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I/IV B. Tech. DEGREE EXAMINATIONS, AUGUST - 2023

Second Semester

CE / AM / CS / CYS / DS / EC / EEE / ME

MATHEMATICS - II

Time : **Three Hours** Maximum : **70** Marks

Answer All Questions

Answer ONE question from each Unit. 5x14=70 M

UNIT - I

1. a) Solve $(D^2 + 3D + 2)\, y = xe^x \sin x$.

   b) Find the complementary function y'' + 6y' + 9y = 0, provided that y (0) = -4, y' (0) = 14.

(OR)

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

   b) Solve $y'' + 4y' + 4y = 4\cos x + 3\sin x$, given $y(0) = 1$, $y'(0) = 0$.

UNIT - II

3. Solve the differential equation $(x^2D^2 - 3xD + 1)\, y = \log x\left(\frac{\sin(\log x) + 1}{x}\right)$.

(OR)

4. a) Solve simultaneous Linear equations $\frac{dx}{dt} = 5x + 4$, $\frac{dy}{dt} = y - 4x$.

   b) Write the procedure of Legendre's Equation.

UNIT - III

5. a) Solve $x^2 (y - z)\, p + y^3 (z - x)\, q = z^2 (x - y)$.

   b) Solve $p^2 + q^2 = x + y$.

(OR)

6. a) Solve $(D^2 + 4DD' - 5\, D'^2)\, z = \sin(2x+3y)$.

   b) Write different types of Non-Linear partial differential equations with examples.

P.T.O.

UNIT - IV

7. a) Find the directional derivative of $xy^3 + yz^3$ at (2, -1, 1) in the direction of $i + 2\bar{j} + 2\bar{k}$.

   b) Find div F and curl F at the point (1, 2, 3) given $F = 3x^2I + 5xy^2J + 5xyz^3 K$.

(OR)

8. Show that curl (FxG) = F(divG) - G (divF) + (G. ∇)F - (F. ∇)G.

UNIT - V

9. State Green's theorem and verify Green's theorem for $\int_C [(xy + y^2)\,dx + x^2\,dy]$ where C is bounded by $y = x$ and $y = x^2$.

(OR)

10. Evaluate $\int_C \bar{F}.d\bar{r}$ by Stoke's theorem if $\bar{F} = (x^2 + y^2)\,\bar{i} - 2xy\,\bar{j}$ where C is the rectangle formed by the lines $x = a$, $x = -a$, $y = 0$, $y = b$.