GLA University, Mathura — Set -D

Mid- Term II Examination, 2012-13

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 ALL questions of Section- A, ANY TWO 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 (8 × .5 = 4)

Q1. Order and degree of the differential equation $\frac{d^4y}{dx^4}+3\left(\frac{d^2y}{dx^2}\right)^5+5y=0$ are:

* 5, 2 * 4, 1 * 1, 4 * 2, 5

Q2. The solution of differential equation $\frac{d^2y}{dx^2}+y=0$ is:

* None of these * $y=c_1e^{-x}+c_2e^{x}$ * $y=c_1\cos x+c_2\sin x$ * $y=(c_1+c_2x)\cos x+(c_3+c_4x)\sin x$

Q3. P.I. of differential equation $(D^2+D+1)\,y=e^x$ is:

* None of these * $\frac{1}{3}e^x$ * $3e^x$ * e^x

Q4. For the particular integral $\frac{1}{f(D^2)}\sin ax$ when $f(-a^2)=0$ which one of the following is correct:

* None of these
* $\frac{1}{f(D^2)}\sin ax=\frac{1}{f(-a^2)}\sin ax$
* $\frac{1}{(D^2+a^2)}\sin ax=-\frac{x}{2a}\cos ax$
* $\frac{1}{(D^2+a^2)}\sin ax=\frac{x}{2a}\sin ax$

Q5. Homogeneous linear differential equation $x^2\frac{d^2y}{dx^2}+5x\frac{dy}{dx}+4y=0$ will reduce to a linear differential equation with constant coefficients by putting:

* $x=\tan z$ * $x=e^z$ * $x=\log z$ * $x=z^2$

Q6. Eliminating y between the simultaneous equations $\frac{d^2x}{dt^2}+m^2y=0$, $\frac{d^2y}{dt^2}-m^2x=0$, we obtain differential equation:

* $(D^2-m^2)\,x=0$ * $(D^4+m^4)\,x=0$ * $(D^4-m^4)\,x=0$ * $(D^2+m^2)\,x=0$

Q7. The general solution of differential equation $\frac{d^5y}{dx^5}+\frac{d^3y}{dx^3}=0$ is given by:

* $y=(c_1+c_2x+c_3x^2+c_4x^3)+c_5e^{x}$ * $y=(c_1+c_2x+c_3x^2)+c_4e^{x}+c_5e^{-x}$
* $y=(c_1+c_2x)+c_3e^{x}+c_4e^{2x}+c_5e^{-x}$ * $y=(c_1+c_2x)+c_3e^{2x}+c_4e^{3x}+c_5e^{4x}$

Q8. Solving the equations $\frac{dx}{dt}+\omega y=0$, $\frac{dy}{dt}-\omega x=0$ for x, we get x =

* None of these * $c_1e^{\omega t}+c_2e^{-\omega t}$ * $(c_1+c_2t)\,e^{\omega t}$ * $c_1\cos\omega t+c_2\sin\omega t$

Section–B (2 × 3 = 6)

Attempt any two of the followings.

Q1. Find the complete solution of $\frac{d^2y}{dx^2}-3\frac{dy}{dx}+2y=xe^{3x}+\sin 2x$.

Q2. Find the general solution of the differential equation $\frac{d^2y}{dx^2}+3\frac{dy}{dx}+2y=e^{e^x}$

Q3. Solve $x^3\frac{d^3y}{dx^3}+3x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}+y=x+\log x$.

Section –C (2 × 5 = 10)

Attempt any two of the followings.

Q1. Solve by method of variation of parameters:

$$\frac{d^2y}{dx^2}-3\frac{dy}{dx}+2y=\frac{e^x}{1+e^x}$$

Q2. Solve the simultaneous differential equations: $\frac{dx}{dt}+\frac{dy}{dt}+3x=\sin t$, $\frac{dx}{dt}+y-x=\cos t$.

Q3. The differential equation for a circuit in which self – inductance 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 the maximum current And i = 0 when t = 0.