

School of Basic Sciences
Bachelor of Science Honours in Mathematics
Mid Term Examination - May 2024

Duration : 90 Minutes
Max Marks : 50

Sem II - C1UC202B - Ordinary Differential equations and Mechanics

General Instructions

Answer to the specific question asked

Draw neat, labelled diagrams wherever necessary

Approved data hand books are allowed subject to verification by the Invigilator

- 1) Define general and particular solution of the ODE. K2 (2)
- 2) Find the order and degree of $(d^2y/dx^2)^3 + x(dy/dx)^5 + y = x^2$ K1 (3)
- 3) Solve $(x + y)(dx - dy) = dx + dy$. K2 (4)
- 4) Solve $y^2 \log y = xpy + p^2$ K2 (6)
- 5) Check whether or not the equation is exact $(3x^2 + 4xy)dx + (2x^2 + 2y)dy = 0$ hence solve the equation. K3 (6)
- 6) Construct the differential equation of the family of curves given by the equation $x^2 - y^2 + 2\lambda xy = 1$, where λ is a parameter. Obtain the differential equation of its orthogonal trajectories and solve it. K3 (9)
- 7) Examine, for what values of the values of constant λ such that $(2xe^{xy} + 3y^2) (dy/dx) + (3x^2 + \lambda e^{xy}) y$ is exact. Further, for this value of λ , solve the equation. K4 (8)
- 8) Solve $(D^2 + 3D + 2)y = e^{2x} \sin x$ K4 (12)

OR

Solve $D^3 - 3D - 2)y = 540x^3 e^{-x}$ K4 (12)