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 be a vector space and let $S_1 = \{u_1, u_2, \ldots, u_n\}$ and $S_2 = \{v_1, v_2, \ldots, v_m\}$ be two subset of V. If S_1 spans V and S_2 is linearly independent, then

(A) $n \leq \dim V \leq m$ (B) $\boxed{m \leq \dim V \leq n}$ (C) $n < m \leq \dim V$ (D) $\dim V < n < m$

2. Let V be a seven-dimensional vector space and U, W both are six-dimensional distinct subspaces of V. Then $\dim(U \cap W) =$

(A) 6 (B) 2 (C) $\boxed{5}$ (D) 1

3. Which of the following pairs of vectors is an orthogonal pair in $\mathbb{R}^2$ with respect to the inner product defined by $\langle u, v\rangle = 3u_1v_1 + 2u_2v_2$, where $u = (u_1, u_2)$, $v = (v_1, v_2)$.

(A) $u = (1, 1)\, v = (1, -1)$ (B) $\boxed{u = (1, -1),\ v = (2, 3)}$
(C) $u = (1, -1),\ v = (3, 2)$ (D) $u = (1, 1),\ v = (-1, -1)$

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

5. Third Picard's successive approximation of the IVP $y' = 4x(1+y), y(0) = 0$ is _____.
Sol: $2x^2 + 2x^4 + \frac{4x^6}{3}$

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 $2ay_1 + 3by_2$ is also a solution for _____.
(Obtain conditions on the constants a and b)
Sol: $2a + 3b = 1$

7. A particular solution for $y'' + 4y = \text{cosec } 2x$ is _____.
Sol: $-(1/2)x \cos 2x + (1/4) \sin 2x \ln(\sin 2x)$

8. Inverse Laplace trasformation for $\ln(1 + \frac{4a^2}{s^2})$ is _____.
Sol: $\frac{2}{t}[1 - \cos 2at]$