

**B.SC. MATHEMATICS
FIRST SEMESTER
DIFFERENTIAL EQUATION-I
BMT – 103 [REPEAT]
[USE OMR FOR OBJECTIVE PART]**

**SET
A**

Duration: 1:30 hrs.

Full Marks: 35

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
- $C.F = c_1 e^x - c_2 e^{2x}$, c_1, c_2 are arb constant
 - $C.F = c_1 e^x + c_2 e^{2x}$, c_1, c_2 are arb constant
 - $C.F = c_1 e^x + c_2 e^{-2x}$, c_1, c_2 are arb constant
 - $C.F = c_1 e^{-x} + c_2 e^{-2x}$, 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
- Linear Differential Equation
 - Exact DE
 - Bernouli's Equation
 - none of the above
3. The Differential Equation $\frac{d^2 y}{dx^2} + P \frac{dy}{dx} + Qy = R$, P, Q, R are function of x only is called
- Non- Linear Differential Equation of second order with constant coefficient
 - Homogeneous DE
 - Linear Differential Equation of second order with constant coefficient
 - Non-homogeneous 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. $y = C_1 e^{3x} + C_2 e^{3x}, C_1, C_2$ are arbitrary constant

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

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

d. none of the above

7. The Auxiliary Equation (A.E) of the following differential equation $(D^3 - 4D^2 + 5D - 2)y = 0$ 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. $I.F = e^{\int R dx}$

b. $I.F = e^{\int p dx}$

c. $I.F = e^{\int Q dx}$

d. $L.F = e^{-\int p dx}$

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) $(D^2 - 3D + 2)y = \sin 2x$

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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