The LNM Institute of Information Technology
Jaipur, Rajasthan

End Semester Exam

MATH-II, 26th April, 2016

Part-A

Time: − − − minutes, Maximum Marks:− − −

Name:_____ **Roll No.:**_____

Note: Encircle/Tick the **correct** answer for objective type questions. Each question carry 5 marks for correct answer and carry a **negative marking of 2 mark for wrong answer**. Overwriting will be treated as a wrong answer. Use only the last page of main answer sheet for rough work and calculation. Write down the final answer, no marks for formula or incomplete solution.

1. Let $V = \mathbb{R}^+$. Define addition and scalar multiplication in V by

$$u \oplus v = u \cdot v, \quad \text{and} \quad \alpha \odot u = u^\alpha$$

for all $u, v \in V$ and $\alpha \in \mathbb{R}$. Then V is a vector space with additive identity equal to

(A) 0 (B) $\boxed{1}$ (C) 1^α (D) None of these

2. Let $\mathbb{P}_{24}$ is set of all real polynomials of degree ≤ 24. If $T : \mathbb{P}_{24} \to \mathbb{R}^{40}$ be a linear transformation then $R(T)$ can be a subspace of $\mathbb{R}^{40}$ of dimension

(A) 30 (B) 40 (C) 26 (D) $\boxed{\text{None of these}}$

3. Let u and v be two orthogonal vectors in an inner product space V such that $||u|| = 3$ and $||v|| = 4$. What exactly can we say about the distance between u and v?

(A) 1 (B) 7 (C) $\boxed{5}$ (D) None of these

4. An interval in which the IVP $xy'+2y = 4x^2, y(-1) = 2$ has unique solution is _____.
Sol: $-\infty < t < 0$

5. Third Picard's successive approximation of the IVP $y' = 2x(1+y), y(0) = 0$ is _____.
Sol: $x^2 + \frac{x^4}{2} + \frac{x^6}{6}$

6. Let $p(x)$, $q(x)$, $r(x)$ are continuous functions on an interval I. Further, suppose $y_1(x)$, $y_2(x)$ are any two solutions of the linear non-homogeneous equation $y'' + p(x)y' + q(x)y = r(x), \forall x \in I$. Then $3ay_1 + 2by_2$ is also a solution for _____.
(Obtain conditions on the constants a and b)
Sol: $3a + 2b = 1$

7. A particular solution for $y'' + 9y = \text{cosec } 3x$ is _____.
Sol: $-(1/3)x \cos 3x + (1/9) \sin 3x \ln(\sin 3x)$

8. Inverse Laplace trasformation for $\ln(1 + \frac{9a^2}{s^2})$ is _____. Sol: $\frac{2}{t}[1 - \cos 3at]$