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THREE YEAR B.A./B.Sc./B.Com. (CBCS) DEGREE EXAMINATION APRIL/MAY 2024.

SECOND SEMESTER

Mathematics (Minor)

Course – III: DIFFERENTIAL EQUATIONS

(w.e.f. 2023-24 admitted batch)

Time : Three hours

Maximum : 70 marks

(No additional sheet will be supplied)

SECTION A — (5 × 4 = 20 marks)

Answer any FIVE of the following questions.

1. Solve $(x+2y^2)\frac{dy}{dx}=y$.

2. Solve $(1+xy)x\,dy+(1-yx)y\,dx=0$.

3. Show that the family of Confocal conics $\frac{x^2}{a^2+\lambda}+\frac{y^2}{b^2+\lambda}=1$ is self orthogonal. Where 'h' being parameter.

4. Solve $(px-y)(py+x)=2p$.

5. Solve $(D^3-5D^2+8D-4)y=e^{2x}$.

6. Solve $(D^3+9)y=\cos^3 x$.

7. Solve $(D^2+D+1)y=x^3$.

8. Solve $(D^4-1)y=e^x\cos x$.

9. Solve $(D^2+1)=y=\operatorname{cosec} x$ by the method of variation of parameters.

10. Solve $(x^2D^2-2xD-4)y=x^2$.

SECTION B — (5 × 10 = 50 marks)

Answer ALL questions. Each question carries 10 marks.

11. Solve $\frac{dy}{dx}(x^3y^3+xy)=1$.

Or

12. Solve $(1+xy)x\,dy+(1-xy)y\,dx=0$.

13. Solve $y = 2xp + x^2p^4$.

Or

14. Find the orthogonal trajectories of the family of cardioids $r = a(1 - \cos\theta)$ Where 'a' is th parameter.

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

Or

16. Solve $(D^2 + 16)y = e^{-3x} + \cos^4 x$.

17. Solve $\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 6y = e^{2x}(1 + x)$.

Or

18. Solve $(D^2 + 2D + 1)y = x\cos x$.

19. Solve $(D^2 + a^2)y = \sec ax$ by the method of variation of parameters.

Or

20. Solve $(x^2D^2 + 3xD + 1)y = \frac{1}{(1-x)^2}$.