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Enrolment No/Seat No.: _____

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

B.VOC SEMESTER-I, SEMESTER END EXAMINATION – SUMMER 2025

Subject Code: 1SH114ISubject Name: MATHEMATICSTime: 11:00 AM to 01:00 PM		Date: 02-	Date: 02-06-2025		
		Total Ma	rks: {	50	
Instructions		I otur miu	11.5.		
 It is compulsory for students to write Enrol Attempt all questions in the question paper. The figures to the right of each question ind wherever required. Simple, non-programmable scientific calcu BL - Bloom's Taxonomy Levels (R-Reme Create), CO - Course Outcomes. 	Diment No. /Seat No. on the question pap licate full marks. Make suitable assumption lators are permitted. mber, U-Understanding, A-Application,	er. ns with prop N-Analyze, l	er just E-Eval	ification uate, C-	
		Marks	BL	CO	
Q.1 Multiple-Choice Questions		[05]			
(a) Which of the following is order of th	the matrix $\begin{bmatrix} 1 & 3 & 2 \\ 7 & 11 & -1 \end{bmatrix}$	1	A	2	
(i) 3×2	(ii) 3 × 3				
(iii)2 × 2	$(iv)2 \times 3$				
(b) The possible truth values of the Boolean variable is/are		1	R	3	
(i) 0	(ii) 1				
(iii) Both 0 and 1	(iv) none of the above				
(c) Which of the following represent integration of $\cos x$?		1	R	4	
(i) $\int \cos x dx = \sin x + c$	(ii) $\int \cos x dx = -\sin x + c$				
(iii) $\int \cos x dx = \sec x + c$	$(\mathbf{iv}) \int \cos x dx = \operatorname{cosec} x + c$				
(d) Which of the following represent the multiplication rule for differentiation:		: 1	R	4	
(i) $\frac{d}{dx}[u \cdot v] = u \cdot v' + u' \cdot v$	$(\mathbf{ii})\frac{d}{dx}[u\cdot v] = u' + v'$				
(iii) $\frac{d}{dx}[u \cdot v] = u' \cdot v'$	$(\mathbf{iv})\frac{d}{dx}[u\cdot v] = (u+v')\cdot(u'+v)$				
(e) What is the general form of a first-order ordinary differential equation?		1	R	5	
(i) $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$	$(\mathbf{ii})\frac{dy}{dx} + Py = Q$				

(iv) none of the above

(iii) $\frac{d^2y}{dx^2} + Py = Q$

Q.2	Attempt Any Three			
	(a) Find the roots of the equation $x^2 + 2x + 2 = 0$.	5	A	1
	(b) Find the complex conjugate and modulus of $\frac{(2+i)(1-2i)}{3-i}$	5	A	1
	(c) State and prove De morgan's law by using truth table.	5	R,A	3
	(d) Construct a truth table for $X + (Y \cdot Z) + \overline{Z}$	5	Α	3
Q.3	Attempt Any Three	[15]		
	(a) Find the length of the following vectors: i. $\overrightarrow{V_1} = 3\hat{i} + 2\hat{j} + 3\hat{k}$	5	Α	2
	ii. $V_2 = \hat{\imath} + 3\hat{\jmath} + 3\hat{k}$ (b) Find matrix multiplication <i>AB</i> and <i>BA</i> if possible, where $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 0 & 1 \\ 2 & 1 \end{bmatrix}$	5	U,A	2
	(c) Find inverse of a matrix $\begin{bmatrix} 1 & 2 & 4 \\ 4 & 3 & 1 \\ 2 & 3 & 4 \end{bmatrix}$	5	Α	2
	(d) Find the value of integration $\int x \sin x dx$	5	Α	4
Q.4	Attempt Any Three	[15]		
	(a) Find derivative of the following: i. $f(x) = e^x(x^2 - 1)$ ii. $f(x) = \log(x^2 + 1)$	5	Α	4
	(b) Form Differential equation corresponding to the equation: $y = c a^{x} + c a^{-x}$	5	A	5
	(c) Find Order and Degree of the following Differential equations: i. $\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^3 + xy = x^2$ ii. $\left(\frac{d^3y}{dx^2}\right)^2 + \left(\frac{d^2y}{dx}\right)^3 + y = \log x$	5	U,A	5
	(d) Solve the following differential equation $\frac{dy}{dx} = \frac{y}{x+2}$	5	Α	5
