Sr. No 322414

May-2026

B.Sc. IV SEMESTER

Introduction to
Differential Equations (MIC24-M-401) (Re-appear)

Time: 3 Hours **Max. Marks:75**

Instructions:
1. *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. *Any other specific instructions*

PART -A

Q1 (a) What is the order and degree of differential equation $\left[1+\left(\frac{dy}{dx}\right)^2\right]^3=\left(\frac{d^3y}{dx^3}\right)^2$. (1.5)

(b) Form a differential equation by eliminating the arbitrary constants A and B from $y = Acosx + Bsinx$. (1.5)

(c) Write the working rule for solving first order and first degree homogeneous differential equation. (1.5)

(d) Solve $(y^2 - x^2)dx + 2xydy = 0$. (1.5)

(e) What is the necessary and sufficient condition for $M(x,y)dx + N(x,y)dy = 0$ to be exact. (1.5)

(f) Write a short note on method of variation of parameters. (1.5)

(g) Solve $x^2 = 1 + p^2$. (1.5)

(h) Find the Complementary function for the equation $(D^2 + 3D + 3)y = e^{3x}$. (1.5)

(i) Write the working procedure for solving the linear differential equation by changing the independent variable. (1.5)

(j) Given that $y = e^{2x}$ is a solution of $(2x + 1)y'' - 4(x + 1)y' + 4y = 0$, find the general solution. (1.5)

PART -B

Q2 (a) Solve $\frac{dy}{dx}=\frac{x+2y-3}{2x+y-3}$. (8)

(b) Solve by separating the variables, $\cos(x + y)\,dy = dx$. (7)

Q3 (a) Solve $sinx\frac{dy}{dx} + 2y = tan^3\left(\frac{x}{2}\right)$. (8)

(b) Solve $(y^4 + 2y)dx + (xy^3 + 2y^4 - 4x)dy = 0$. (7)

Q4 (a) Solve $y = 2px + yp^2$. (8)

(b) Solve $(1+y^2)dx = (tan^{-1}y - x)dy.$ (7)

Q5 (a) Solve $(D^2+1)y = cos^2\left(\frac{x}{2}\right) + e^{-x}.$ (8)

(b) Solve the differential equation $(D^2 - 4D + 4) = 8e^{2x}sin2x.$ (7)

Q6 (a) Apply Method of variation of parameters to solve $\frac{d^2y}{dx^2} + y = cosecx.$ (8)

(b) Solve $x^2\frac{d^2y}{dx^2} - 2x[1+x]\frac{dy}{dx} + (x-1)y = 0.$ (7)

Q7 (a) Solve the linear differential equation $\frac{d^2y}{dx^2} + cotx\frac{dy}{dx} + 4ycosec^2x = 0$ by changing the independent variable. (8)

(b) Solve $cosx\frac{d^2y}{dx^2} + sinx\frac{dy}{dx} - 2ycos^3x = 2cos^5x.$ (7)

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