The LNM Institute of Information Technology
Jaipur, Rajasthan

Objective End Semester Exam (B)

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 $n \times n$ symmetric matrices over $\mathbb{R}$ is $\frac{n(n+1)}{2}$ **[3]**

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

3. Consider $A = \begin{bmatrix} 1 & 0 \\ -1 & 2 \end{bmatrix}$. Then $A^{20} = \begin{bmatrix} 1 & 0 \\ -2^{20}+1 & 2^{20} \end{bmatrix}$ **[5]**

4. The equation $(y^3 + bxy^4 - 2x)dx + (3xy^2 + 20x^2y^3)dy = 0$ is exact for $b = 10$ **[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 $[0, 8\pi]$ is **8**_____. **[4]**

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

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

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

9. The equation $y'' + 2e^x y = 0$ 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 $\underline{-1}$ and c_3 is $-1/3$_____.**[4]**

10. The inverse Laplace transform of $\frac{e^{-\pi s}}{(s+3)^{5/2}} + \frac{1}{s(s^2+1)}$ is

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

    u- unit step function

End of paper