GLA University, Mathura

Mid- Term Examination, 2013-14

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

Subject: - Mathematics -I (AHM- 101) **Uni. Roll No:-**

Time:-1HOURS 30 Minutes **Total Marks:-20**

Notes:-

1) Attempt ANY FOUR questions from Section- A, ANY THREE from Section- B and ANY TWO from Section- 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.

Section –A

Attempt any Four of the followings. **(4 × 1 = 4)**

Q1. Solve $\frac{d^4y}{dx^4} = n^4 y$

Q2. Find the value of x solving the differential equations; $\frac{dx}{dt} + \omega y = 0, \frac{dy}{dt} - \omega x = 0.$

Q3. Find one part of C.F. of the differential equation; $x^2\frac{d^2y}{dx^2} - 2x(1+x)\frac{dy}{dx} + 2(1+x)y = x^3$

Q4. Solve; $x^2D^2y + 5xDy + 4y = 0.$

Q5. Write the differential equation corresponding to L-C-R Electrical circuit with e.m.f. Q cos nt.

Section–B

(3 × 2 = 6)

Attempt any Three of the followings.

Q1. Solve $(D^2 + 4)\, y = \sin 3x + \cos 2x.$

Q2. Solve $x^3\frac{d^3y}{dx^3} + 3x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = x + \log x.$

Q3. Solve the following differential equation by variation of parameters method;

$$\left(D^2 - 1\right)y = 2\left(1 - e^{-2x}\right)^{\frac{-1}{2}}$$

Q4. The differential equation for a circuit in which self- inductance and capacitance neutralize each other is $L\frac{d^2i}{dt^2} + \frac{i}{C} = 0$ .Find the current i as a function of t, given that I is maximum current and i = 0

When t = 0.

Section –C

(2 × 5 = 10)

Attempt any two of the followings.

Q1.Solve $\frac{d^2y}{dt^2} + \frac{dy}{dt} - 2y = \sin t, \frac{dx}{dt} + x - 3y = 0.$

Q2. Solve $(D^2 + 2)\, y = x^3 + x^2 + e^{-2x} + \cos 3x.$

Q3. A spring for which stiffness k = 700 Newton/m hangs in a vertical position with its upper end fixed. A mass of 7 kg is attached to the lower end. After coming to rest, the mass is pulled down 0.05m and released. Discuss the resulting motion of the mass, neglecting air resistance.

Q4. Solve $\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + (2 + x^2)\, y = e^{\frac{1}{2}\left(x^2 + 2x\right)}$