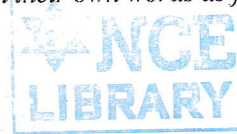


TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2083 Baishakh

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

Subject: - Engineering Survey I (ENCE 153)

- ✓ 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.



1. Distinguish between primary classification of surveying. Why in surveying, the fundamental principle of working from whole to part and never from part to whole is to be followed? [3+1]

2. What are the methods of horizontal distance measurement in sloping ground? What type of significant figures are you used in the distance measurement?

A car is travelling at a speed of 60 km per hour. A 4 cm long line represents the distance travelled by the car in two hours; construct a scale upto 10 hours. The scale should be able to read the distance travelled in one minute. Show the distance 476 km and the distance in 4 hours and 4 minutes on map. [3+5]

3. Explain the principles of chain survey and plane table survey with supporting sketches. Also mention the suitability of these survey. [2+2]

4. If there is bearing of initial line and angle to the right are known; establish the relation to calculate bearing of other lines. The F.B & B.B. of the lines of a closed compass traverse are as follows: Calculate the correct bearings. [3+5]

Line	F.B.	B.B.
AB	33° 00'	214° 30'
BC	124° 30'	303° 15'
CD	180° 00'	1° 00'
DA	289° 30'	107° 45'

5. Describe the loop levelling and level circuits. What is the basic fundamental consideration in this type of surveying? [4]

6. The following readings were successively taken during a levelling operation. 0.320, 0.530, 0.620, 1.780, 1.910, 2.350, 1.750, 0.350, 0.620, 1.240 and (-) 0.980 m. The position of instrument was changed after 3rd, 7th and 9th reading. Draw out the form of level book and enter the above reading properly. The R.L. of 3rd point as 1500.000m. Calculate RL of all points by HI method and gradient between first and last point if the staff is kept constant interval at 30 m. [5]

7. The following data were recorded while surveying the closed traverse PQRSP. Calculate the correct RLs of traverse stations. RL of P = 1650.00 m. [4]

Line	Length (km)	Rise (m)	Fall (m)
PQ	1.345	-	3.540
QR	2.235	-	2.150
RS	1.250	2.050	-
SP	1.900	3.670	-

8. List the features of total station. Why back station and occupied station are important in digital data recording in the total station? [2+2]

9. What is the principle of stadia method? The vertical angles to vanes fixed at 1m and 3m above the foot of the staff held vertically at a station P were - 1°45' and + 2° 30' respectively. Find the horizontal distance and the reduced level of P if the RL of the instrument axis is 1450.00 m. [2+4]

10. Calculate the average angle AOB and missing angle from the following data in a standard booking format: [5]

Inst. Stn.	Target stn	Face	HCR Observation		VCR observations
			Set I	Set II	
O	A	L	00°00'00"	90°00'10"	78°24'10"
	B	L	121°00'00"	211°00'40"	?
	B	R	301°00'20"	31°00'20"	?
	A	R	179°59'30"	269°59'40"	267°55'40"

11. Describe the principle of the triangulation and trilateration method. [4]
12. Do you think SW DTM is best then generic plotting software? Write the differences between the manual and computerized plotting. [4]

Exam.	Back (New Course)		
Level	BE	Full Marks	60
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Year / Part	I / II	Time	3 hrs.

Subject: - Engineering Survey I (CE 153)

- ✓ 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.

1. a) List the principle of surveying in chronological order. Differentiate the primary classification of surveying with examples. [1+3]
- b) What are the method that you can apply for the distance measurements at the sloping ground? Explain with neat sketch. Is there any need to check precision if so explain? [3+1]
- c) A rectangular plot of land of area 2.25 hectare is represented on a map of similar rectangle area of 36 cm². Calculate the representative factor of the scale of the map. Draw a diagonal scale to read up to a meter from the map. The scale should be long enough to measure up to 500 m. Also show 275 m on the drawn scale. [4]
2. a) What are the types of offsets that you used in chain surveying? What is the principle of plane table survey? Is the plane table survey being better than the chain survey if so give reason behind this? [2+1+1]
- b) List and explain the types of bearing according to designation of bearing. [2]
- c) The following are bearing taken on closed compass traverse. [6]

Line/leg	FB	BB
AB	120° 20'	301° 50'
BC	170° 50'	350° 50'
CD	230° 10'	49° 30'
DE	310° 20'	130° 15'
EA	80° 10'	259° 0'

Compute correct interior angle and corrected bearing also. The least count of compass is 30'.

