



Faculty of Engineering

Mid term Examination (Summer- 2026)

Course Code:0541-121

Section: A, B,

Full Marks: 25

Course Title: Ordinary and Partial Differential Equation

Level-Term: L1-T2

Exam Date:28th June , 2026

Teacher's Initial: IJM

Time: 1.30 Hours

[Notes: Answer all the following questions

CO's represent one of the learning outcomes of the course.

Figures on the right hand side indicate marks allocated for the questions.]

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|---|--------------|-------------|-------|
| Q1. (a) Discuss the conditions based on which an ordinary differential equation can be called linear or nonlinear along with some examples.
(b) By eliminating constants a and b, Demonstrate an ordinary differential equation of which $xy = ae^x + be^{-x} + x^2$ is a solution and identify your obtain differential equation is either linear or nonlinear and if nonlinear, then why? | CO-1
(C2) | [2]
[3] | |
| Q2. Solve the solution of the following differential equations
i) $(e^y + 1)\cos x dx + e^y \sin x dy = 0$
ii) $(2xy + x^2) \frac{dy}{dx} = 3y^2 + 2xy$
(iii) $t \frac{d\theta}{dt} + \theta = \theta^2 \log(t)$ | CO2
(C2) | [3+3
+4] | |
| Q3. (a) An RL circuit has emf of 5 volts, a resistance of 50 ohms, and inductance of 1 henry, no initial current. Determine the current in the circuit at any time t.
(b) The variation of resistance R ohms, of an aluminum conductor with temperature $\theta^\circ C$ is given by $\frac{dr}{dt} = \alpha R$, where α is the temperature coefficient of resistance of aluminum. If $R=R_0$ When $\theta = 0^\circ C$.
(i) Solve the equation for R,
(ii) $\alpha = 38 \times 10^{-4}/^\circ C$. Determine the resistance of an aluminum conductor at $50^\circ C$, When its resistance at $0^\circ C$ is 24.0 ohm. | CO-3
(C2) | [4+6
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