



Bridging the Characterful International in Excellence

B. Tech II Semester Supplementary Examinations, January 2026

**ORDINARY DIFFERENTIAL EQUATIONS, TRANSFORMS AND VECTOR CALCULUS
(EEE)**

Maximum Marks: 70

Date: 08.01.2026

Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks		(10X2M=20 Marks)	Marks	CO	BTL
1	Write condition for exact differential equation.		2M	1	L1
2	Find I. F. of $2xydy - (x^2 + y^2 + 1)dx = 0$.		2M	1	L1
3	First General solution of $(D^2 + 2D^2 + D)y = 0$.		2M	2	L1
4	Find P.I of $(D^2+6D+9)Y = 2e^{-3x}$.		2M	2	L1
5	State first shifting theorem.		2M	3	L1
6	Find L $\{e^{-t}(3\cos 5t - 4\sin 5t)\}$.		2M	3	L1
7	Define gradient of a scalar point function.		2M	4	L1
8	If $\vec{f} = (x^2y)\vec{i} + (2y^2z)\vec{j} + (3z^2y)\vec{k}$ then find curl \vec{f} .		2M	4	L1
9	State stoke's theorem.		2M	5	L1
10	Define surface integral.		2M	5	L1

Part-B

Answer All the following questions.		(5X10M=50Marks)	Marks	CO	BTL
11	Solve $3\frac{dy}{dx} - y\cos x = y^4(\sin 2x - \cos x)$.		10M	1	L2
OR					
12	An object whose temperature is $75^{\circ}C$ cools in an atmosphere of constant temperature $25^{\circ}C$ at the rate $k\theta$, θ being the excess temperature of the body over the temperature, if after 10 minutes the temperature of the object falls to $65^{\circ}C$, find its temperature after 20 minutes, find the time required to cool down to $55^{\circ}C$.		10M	1	L2
13	Solve $(D^2 - 4D)y = x^2 \sin 2x$.		10M	2	L2
OR					
14	Solve by the method of variation of parameters $(D^2 + a^2)y = \tan ax$.		10M	2	L2
15	Evaluate $L\left\{\int_0^t te^{-t} \sin 4t dt\right\}$.		10M	3	L2

	OR			
16	Solve the D.E $\frac{d^2 y}{dx^2} - 4 \frac{dy}{dx} + 12y = e^{3x}$ given that $y(0) = 0$ and $y'(0) = 0$.	10M	3	L2
17	Prove that $\text{div}(\phi \bar{a}) = (\text{grad} \phi) \cdot \bar{a} + \phi \text{div} \bar{a}$.	10M	4	L2
	OR			
18	Show that vector $(x^2 - yz)\bar{i} + (y^2 - zx)\bar{j} + (z^2 - xy)\bar{k}$ is irrotational and find its scalar potential.	10M	4	L2
19	Verify stokes theorem for $F = y^2 \bar{i} + y \bar{j} - 3x \bar{k}$ and S is the upper half of the sphere $x^2 + y^2 + z^2 = a^2$ and $z \geq 0$.	10M	5	L2
	OR			
20	Find the work done by $\bar{f} = 3x^2 \bar{i} + \bar{j} + 2z \bar{k}$ along the straight line from $(0,0,0)$ to $(2,1,3)$.	10M	5	L2