The LNM Institute of Information Technology
Jaipur, Rajasthan

Objective End Semester Exam (A) MATH-II, 28^{th} April 2015

Time: 90 minutes, Maximum Marks: 40

Name:________________________ Roll No.:________________________

Note: Fill in the blanks. Write the answers in the space provided. Submit this part of the question cum answer paper on or before 11 AM.

1. Dimension of all $n \times n$ skew-symmetric matrices over $\mathbb{R}$ is $\dfrac{n(n-1)}{2}$ **[3]**

2. Set of all real polynomials of degree n is a vector space over $\mathbb{R}$. FALSE **[3]**

3. Consider $A = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}$. Then $A^{10} = \begin{bmatrix} 1 & 0 \\ -1023 & 1024 \end{bmatrix}$ **[5]**

4. The equation $(xy^2 + bx^2y)dx + (x+y)x^2dy = 0$ is exact for $b = 3$. **[5]**

5. The solution of $y' + y = e^{(y-1)^2}, y(0) = 1$ is $\underline{y \equiv 1.}$ **[4]**

6. Let $y(x)$ be a non-trivial solution of $y'' + [\alpha + 2\sin(x + \pi/4)]y = 0;\ \alpha > 4$. Then the minimum number of zeros of $y(x)$ in the interval $[0, 7\pi]$ is **7**. **[4]**

7. The orthogonal trajectories for the family of curves $y^2 = 4c(x+c)$ is

   $\underline{y^2 = 4c(x+c)}$. **[4]**

8. The general solution of $xy'' - y' = 6x^2$ is $\underline{a + bx^2 + 2x^3}$. **[4]**

9. The equation $y'' + e^x y = 0$ has a solution of the form $\phi(x) = \sum_{0}^{\infty} c_k x^k$ which satisfies $\phi(0) = 1, \phi'(0) = 0$. The value of c_2 is $\underline{-1/2}$ and c_3 is $-1/6$. **[4]**

10. The inverse Laplace transform of $\dfrac{e^{-\pi s}}{(s+4)^{5/2}} + \dfrac{1}{s(s^2+1)}$ is

    $\dfrac{u(t-\pi)e^{-4(t-\pi)}(t-\pi)^{3/2}}{\Gamma(5/2)} + 1 - \cos t$. **[4]**,

    u- unit step function

End of paper