DEPARTMENT OF MATHEMATICS

SCHOOL OF APPLIED SCIENCES ,KIIT UNIVERSITY

1st Sem

MID-SEMESTER EXAMINATION-2016

MATHEMATICS(MA-1001)

Full Marks: 25 Time: 2 Hours

*Answer any **Six** questions including question No. 1*

1. Answer the following. [5x1]

   a) Find the degree and order of the following Differential equation
   $$y''' + 2y' + 3y = 0$$

   b) Verify whether $y = \frac{1}{1+ce^{-x}}$ is a solution of $y' = y - y^2$

   c) Solve $y' + 4y = 1.4$

   d) Test whether the ODE is exact or not $(x^2 + y^2)\,dx - 2xy\,dy = 0$

   e) Prove that if y_1 is a solution of $y' + p(x)y = 0$ it then cy_1 is also a solution of the given equation.

2. Solve $xy' = y + 3x^4\cos^2(y/x), \quad y(1) = 0$ [4]

3. A tank contains 400 gal of water in which 100 lb salt are dissolved. Fresh water runs into the tank at a rate of 2 gal/min . The mixture, kept practically uniform by stirring, runs out at the same rate . How much salt will there be in the tank at the end of 1 hour? [4]

4. Test the exactness and solve $(e^{x+y} + ye^y)dx + (xe^y - 1)dy = 0, \quad y(0) = -1$ [4]

5. Solve ODE $y' + xy = x\,y^{-1}, \quad y(0) = 3$ [4]

6. Solve the following ODEs [2x2]

   a) $y' + ky = e^{-kx} \quad y(0) = 3$

   b) $2\,e^{2x}\cos y\,dx - e^{2x}\sin y\,dy = 0$

7. Find the equations of orthogonal trajectories for the followings curves. [2x2]

   a) $y = cx$

   b) $y = c\,e^{-x^2}$

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