Enrolment No/Seat No.: _____

R.N.G.PATEL INSTITUTE OF TECHNOLOGY-RNGPIT

(An Autonomous College U/s UGC Act 1956)

B.Tech SEMESTER-II, SEMESTER END EXAMINATION – SUMMER 2025

Subject Code: 1CV201 **Date: 26-05-2025**

Subject Name: BASIC SURVEYING

Time: 11:00 AM to 1:30 PM **Total Marks: 70**

Instructions

1. It is **compulsory** for students to write **Enrolment No. /Seat No.** on the question paper.
2. Write answers of **Section A** and **Section B** in **separate answer books**.
3. Attempt all questions from both **Section A** and **Section B**.
4. Each section carries **35 marks**, with a total of **70 marks** for the examination.
5. The figures to the right of each question indicate full marks, make suitable assumptions with justification.
6. BL - Bloom's Taxonomy Levels (R-Remember, U-Understanding, A –Application, N –Analyze, E – Evaluate, C -Create), CO - Course Outcomes.

SECTION A

		Marks	BL	CO
Q.1	**Multiple-Choice Questions**	**[05]**		
	(a) The errors mainly occur due to _____.	**1**	**R**	**5**
	(i) Imperfect instruments **(ii)** Human limitation			
	(iii) Climatic conditions **(iv)** All of above			
	(b) Gross errors arise due to_____.	**1**	**R**	**5**
	(i) Carelessness **(ii)** Poor judgment			
	(iii) Negligence **(iv)** All of above			
	(c) The errors which are always of same size and sign under certain conditions are called _____.	**1**	**R**	**5**
	(i) Systematic errors **(ii)** human errors			
	(iii) climatic errors **(iv)** gross errors			
	(d) The error arising due to use of tape in temperature above standardized temperature is example of _____.	**1**	**R**	**5**
	(i) Accidental error **(ii)** Random error			
	(iii) Cumulative error **(iv)** mistake			

(e)	The difference between observed value of a quantity and its most probable value is known as _____. **(i)** Residual error **(ii)** Systematic error **(iii)** True error **(iv)** Gross error	**1**	**R**	**5**

Q.2 Attempt Any Two **[10]**

(a)	Explain Laws of Weights.	**5**	**U**	**5**
(b)	Elaborate theory of least squares.	**5**	**A**	**5**
(c)	The following are the angles observed at a triangular traverse along with their probable errors. Determine correct values of angle. $\angle A = 64^o\ 12'\ 12" \pm 02"$, $\angle B = 50^o\ 48'\ 30" \pm 04"$, $\angle C = 64^o\ 59'\ 08" \pm 05"$	**5**	**N**	**5**

Q.3 Attempt Any Two **[10]**

(a)	Derive the expression for horizontal and vertical distances, in the fixed hair method when the staff is held vertically and the measure angle is that of elevation.	**5**	**N**	**3**
(b)	Explain in details the field procedure of tacheometric survey which you have carried out.	**5**	**A**	**3**
(c)	What is trigonometric levelling? What are its advantages and disadvantages over direct levelling?	**5**	**U**	**3**

Q.4 Attempt Any Two **[10]**

(a)	Explain procedure for indirect levelling on a steep slope.	**5**	**A**	**3**
(b)	Derive equations for the base of object inaccessible, instrument station in the same vertical plane but at different elevations.	**5**	**N**	**3**
(c)	A theodolite was set up at a distance of 150m from tower. The angle of elevation to the top of the parapet was $10^o\ 08'$ while the angle of depression to the foot of the wall was $03^o\ 12'$. The staff reading on the BM of RL 50.217 with the telescope horizontal was 0.880. Find the height of the tower and the RL of the top of the parapet.	**5**	**A**	**3**

SECTION B

		Marks	BL	CO
Q.5	**Multiple-Choice Questions**	**[05]**		
(a)	A theodolite fitted with a diaphragm is known as	**1**	**R**	**3**
	(i) Subtense theodolite **(ii)** Micrometer			
	(iii) Tacheometer **(iv)** None of above			
(b)	The subtense bar is used to measure	**1**	**R**	**3**
	(i) Vertical distance **(ii)** Horizontal distance			
	(iii) Inclined Distance **(iv)** None of above			
(c)	The best shape of a triangle in triangulation is	**1**	**R**	**1**
	(i) Isosceles with base angle 30^0 **(ii)** Isosceles with base angle $56^0\,14'$			
	(iii) Isosceles with base angle 60^0 **(iv)** equilateral			
(d)	Systematic errors are also known as	**1**	**R**	**2**
	(i) Positive errors **(ii)** Random errors			
	(iii) Negative errors **(iv)** Cumulative errors			
(e)	Accidental errors follow the law of	**1**	**R**	**2**
	(i) Mathematics **(ii)** Probability			
	(iii) Physics **(iv)** Gravity			
Q.6	**Attempt Any Two**	**[10]**		
(a)	Derive equation for V and H in tacheometry when staff held vertically in fixed hair method.	**5**	**E**	**3**
(b)	Explain field work in techeometry.	**5**	**U**	**3**
(c)	To determine the gradient between two points P and Q, a tacheometer was set up at another station R and the following observations were taken, keeping the staff vertical.	**5**	**E**	**3**

Staff at	Vertical angle	Stadia readings
P	$+ 4^0\,40'$	1.210, 1.510, 1.810
Q	$- 0^0\,40'$	1.000, 1.310, 1.620

If the horizontal angle PRQ is $36^0 20'$, determine the average gradient between P and Q. Take A = 100, B = 0 and PL of HI = 100 M.

Q.7 Attempt Any Two **[10]**

(a)	There are two stations A and B at elevations of 200 m and 1000 m respectively. The distance between A and B is 100 km. If the elevation of a peak P at a distance of 30 km from A is 300 m, show that stations A and B are intervisible.	**5**	**E**	**4**
(b)	What is triangulation? What are the factors that affect the selection of triangulation stations?	**5**	**U**	**4**
(c)	Describe uses, principles and figures of triangulation.	**5**	**U**	**4**

Q.8 Attempt Any Two **[10]**

(a)	State and prove the Principles of least squares.	**5**	**U**	**5**
(b)	Find most probable values of angles A, B and C of triangle ABC from the following observation equations: $A = 60^0\ 12'\ 36"$ $B = 53^0\ 46'\ 12"$ $C = 58^0\ 01'\ 16"$	**5**	**E**	**5**
(c)	Differentiate between the following: (i) Gross errors and random errors (ii) Cumulative errors and compensating errors	**5**	**N**	**5**

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