



I B.TECH II Sem Supply End Examination, March 2022

Engineering Mathematics-II
(Common to all branches)

Time: 3 Hours.

Max. Marks: 70

Note: 1. Answer any FIVE questions.

2. Each question carries 14 marks and may have a, b as sub questions.

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|---|--|-----|-----|-----|
| 1 | a) Solve $(y^2 - x^2)dx + 2xydy = 0$. | 7M | C01 | BL3 |
| | b) Solve $x^2y dx - (x^3 + y^3)dy = 0$. | 7M | C01 | BL3 |
| 2 | a) Solve $(x+1) \frac{dy}{dx} - y = e^{3x} (x+1)^2$ | 7M | C01 | BL3 |
| | The number N of bacteria in a culture grow at a rate proportional to N .
The value of N was initially 100 and increased to 332 in one hour. | | | |
| | b) What was the value of N after $1\frac{1}{2}$ hours | 7M | C01 | BL3 |
| 3 | a) Solve $(D^2 + 6D + 9)y = 0$ | 7M | C02 | BL3 |
| | b) Solve $(D^2 + 3D + 2)y = \sin 3x$ | 7M | C02 | BL3 |
| 4 | Solve $(D^2 + 4)y = \sec 2x$ by the variation of parameters method | 14M | C02 | BL3 |
| 5 | a) Change the order of integration and evaluate $\int_0^a \int_y^a \frac{x}{x^2 + y^2} dx dy$. | 7M | C03 | BL5 |
| | b) Evaluate $\iiint_R x^2 y^2 z dx dy dz$, where R is the region bounded by the surfaces $x^2 + y^2 \leq 1, 0 \leq z \leq 1$ | 7M | C03 | BL5 |
| 6 | a) Find the unit normal vector of the surface $x^2y + 2yz - 1$ at the point $(1, 2, 3)$.
prove that the vector field | 7M | C04 | BL3 |
| | b) $\hat{F} = (y^2 - z^2 + 3yz - 2x)\hat{i} + (3xz + 2xy)\hat{j} - (3xy - 2xz + 2z)\hat{k}$
is irrotational | 7M | C04 | BL3 |
| 7 | Show that $\text{curl}(f v) = (\text{grad } f) \times v + f \text{curl } v$. | 14M | C04 | BL3 |
| | State Stokes theorem. Verify Stokes theorem for | | | |
| 8 | a) $\hat{F} = (x^2 - y^2)\hat{i} + 2xy\hat{j}$ over the box bounded by the planes
$x = 0, x = a, y = 0, y = b$. | 14M | C05 | BL3 |