

Time: Three hours

Use a separate Answer-Script for each part

Part-I

Question no. 1 is compulsory
 Answer any **two** from the rest
 (Assume any data, if required, reasonably)

Q.1. Write short notes on the following (any five): (4×5) = 20

- I. Setting out of a horizontal angle of $58^{\circ} 34' 13''$ with a $20''$ least count theodolite
- II. Sequential field works to be done in triangulation survey
- III. Tangential method of tacheometric survey
- IV. Draw a neat sketch to show the formation of enlarged inverted virtual image in Keplerian telescope
- V. 'Phase error' of cylindrical signals in triangulation survey
- VI. The test and adjustment of vertical hair of cross hairs in a diaphragm of a theodolite
- VII. Variation of additive constant 'C' in different types of tacheometric telescope
- VIII. Least count of a theodolite in retrograde vernier

Q.2.

- a) In fixed hair stadia method of tacheometric survey, find out the distance elevation formula when line of sight inclined, staff held vertically and both angles are in depression.

6

- b) In conducting a traverse $ABCDEA$, the length of the line CD and the bearing of the line EA could not be measured. Find the length of the line CD and the bearing of the line EA from remaining data given below.

Line	AB	BC	CD	DE	EA
Length (m)	178	228	Missing	126	238
Bearing	S $52^{\circ} 36'$ E	N $48^{\circ} 40'$ E	N $18^{\circ} 20'$ W	S $78^{\circ} 34'$ W	Missing

14

[Turn over

Q.3.

- a) Discuss the problem and its remedy (with prove) in theodolite survey due to the eccentricity of 'upper plate' and 'lower plate' axes.

7

- b) Directions were observed from a satellite station S , 62.195m from triangulation station C . The following observations were recorded from satellite station S

Triangulation Station	Observed Direction
A	$00^{\circ} 00'$
B	$71^{\circ} 54' 32.25''$
C	$296^{\circ} 12'$

Angle CAB is $64^{\circ} 50'$ and angle CBA is $43^{\circ} 20'$ and length AB is 22817m. From these data, compute the angle BCA .

13

Q.4.

- a) In triangulation survey for a hexagon $ABCDEF$ with a central station O , prove that "the sum of the log sine of the right hand angles = the sum of the log sine of the left hand angles".

6

- b) The following data refer to a traverse $ABCD$ run by a tachometer fitted with an anallactic lens. The constant of the instrument was 100 and the staff held vertically.

Line	Bearing	Vertical Angle	Staff Intercept (m)
AB	$30^{\circ} 27'$	$+ 5^{\circ} 10'$	1.875
BC	$300^{\circ} 38'$	$+ 3^{\circ} 20'$	1.446
CD	$226^{\circ} 54'$	$- 2^{\circ} 40'$	1.725

Find the length and bearing of DA .

14

Form A: Paper –Setting Blank

Ref No.: Ex/CE/5/T/106/2022

B.E. (CIVIL ENGINEERING) (1st YEAR, 2nd SEMESTER) EXAMINATION, 2022**(1st / 2nd Semester / Repeat / Supplementary / Annual / Biannual)****SUBJECT: SURVEYING-II****Full Marks: 100****Time: ~~Two hours/Three hours/Four hours/ Six hours~~****(40 marks for this part)****Use a separate Answer-Script for each part**

Question No.	Part-II	Marks
	Answer Question-1 and 2 and any <i>Two</i> questions from the rest	
Q.1)	Fill in the blanks with appropriate word(s): <ol style="list-style-type: none"> i. The distance between apex and mid-point of the long chord of a simple curve is called ii. The sounding stations are located by for deep seas. iii. is the form of an ideal transition curve. iv. Tracer method is adopted for measurement of of any water body. v. The angle between the original tangent and the tangent common to both transition and circular curve is called vi. In tunnel survey the very first step of field work comprises 	1*6=6
Q.2)	<ol style="list-style-type: none"> a) Establish the fundamental expression for computing the total tangential angle for nth peg on a simple circular curve required for "Tangential Angle Method" of setting out of simple curve. b) Deduce the necessary expression for forward tangent length (T_r) of a reverse curve comprising two simple circular arc bending in opposite direction? c) What are the conditions to be satisfied by a transition curve when inserted at both ends of a circular curve? 	4 7 3

[Turn over

B.E. (CIVIL ENGINEERING) 1st YEAR 2nd SEMESTER EXAMINATION, 2022**(1st / 2nd Semester / Repeat / Supplementary / Annual / Biannual)****SUBJECT: SURVEYING-II****Full Marks: 100****Time: Two hours/Three hours/Four hours/ Six hours****(40 marks for this part)****Use a separate Answer-Script for each part**

No. of Question	Part-II	Marks
Q.3)	<p>A transition curve is to be inserted between a tangent and the circular curve in connection with the construction of a highway. The following data are provided for setting out of the curve.</p> <ol style="list-style-type: none"> i. Deflection Angle (Δ)= $64^{\circ}36'$ ii. Maximum speed of the vehicle= 87 Kmph iii. Centrifugal Ratio= 0.25 iv. Chainage of the Vertex= 2424 m v. Maximum rate of change in radial acceleration= 0.3 m/sec^3 <p>Calculate: i) Radius of the circular curve ii) Length of the transition curve iii) Shift of the circular curve iv) Total tangent length v) Chainages of different salient points</p>	10
Q.4)	<p>Calculate the reduced levels (RLs) of various station pegs on a vertical curve connecting two uniform grades of (0.73%) and (-0.55%). The chainage and the reduced level at the point of intersection are 446m and 313.57m respectively. Consider the rate of change of grade as 0.1% per 30m.</p>	10
Q.5)	<p>An observer taking soundings from a boat (O) wished to locate his position and measured with a sextant the angles subtended at (O) by three points A, B and C on the shore. The length AB and BC were scaled from the map and found to be 236m and 249m respectively and the angle $\angle ABC$ was $127^{\circ}58'$. The observed angles $\angle AOB$ and $\angle BOC$ were $32^{\circ}22'$ and $41^{\circ}39'$ respectively. What are the distances of (O) from A, B and C?</p>	10