GLA University, Mathura

II-Mid Term Examination, 2011-12

Course: - B.Tech. I Year I Sem.

Subject: - Mathematics I (AHM – 101) **University Roll No:-**

Time:- 90 Minutes **Total Marks:- 40**

Note:-

1) Attempt ALL questions of group A, ANY TWO from Group B and ANY TWO from Group C.
2) All parts of a question (a, b, etc.) should be answered at one place.
3) Answer should be brief and to-the-point and be supplemented with neat sketches.
4) Any missing or wrong data may be assumed suitably giving proper justification.
5) Figures on the right-hand side margin indicate full marks.

GROUP – A (2 * 8 = 16)

FILL IN THE BLANKS :

Q.1. The differential equation $d^2y / dx^2 + 2\,(dy/dx)^3 + y = 0$ is of _____ order and ___degree.

Q.2. The differential equation satisfying the relation $y = A\,e^{x} + B\,e^{-x}$ is _____.(A,B are constants)

Q.3. The general solution of $x\,dy - y\,dx = 0$ is $y =$ ______________.

Q.4. The integrating factor of the differential equation $(dy/dx) + 2011\,(y/x) = 2012$ is ________.

Q.5. The complementary function of the differential equation $(d^5y/dx^5) - (d^3y / dx^3) = 0$ is ____.

Q.6. The particular integral of the differential equation $(D - 1)^3\,y = 1$ where $D = d/dx$ is ______.

Q.7. The particular integral of the differential equation $(d^2y/dx^2) + y = \sin x$ is ______________.

Q.8. The general solution of the differential equation $x^2\,(d^2y/dx^2) + x\,(dy/dx) = 0$ is ________.

GROUP – B (Attempt ANY TWO) (5 * 2 = 10)

Q.1. Solve the differential equation : $(D+2)(D-1)^2\,y = e^{x}$ (Assume $D = d/dx$)

2. Solve the differential equation : $(D^2 + 1)\,y = \operatorname{cosec} x$ (Assume $D = d/dx$)

3. Solve the differential equation : $(d^4y / dx^4) - y = \cos x \cosh x$

GROUP – C (Attempt ANY TWO) (7 * 2 = 14)

Q.1. Solve the differential eqn. $(D^2 + 1)\,y = \sec x \tan x$ by method of variation of parameters.

Q.2. Solve the following system of simultaneous linear differential equations :

$$(dx/dt) + (dy/dt) + 3x = \sin t \quad ; \quad (dx/dt) + y - x = \cos t$$

Q.3. A circuit consists of an inductance L and a condenser of capacity C in series. An alternating e.m.f E sin nt is applied to the circuit at time t = 0, the initial current and the charge on the condenser being zero. Prove that the current at time t is

$$i = [\,n E\,(\cos wt - \cos nt)\,] \,/\, [\,L\,(n^2 - w^2)\,] \qquad \text{where } CLw^2 = 1$$