

**R.N.G.PATEL INSTITUTE OF TECHNOLOGY-RNGPIT**  
(An Autonomous Institute U/s UGC Act 1956)

**B.Voc. SEMESTER-I, SEMESTER END EXAMINATION – WINTER 2025**

**SUBJECT CODE: 1SH114**

**DATE: 15-12-2025**

**SUBJECT NAME: MATHEMATICS**

**TIME: 11:00 AM to 01:00 PM**

**TOTAL MARKS: 50**

**Instructions**

1. It is **compulsory** for students to write **Enrolment No. /Seat No.** on the question paper.
2. Attempt all questions in the question paper.
3. The figures to the right of each question indicate full marks. Make suitable assumptions with proper justification wherever required.
4. Simple, non-programmable scientific calculators are permitted.
5. BL - Cognitive Level (As per Revised Bloom's Taxonomy) (R-Remember, U-Understanding, A –Application, N –Analyze, E – Evaluate, C -Create), CO - Course Outcomes.

		Marks	BL	CO
<b>Q.1</b>	(a) Find real and imaginary part of $\frac{2-3i}{5+8i}$ .	05	A	1
	(b) Find the Complex conjugate and modulus of the equation $\frac{1-i}{1+i}$ .	05	A	1
<b>Q.2</b>	(a) If $\vec{v}_1 = 5\hat{i} + 4\hat{j} + 7\hat{k}$ , $\vec{v}_2 = \hat{i} + 2\hat{j} - \hat{k}$ then evaluate the following expressions: i) $\vec{v}_1 + 2\vec{v}_2$ ii) $2\vec{v}_1 - \vec{v}_2$ iii) $\vec{v}_1 \cdot \vec{v}_2$ .	05	A	2
	(b) Find A+2B and 3A-B, where $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & -1 \\ 1 & -2 & 2 \end{bmatrix}$ , $B = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 3 & -1 \\ 1 & 2 & 2 \end{bmatrix}$ .	05	A	2
<b>OR</b>				
<b>Q.2</b>	(a) Find $\bar{a} = i - j + k$ , $\bar{b} = 2i - j + k$ , $\bar{c} = i + j - 2k$ , then find $\bar{a} \cdot (\bar{b} + \bar{c})$ .	05	A	2
	(b) Find the inverse of the matrix $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ .	05	A	2
<b>Q.3</b>	(a) Construct the truth table $(p \rightarrow (q \rightarrow r)) \rightarrow ((p \rightarrow q) \rightarrow (p \rightarrow r))$ .	05	A	3

- (b) Draw the circuit using logic gates for the following Boolean expression:  $(B' + D).(A' + B).(C' + D)$ . **05 A 3**

**OR**

- Q.3 (a)** Construct the truth table for: **05 A 3**

(i)  $(p \vee (q \wedge r)) \equiv ((p \vee q) \wedge (p \vee r))$       (ii)  $(p \wedge (p \vee q)) \equiv p$

- (b) Draw the circuit using logic gates for the following Boolean expression:  $X'.Y'Z + X'YZ + XY'$ . **05 A 3**

- Q.4 (a)** Find the derivative of  $f(x) = \frac{x^2 + 1}{x - 3}$ . **05 A 4**

- (b) Find the integration of  $\int \left( \frac{1}{x} + e^{2x} + \cos x \right) dx$ . **05 A 4**

**OR**

- Q.4 (a)** Find the derivative of  $f(x) = e^x \sin x$ . **05 A 4**

- (b) Find a)  $\int (x^3 + \sin x) dx$       b)  $\int (x^2 - 4x + 11) dx$  **05 A 4**

- Q.5 (a)** Solve  $\frac{dy}{dx} = \frac{x}{y}$  by using variable separable. **05 A 5**

- (b) Solve  $\frac{dy}{dx} + y = x$  by using linear differential equation. **05 A 5**

**OR**

- Q.5 (a)** Form differential equation corresponding to the following equation:  $y = a \sin x + b \cos x$ . **05 A 5**

- (b) Solve  $\frac{dy}{dx} + y = e^x$  by using linear differential equation. **05 A 5**

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