

**The LNM Institute of Information Technology
Jaipur, Rajasthan**

Math-II (2015-16), Quiz-2: Section-A

Name:

Roll No:

Time: 15 Minutes

Maximum Marks: 10

- Q1. Find the family of oblique trajectories which intersect the family of curves $y = ce^x$ at an angle of 45° . [5]

Sol. The differential equation (DE) corresponding to the given family of curve is $y' = y$.

Now use $\tan 45 = \frac{m_1 - m_2}{1 + m_1 m_2}$, where m_1 is the slope of given DE which is y and m_2 is the desired slope of oblique trajectories. Therefore, the DE corresponding to the oblique trajectories is $y' = \frac{y-1}{y+1}$.

By solving this we get the family of oblique trajectories as $y + 2 \log(y - 1) = x + c$.

- Q2 Solve the differential equation $yy' + xy^2 = x$. [5]

Sol. Note that this is a Bernoulli equation with $a = -1$. By applying the transformation $u(x) = y^2$, the non-linear equation reduced to linear equation in u : $u' + 2xu = 2x$.

Integrating factor is $e^{\int 2x dx} = e^{x^2}$ and hence $ue^{x^2} = \int 2xe^{x^2} dx + c$. By solving $u(x) = 1 + Ce^{-x^2}$ and hence $y^2 = 1 + Ce^{-x^2}$.