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End Semester Examination, December 2024
B.Sc.(H) Mathematics – III Semester
Ordinary Differential Equation (SCMA203)

Time: 2.5 hrs.

Max Marks: **50**

Note: *All Questions are compulsory. Marks are indicated against each question.*

PART-A

Q.1 Attempt any five questions:

- (a) Write the solution of Exact differential equation $Mdx + Ndy = 0$ [CO-1] [L-1] **2**
(b) Define general solution, particular solution of a differential equation. [CO-1] [L-1] **2**
(c) Solve the differential equation $(D^4 + 5D^2 + 6) = 0$ [CO-1] [L-1] **2**
(d) Define Homogeneous linear Differential equation [CO-1] [L-1] **2**
(e) Define Integrating factor of a differential equation? [CO-1] [L-1] **2**
(f) Find the integrating factor of the differential equation
 $(y^2 - 3xy)dx + (x^2 - xy)dy = 0$ [CO-1] [L-1] **2**
(g) What is the degree of the differential equation?

$$\frac{d^3 y}{dx^3} + 7 \frac{d^2 y}{dx^2} + 8 \frac{dy}{dx} - 9y = \log x$$

[CO-1] [L-1] **2**

2x5

PART-B

Q.2 Solve $\left[\frac{d^2 y}{dx^2} + y \right] \cot x + 2 \left[\frac{dy}{dx} + y \tan x \right] = \sec x$ [CO-3] [L-4] **10**

OR

Solve the differential equation $(x+a)^2 \frac{d^2 y}{dx^2} - 4(x+a) \frac{dy}{dx} + 6y = x$

[CO-6] [L-4] **10**

Q.3 Solve $\frac{d^2 y}{dx^2} - 2 \tan \frac{dy}{dx} + 5y = 0$ by removing the first derivative [CO-2] [L-4] **10**

OR

Prove that $\frac{d}{dx} [x^n J_n(x)] = x^n J_{n-1}(x)$ [CO-4] [L-2] **10**

Q.4 Apply the method of variation of parameters to solve

$$\frac{d^2 y}{dx^2} + n^2 y = \sec nx$$

[CO-4] [L-2] **10**

OR

Solve the differential equation $x - yp = ap^2$ [CO- 2] [L- 3] **10**

Q.5 Prove that $2J'_n(x) = J_{n-1}(x) - J_{n+1}(x)$ [CO-5] [L- 2] **10**

OR

Solve the differential equation $\frac{d^2 y}{dx^2} + 4y = x \sin x$

[CO- 5] [L-4] **10**