Total No. of Printed Pages: 2

SUBJECT CODE NO: - YY-2387
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. (CBCGS) (Pattern 2022) S.Y SEM III
Examination April / May - 2024
Mathematics-V Differential Equations

[Time: 1:30 Hours] **[Max. Marks: 40]**

Please check whether you have got the right question paper.

N. B 1) All questions are compulsory
2) Figures to the right indicate full marks

Q1 Attempt any five **10**

a) Define ordinary and partial differential equation

b) Write the condition for differential equation $Mdx + Ndy = 0$ to be exact

c) Find the integrating factor of $cos^2 x \frac{dy}{dx} + y = \tan x$

d) What is the order and degree of differential equation

$$p^n + P_1 p^{n-1} + P_2 p^{n-2} + - - - - + P_{n-1}\, p + P_n = 0 \; where \; p = \frac{dy}{dx}$$

e) Find the roots of auxiliary equation of $\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + 4y = 0$

f) Find the value of $D^n e^{ax}$

g) Find the complementary function of

$$x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} - 4y = x^4$$

Q2 A) Attempt any one **08**

a) Explain the method of solving the differential equation $\frac{dy}{dx} + py = Q.Y^n$ where P and Q are functions of x

b) Explain the method of solving the differential equation which are solvable for y

B) Attempt any one **07**

c) Solve $(x^2 - 4xy - 2y^2)dx + (y^2 - 4xy - 2x^2)dy = 0$

d) Solve $x^2(y - px) = yp^2$

Q3 A) Attempt any one **08**

a) With usual notation prove that

$$\frac{1}{f(D)}(xV) = \left\{ x - \frac{1}{f(D)} \cdot f'(D) \right\} \frac{1}{f(D)} V$$

Where V is any function of x

b) Find the particular integral of

$$x^n \frac{d^n y}{dx^n} + p_1 x^{n-1} \frac{d^{n-1} y}{dx^{n-1}} + - - - + P_n y = X$$

Where $P_1, P_2, - - - - -, P_n$ *and* X *are function of* x

B) Attempt any one

c) Solve $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} - \frac{dy}{dx} - y = \cos 2x$ **07**

d) Solve $(2x - 1)^3 \frac{d^3y}{dx^3} + (2x - 1) \frac{dy}{dx} - 2y = 0$