SET A

B.Sc. MATHEMATICS
FIRST SEMESTER
DIFFERENTIAL EQUATION-I
BMT – 103

[USE OMR FOR OBJECTIVE PART]

Duration: 1:30 hrs. **Full Marks: 35**

(Objective)

Time: 15 mins. **Marks: 10**

Choose the correct answer from the following: ***1×10=10***

1. The complementary function (C.F) of $(D^2 - 3D + 2)y = 0, D = \frac{d}{dx}$ is

   a. $C.F = c_1 e^x - c_2 e^{2x}, c_1, c_2$ are arb constant

   b. $C.F = c_1 e^x + c_2 e^{2x}, c_1, c_2$ are arb constant

   c. $C.F = c_1 e^x + c_2 e^{-2x}, c_1, c_2$ are arb constant

   d. $C.F = c_1 e^{-x} + c_2 e^{-2x}, c_1, c_2$ are arb constant

2. A differential equation of the form $\frac{dy}{dx} + Py = Qy^n, P, Q$ are function of x is called

   a. Linear Differential Equation
   b. Exact DE
   c. Bernouli's Equation
   d. none of the above

3. The Differential Eqquation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R, P, Q, R$ are function of x only is called

   a. Non- Linear Differentiaal Equation of second order with constant coefficient
   b. Homogeneous DE
   c. Linear Differentiaal Equation of second order with constant coefficient
   d. Non-homogeneouss DE

4. Solution of the following differential equation $\frac{d^2y}{dx^2}+\frac{dy}{dx}+y=e^x$ is

a. $y=e^{-x/2}\left\{c_1\cos\frac{\sqrt{3}}{2}x+c_2\sin\frac{\sqrt{3}}{2}x\right\}+\frac{e^x}{3}$

b. $y=e^{-x/2}\left\{c_1\cos\frac{\sqrt{3}}{2}x-c_2\sin\frac{\sqrt{3}}{2}x\right\}+\frac{e^x}{3}$

c. $y=e^{-x/2}\left\{c_1\cos\frac{\sqrt{3}}{2}x+c_2\sin\frac{\sqrt{3}}{2}x\right\}+\frac{e^x}{2}$

d. none of the above

5. The General solution of a Linear Differential Equation of second order with constant coefficient is

a. $y=C.F\times P.I$ b. $y=P.I$

c. $y=C.F$ d. $y=C.F+P.I$

6. If $m=2.2$,then C.F is

a. $y=C_1e^{3x}+C_2e^{3x}, C_1, C_2$ are arbitrary constant

b. $y=C_1e^{2x}+xC_2e^{2x}, C_1, C_2$ are arbitrary constant

c. $y=C_1e^{3x}+xC_2e^{3x}, C_1, C_2$ are arbitrary constant

d. none of the aabove

7. The Auxillaary Equaation (A.E) of the following differential equation $\left(D^3-4D^2+5D-2\right)y=0$ is

a. $m^3-4m^2+5m-2=0$ b. $(m^3-4m^2+5m-2)y=0$

c. $D^3-4D^2+5D-2=0$ d. $(D^3-4D^2+5D-2)y=0$

8. The Differential equation $Mdx+Ndy=0$ is exact if

a. $\frac{\partial M}{\partial x}=\frac{\partial N}{\partial y}$ b. $\frac{\partial M}{\partial y}=\frac{\partial N}{\partial x}$

c. $\frac{\partial M}{\partial y}\neq\frac{\partial N}{\partial x}$ d. $\frac{\partial M}{\partial x}\neq\frac{\partial N}{\partial y}$

9. Integrating factor of a Linear differential equation is

a. $I.F = e^{\int Rdx}$ b. $I.F = e^{\int Pdx}$

c. $I.F = e^{\int Qdx}$ d. $I.F = e^{-\int Pdx}$

10. Solution of $(1+x^2)dy = (1+y^2)dx$ is

a. $(y-x) = c(1-yx), c$ is arb constant

b. $(y-x) = c(1+x), c$ is arb constant

c. $(y-x) = c(1+yx), c$ is arb constant

d. $(y+x) = c(1+yx), c$ is arb constant

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Descriptive

Time : 1 hr. 15 mins. **Marks: 25**

[Answer question no.1 & any two (2) from the rest]

1. SOLVE **2+3=5**

(a) $(D^3+1)y = (e^x-1)^2$

(b) $(D^2-3D+2)y = Sin2x$

2. What do you mean by Linear Differential Equation of second order with constant coefficient. Give one example and Solve **2+2+6 =10**

$(D^3-8)y = 0$

3. What is the definition of Differential Equation.Find the differential equation of the family of curves $y = Ae^{2x} + Be^{-2x}$ for different values of $A, B.$ **2+8=10**

4. What do you mean by Homogeneous Differential Equation.Solve **3+7=10**

$$y - x\frac{dy}{dx} = x + y\frac{dy}{dx}$$

5. What is Bernouli's Equation.Write two difference between Linear Differential Equation and Bernouli's Equaation.Also solve the following equation **2+4+4 =10**

$$\frac{dy}{dx} + 2xy = e^{-x^2}$$

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