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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 Teacher's Initial: IJM
Exam Date:28th June , 2026 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 i) $(e^{y} + 1)cosxdx + e^{y}sinxdy = 0$ 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.	**CO-3 (C2)**	**[4+6]**
	(b) The variation of resistance R ohms, of an aluminum conductor with temperature $\theta°c$ is given by $\frac{dr}{dt} = \alpha R$, where α is the temperature coefficient of resistance of aluminum .If R=R$_0$ When $\theta = 0°C$. *(i)* **Solve** the equation for R, *(ii)* $\alpha = 38 \times 10^{-4}/°c$. **Determine** the resistance of an aluminum conductor at $50°c$,When its resistance at $0°c$ is 24.0 ohm.		