3. a) Explain the field procedure and process to find out correct staff reading on two peg test. Why you are performing the two peg test? Give reason. [3+1]
- b) You are asked to transfer the reduced level from TBM1 to TBM2, which type of levelling operation you preferred? Explain with neat sketch. [3]
- c) The consecutive readings taken during a levelling operation at a common interval of 15 m were as follows: 0.597, 2.587, 3.132, 1.565, 1.911, 0.376, 1.522, 2.244, 0.376, 1.522, 2.244, 3.771, 1.985, 1.334, 0.601 and 2.002m. The level instrument was shifted after 2nd, 7th and 10th readings. The first reading was taken to a benchmark of assumed elevation 2778.233 m. Reduce the levels and apply appropriate checks. [5]
4. a) What is total station? Describe the procedure for the digital data recording on the total station briefly. [4]
- b) What is the principle of stadia tacheometry? Explain with neat sketch. [3]

- c) Calculate the mean horizontal angle $\angle AOB$, $\angle BOC$ and $\angle COA$ from the following observation. [5]

Instrument station	Sighted to	Face Left	Face Right
O	A	$00^{\circ}10'30''$	$180^{\circ}50'30''$
	B	$150^{\circ}35'20''$	$330^{\circ}15'20''$
	C	$240^{\circ}20'30''$	$60^{\circ}25'40''$
	A	$0^{\circ}05'40''$	$180^{\circ}10'40''$

5. a) Differentiate between triangulation and trilateration. Explain the different layout of triangles in triangulation with sketch. [2+2]
- b) Write the features of any software that be used for mapping and plotting. Explain briefly how does that software works. [4]
- c) Find out Reduced level, distance and gradient between P and Q by using the following data given in table, the staff held vertical to the line of sight by using anallactic lens. Take RL of instrument station is 1250.50m. HI = 1.450 m. [4]

Instrument Station	Staff	Line	Bearing	Zenithal angle	Stadia Hair readings
O	P	OP	$60^{\circ}30'$	$87^{\circ}30'$	1.35, 2.10, 2.85
O	Q	OQ	$170^{\circ}45'$	$92^{\circ}45'$	1.955, 2.875, 3.795

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2081 Ashwin

Exam.	Regular (New Course-2080 Batch)		
Level	BE	Full Marks	60
Programme	BCE	Pass Marks	24
Year / Part	I / II	Time	3 hrs.

Subject: - Engineering Survey I (CE 153)

- ✓ 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.

1. a) Define surveying. List the principle of surveying in chronological order. Explain any two with suitable examples. [1+1+2]
- b) What are the factors affecting the selection of scale. Describe the types of errors. [2+2]
- c) A rectangular plot of land of area 0.96 hectare is represented on map of similar rectangle area of 6 cm². Calculate the R.F. of scale of map. Draw a scale to read up to a meter from a map. The map should be long enough to measure up to 500m. Also show distance of 369 m. [4]

2. a) What is principle of Chain survey and Plane table survey? Also write down advantages and disadvantages of Plane table survey. [1+1+2]

- b) Define bearing and meridians. [1+1]

- c) The following bearing was observed in the compass traverse

Lines	AB	BC	CD	DE	EA
FB	188°45'	119°15'	346°30'	337°00'	293°30'
BB	7°45'	298°15'	168°30'	158°30'	113°00'

At which stations do you suspect local attraction? Find the correct bearing of the lines by included angle method. [6]

3. a) What are the points to be considered while doing fly levelling? If RL of one TBM is known give the example to calculate RL of another TBM at k loop distance in km. [3+1]
- b) Explain the Longitudinal and cross section levelling with sketch. [3]

- c) The consecutive readings taken during a levelling operation at 20 m intervals are as follows: 0.685, 1.315, 1.825, 0.635, 1.205, 1.235, 2.631, 1.355 and 2.015 m. The instrument was shifted after third and sixth readings. The third reading was taken to a BM of assumed elevation 1580.000 m. Find the reduced level of points using Rise and fall method. Find the gradient from first to last stations. Apply check. [5]

4. a) What are the features of Total Station? List and explain briefly. [4]

- b) What is tangential tacheometry? Explain the cases with sketch. [3]

- c) Calculate the mean horizontal angle <AOB, <BOC and <COA from the following observation. [5]

Instrument station	Sighted to	Face Left	Face Right
O	A	00°10'30"	180°50'30"
	B	150°35'20"	330°15'20"
	C	240°20'30"	60°25'40"
	A	0°05'40"	180°10'40"

