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R-15

Code: 5GC14

I B.Tech. I Semester Supplementary Examinations November 2023

Engineering Mathematics-I

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks)

UNIT-I

- 1. a) Find the Orthogonal trajectories of the family of parabolas $y^2 = 4ax$ 7M
- b) Solve the differential equation $(x+1)\frac{dy}{dx} - y = e^{3x}(x+1)^2$ 7M

OR

- 2. a) A bacterial culture, growing exponentially, increases from 100 to 400 grams in 10 hours. How much was present after 3 hours 7M
- b) Find the Orthogonal trajectories of the family of curves $y = ax$ 7M

UNIT-II

- 3. Solve $(D^2 + 4)y = x^2 + \cos 2x$ 14M

OR

- 4. Using the method of variation of parameters, solve $(D^2 + a^2)y = \sec ax$ 14M

UNIT-III

- 5. a) Expand $\sin x$, by using Maclaurin's theorem. 7M
- b) Test of convergence of the series $\frac{1}{1.2.3} + \frac{3}{2.3.4} + \frac{5}{3.4.5} + \dots \infty$ 7M

OR

- 6. Discuss the convergence of the series $1 - \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} - \frac{1}{\sqrt{4}} + \dots$ 14M

UNIT-IV

- 7. Find the maximum and minimum values of $x^3 + y^3 - 3axy$ 14M

OR

- 8. Find the maximum and minimum values of $x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$ 14M

UNIT-V

- 9. Trace the curve $x^3 + y^3 = 3axy$ 14M

OR

- 10. Trace the curve $r^2 = a^2 \cos 2\theta$ 14M
