

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

B. Voc. SEMESTER-I, SEMESTER END EXAMINATION - WINTER 2024

Subject Code: 1SH114

Date: 10-12-2024

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 - Bloom's Taxonomy Levels (R-Remember, U-Understanding, A-Application, N-Analyze, E-Evaluate, C-Create), CO - Course Outcomes.

Marks BL CO

Q.1 Objective-Type Questions

[05]

(a) Possible truth values of a Boolean variable are

1 R 3

(i) 0

(ii) 1

(iii) Both 0 and 1

(iv) none of these

(b) The derivative of $f(x) = x^{10}$ is _____

1 R/A 4

(i) $10x^{10}$

(ii) $9x^{10}$

(iii) $10x^9$

(iv) $10x^{11}$

(c) The integration of the function $f(x) = x^7$ is _____

1 R/A 4

(i) $7x^8$

(ii) $\frac{x^8}{8}$

(iii) $8x^7$

(iv) $\frac{x^6}{6}$

(d) If $\begin{vmatrix} x & 1 \\ 4 & 2 \end{vmatrix} = 0$ then the value of $x =$ _____

1 R 2

(i) 0

(ii) 1

(iii) 2

(iv) 3

- (e) The degree of the differential equation $\left(\frac{dy}{dx}\right)^2 + 2y = x$ is ____ 1 U 5
- (i) 0 (ii) 1
- (iii) 2 (iv) 3

Q.2 Attempt Any Three [15]

- (a) Find the roots of the equation $z^2 - (5+i)z + 8+i = 0$. 5 A 1
- (b) Find real and imaginary part of $(-1-i)^7 + (-1+i)^7$. 5 R/A 1
- (c) State and prove De Morgan's Law. 5 R/A 3
- (d) Construct a truth table for $X \sqcup (Y \sqcup Z) + (X \sqcup Y)$. 5 A 3

Q.3 Attempt Any Three [15]

- (a) (i) Find the derivative of $y = x^3 - x^2 + 6$. 5 R/A 4
(ii) Find the derivative of $y = \cos x + e^x + x^5$.
- (b) (i) Find the integral $\int (5x^2 - 8x + 5)dx$. 5 R/A 4
(ii) Find the integral $\int 9 \sin(3x)dx$.
- (c) Find the differential equation from $y = ax - a^2$, where a is constant. 5 A 5
- (d) Solve $9yy' + 4x = 0$ using variable separable method. 5 A 5

Q.4 Attempt Any Three [15]

- (a) Find the magnitude of the following vectors: 5 R 2
- (i) $\vec{V}_1 = \hat{i} - 2\hat{j} + 3\hat{k}$ (ii) $\vec{V}_1 = \hat{i} + 3\hat{j} - \hat{k}$

- (b) If $\vec{V}_1 = (1, -2, 3)$, $\vec{V}_2 = (4, 0, -1)$ and $\vec{V}_3 = (-2, 1, 3)$ then evaluate the following: 5 R 2

- (i) $\vec{V}_1 + \vec{V}_2$ (ii) $\vec{V}_1 + 2\vec{V}_2 + \vec{V}_3$

- (c) Find $A+B$, $A-B$ where $A = \begin{bmatrix} 2 & -10 & -2 \\ 14 & 12 & 10 \\ 4 & -2 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 6 & 10 & -2 \\ 0 & -12 & -4 \\ -5 & 2 & -2 \end{bmatrix}$ 5 R 2

- (d) If $\begin{vmatrix} 4 & 3 & 9 \\ 3 & -2 & 7 \\ 4 & 4 & x \end{vmatrix} = -1$ then find the value of x . 5 R 2