5. a) What is triangulation? Write down norms and specification of Third Order Triangulation. [1+3]
- b) Differentiate between manual plotting and computer aided plotting. [4]
- c) Following observations were made in a tacheometric survey a station A of RL 1085.550, the height of instrument being 1.385 m. [4]

Inst Station	HI	Staff Station	Azimuth	Zenithal angle	Staff Reading
A	1.385	B	18°00'	71°30'	1.295, 1.820, 2.345
		C	127°00'	96°00'	1.010, 1.790, 2.570

The instrument is fitted with an anallactic lens and the multiplying constants is 100. Determine the RL of B and C and the gradient of line BC.

TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2082 Bhadra

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

Subject: - Engineering Survey I (ENCE 153)

- ✓ 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.

1. What is surveying and principle of surveying? Differentiate between plane and geodetic surveying. [1+1+2]
2. Explain the types of error in linear distance measurement. In surveying, why is the term precision used more often than accuracy?
A rectangular plot of land of area 0.55 hectare is represented on a map of similar rectangle area of 6.11 cm². Calculate the representative fraction of the scale of the map. Draw a diagonal scale to read at least a meter from the map. The scale should be long enough to measure up to 500 m. [Note: - 1 hectare = 10⁴ m², and also show distance of 357 m] [2+1+5]
3. Discuss the importance of offsets; list the types. What is the principle of plane table surveying, and what are the advantages over the chain surveying? [1+1+2]
4. What is local attraction? Draw sketch only for the graphical adjustment of closing error in compass traverse when closing error is exactly horizontal. In a link traverse ABCDEF the two points A (1000 mE, 2000 mN) and B(2000 mE,1000 mN). The angles to the right at stations are: 125°30' at B, 237°45' at C, 145°15' at D and 55°30' at E. FB of EF = 339°00'20". Check whether the observations for angles are correct or not. If not, compute the correct bearing of all lines. [3+5]
5. You are hired to survey a bridge site and you know the RL of one bank of a river and your task is to transfer the RL to another bank. Explain how you can transfer the RL to another bank, and also find the expression for RL. Does any error exist in this method, if exist find the expression for error also. [4]
6. The following consecutive readings were taken with a level and 5-metre leveling staff on continuously sloping ground at a common interval of 20 m is 0.385, 1.030, 1.925, 2.52, 1.25, 2.87, 3.66, 4.685, 0.625, 2.005, 3.110 and 4.485 m. The reduced level of the last station was 2208.00 m. Rule out a page of a level field book and enter the above readings. Calculate the reduced levels of the points. Also, find the gradient of the line joining the first and last point. [5]
7. In a closed traverse ABCDEA, the following data were provided. Calculate the adjusted RLs of traverse stations. RL of A = 2255.00 m. [4]

Line	Length (km)	Rise (m)	Fall (m)
AB	1.600	3.530	-
BC	1.000	2.150	-
CD	1.250	-	1.050
DE	1.400	-	2.670
EA	0.800	-	2.000

8. What is total station and its uses? Describe basic concept of digital data recording in the total station. [2+2]

9. Define tacheometry. What is the principle of tacheometry? A staff was held vertically at a distance of 100m and 300 m from the tacheometer and staff intercepts with the telescope horizontal were 0.995 m and 3.00m respectively. The instrument was then set over a station P of RL 1950.50 m and height of instrument was 1.42 m. The stadia readings of a staff held vertically at a station Q were 1.00, 1.83, 2.67 m while the vertical angle was $-10^{\circ}00'$. Find the distance PQ and RL of PQ. [2+4]
10. The following observations were recorded in a theodolite traverse. Complete the average horizontal angle and perform check and correction. Also find missing data in VCR. [5]

Inst. St.	Sighted To	Face	HCR Observation			VCR Observation		
			D'	M	S	D	M	S
O	A	L	00	00	00	65	45	00
		R	180	00	00	?	?	?
	B	L	100	40	40	?	?	?
		R	280	39	50	268	55	00
	C	L	161	20	40	?	?	?
		R	341	20	20	300	40	00
	A	L	00	00	10			
		R	179	59	40			

11. Differentiate between the triangulation and trilateration methods of surveying based on their principles. [4]
12. Provide the list of available plotting software. What are the advantages of plotting software compared to conventional manual plotting? Is the customized software like SW DTM being better to use? [4]
