



I B.TECH II Sem Regular End Examination, September 2021

Engineering Mathematics-II
(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.

- 1 a) Solve $(e^y + 1) \cos x dx + e^y \sin x dy = 0$. 7M C01 BL3
 b) Solve $y(x^2y^2 + 2) dx + x(2 - 2x^2y^2) dy = 0$. 7M C01 BL3
- 2 a) Solve $x \frac{dy}{dx} + y = x^3 y^6$. 7M C01 BL3
 b) A body is originally at $80^\circ C$ and cools down to $60^\circ C$ in 20 minutes. If the temperature of the air is $40^\circ C$, find the temperature of the body after 40 minutes. 7M C01 BL1
- 3 a) Solve $(D^2 + 5D + 6)y = 0$. 7M C02 BL3
 b) Solve $(D^2 - 4D + 13)y = e^{2x}$. 7M C02 BL3
- 4 a) Solve $(x^2D^2 + xD - 4)y = 0$. 7M C02 BL3
 b) Solve $\frac{d^2y}{dx^2} + y = \cos ecx$ by the variation of parameters method. 7M C03 BL3
- 5 For what values of x the following series is convergent 14M C03 BL4
 $x \cdot \frac{x^2}{2^2} + \frac{x^3}{3^2} - \frac{x^4}{4^2} + \dots$
- 6 a) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ then find ∇r^n . 7M C04 BL1
 b) Prove that the vector field $\vec{F} = 3y^4z^2\hat{i} + 4x^3z^2\hat{j} - 3x^2y^2\hat{k}$ is solenoidal. 7M C04 BL2
- 7 Prove that $\nabla \times (\nabla \times \vec{A}) = \nabla(\nabla \cdot \vec{A}) - \nabla^2 \vec{A}$. 14M C04 BL2
- 8 a) Evaluate the line integral $\int_C (x + y^2) d\vec{r}$, where C is the parabola $y = x^2$ in the plane $z = 0$ connecting the points $(0, 0, 0)$ and $(1, 1, 0)$. 7M C05 BL6
 b) Evaluate by Green's theorem $\oint_C (y - \sin x) dx + \cos x dy$ where c is the triangle enclosed by the lines $y=0$, $x=\frac{\pi}{2}$ and $\pi y = 2x$. 7M C05 BL6