



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.]

- | | | Marks |
|---|--------------|-------------|
| Q1. (a) Discuss the conditions based on which an ordinary differential equation can be called linear or nonlinear along with some examples. | CO-1
(C2) | [2] |
| (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? | | [3] |
| Q2. Solve the solution of the following differential equations | CO2
(C2) | [3+3
+4] |
| i) $(e^y + 1)\cos x dx + e^y \sin x dy = 0$ | | |
| ii) $(2xy + x^2) \frac{dy}{dx} = 3y^2 + 2xy$ | | |
| iii) $t \frac{d\theta}{dt} + \theta = \theta^2 \log(t)$ | | |
| 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. | CO-3
(C2) | [4+6
] |
| (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. | | |