordinates of instrument station P. [2+4]

Known Point	A	B	C
Easting (m)	2450	8892	12658
Northing (m)	6253	10648	6253

5. Define curve. What is intrinsic equation of ideal transition curve? Derive the equation. Why transition curve is provided both end of circular curve? [1+3]

6. Tabulate the data necessary for setting out of a circular curve with the following data: [6]
   Deflection angle = 30°
   Chainage of point of intersection = 12+360 m
   Degree of curvature =349°'11" for 30 m fixed arc length

   The curve is to be set out by the method of Rankine's deflection angles, with pegs at every 30 meters of through chainage with a theodolite having a least count of 20". Round off in two digits only.

7. What is the general equation of vertical curve? Why vertical curves are generally used parabolic curve? From the following information: L = 300m, g_1 = - 3.2 %, g_2 = +1.8%, PVI at 30+30 with elevation = 465.92. Determine the location of the low point and the elevations on the curve at stations, by using general equation. Peg interval = 30 m. [2+4]

8. Explain about Relief displacement and its expression in photogrammetry. Explain the features of drone mapping and surveying. [3+3]

9. Describe the principle of GPS. Explain about the component of GPS. How you can apply the remote sensing in the field of civil Engineering? [4+1]

10. How the hydrographic surveying used in civil engineering? Explain the method of sounding. [5]

11. Explain the linear method of building layouts with suitable examples. Briefly describe the centerline transfer method in tunnel. [4]

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NCE LIBRARY

1. Why traverse balance is necessary? List the traverse balancing method and explain any one. You are computing the traverse independent coordinates; the given relative precision is 1:5000; you achieved the precision while calculation is 1:4200. Explain your action about it. [1+1+2]

2. For the traverse surveying following data are given below; compute the independent coordinates with required action and calculate the area by DMD method. [6+2]

Station	Line	Length (m)	Consecutive Coordinates		Remarks
			L	D	
A					C (1500mN, 1500mE)
B	AB	71.40	-35.58	59.43	
C	BC	42.00	29.78	29.68	
D	CD	70.00	45.58	-49.53	
A	DA	56.10	-39.69	-39.65	

3. Draw the neat sketch of trigonometric levelling with the condition; base inaccessible and same vertical plane; instrument axes are at very large difference. Explain the procedures of contour plotting with considering the surveying principles. What are the uses of contour map? [2+2+2]

4. What is field astronomy? What are its uses in civil engineering? The coordinates of three unknown station A, B and C are given below. The point P is instrument station and observations are taken to these known coordinate points which is given below. Calculate the coordinate of station P. [2+4]

Station	Horizontal angle	Easting (m)	Northing (m)
A	$\angle APB = 41^0 20' 20''$	7464.718	6928.474
B	$\angle BPC = 97^0 56' 40''$	9602.054	5363.275
C	$\angle CPA = 220^0 42' 50''$	7611.753	1479.468

5. For the small degree of curvature; curve length and chord length is approximately equal justify it. Derive the ideal equation of transition curve. [1+3]

6. In a highway alignment the deflection angle is 52°. The geometry is such that the long chord is 26.303m. The chainage of IP is 2+345.00 km. The peg interval is 5m. Prepare the setting out table. Use three digits round off to calculate. [6]

7. A grade of 1.25% meets another grade of 3.75%. The elevation and chainage of intersection point are 1056m and (1+690) km. Field condition requires that the vertical curve should pass through a point of elevation of 1056.7m at chainage (1+690) km. Compute a suitable equal tangent vertical curve and full station elevation. Peg interval is 30 m. Use parabolic equation. [6]

8. Why vertical scale on photogrammetry is important? How you can estimate the value? Describe the features of drone. Explain the uses of drone in civil engineering. [2+4]

9. What is GPS? Explain about the component of GPS. Do you think DGPS is better for the mapping and surveying? How you can apply the remote sensing in the field of civil engineering? [4+1]

10. What is hydrographic survey? Describe the methods of measurement of velocity of flow. [5]

11. How is the linear method of building setting out carried out? Why gyroscope is used to locate the tunnel instead of theodolite and compass? [3+1]

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