SCHOOL OF APPLIED SCIENCES, KIIT UNIVERSITY

MID-SEMESTER EXAMINATION-2015

SCHEME OF EVALUATION MATHEMATICS(MA-1001)

TIME-2hrs   **F.M-25**

Q1.   [1x5]

a) Find whether the ODE $y^2\, dx - 2xy\, dy$ is exact or not.
   Scheme: Correct answer/ not a ODE   1 mark,

b) Find the order and degree of the ODE $y'' + 2y' + (y^{iv})^2 = 0$.
   Scheme: Correct answer Order(.5) +Degree(.5)= 1 mark,

c) Are the functions $5\sin x\cos x$ $\ and\ $ $3\sin 2x\ for\ x \geq 0$ linearly independent ?
   Scheme Correct answer   1 mark,

d) Find the Orthogonal trajectories for the function $y = c/x$.
   Scheme: Up to ODE of OT(.5)+ Equation of OT (.5)= 1 mark,

e) Find an ODE for the given basis $\{1,\ e^{-3x}.\}$
   Scheme: Correct answer   1 mark,

Q2.   Solve $10y'' - 50y' + 65y = 0$, $y(0) = 1.5$, $y'(0) = 1.5$ [5]

Scheme: ODE general solution of equation (3)+Constant determination(2)=5 mark

Q3.   A tank contains 800 gal of water in which 200 lb of salt is dissolved . Two gallon of fresh   [5]
water runs in per minute, and two gallon of the mixture in the tank, kept uniform by
stirring , runs out per minute. How much salt is left in the tank after 5 hours?

Scheme: ODE formation (1)+ ODE general solution (2.5)+ Constant determination(1) + final
answer (.5) =5 mark

Q4. a) Solve $yy' + 36x = 0$ [2]

Scheme: Variable separable form(1)+ ODE general solution (1)= 2 mark

b) Test the exactness and solve $(e^{x+y} - y)dx + (xe^{x+y} + 1)\, dy = 0$ [3]

Scheme: Exactness test (1)+ ODE general solution (2)= 3mark

Q5. a) Find the second solution (ie. y_2) when $xy'' + 2y' + xy = 0\ for\ y_1 = x^{-1}\cos x$ [2]

Scheme: Formula of y_2 (.5) + Solution of y_2 (1.5) = 2mark

b) Solve $y' = \frac{y}{x} + \left(\frac{2x^3}{y}\right)\cos(x^2)$, $y\left(\sqrt{\frac{\pi}{2}}\right) = \sqrt{\pi}$ [3]

Scheme: ODE general solution (2) + Constant determination (1) = 3 mark

Q6. a) Solve $\quad y'' + 4ay' + 4a^2y = 0$ [2]

Scheme: Auxiliary equation (.5) + ODE general solution (1.5) =2 mark

   b) Solve $\quad y' + (x+1)y = e^{x^2}y^3$ [3]

Scheme: Bernoulli's equation form (1.5) + ODE general solution (1.5) =3mark
<p align="center">OR</p>
Scheme: Variable Separable form (1) + ODE general solution (2) =3mark

Q7 a) Solve $\quad y' + 2y = 4\cos 2x$ [2]

Scheme: Integrating factor (1) + ODE general solution (1) =2mark

   b) Reduce to first order and solve $yy'' = 4\,y'^2$ [3]

Scheme: Reduce to first order (1,5) + ODE general solution (1,5) =3 mark