solution.

OR

14 a) Reduce to first order and solve $y'' + (1 + \frac{1}{y})(y')^2 = 0$ (5)

b) Solve the initial value problem $9y'' - 30y' + 25y = 0, y(0) = 3, y'(0) = 10.$ (6)

Module 1I

15 a) Solve $y'' - 2y' + 5y = e^{2x} sinx.$ (5)

b) Using method variation of parameters solve $y'' + 4y = tan2x$ (6)

OR

16 a) Solve $x^3y''' + 3x^2y'' + xy' + y = x + logx$ (5)

b) Solve using method of variation of parameters $y'' - 2y' + y = \frac{e^x}{x}$ (6)

Module 1II

17 Find the Fourier series of periodic function $f(x) = \begin{cases} -x, -1 \le x \le 0 \\ x, 0 \le x \le 1 \end{cases}$ with period 2. Hence prove that $1 + \frac{1}{3^2} + \frac{1}{5^2} + \cdots \ldots = \frac{\pi^2}{8}$. (11)

OR

18 Find the Fourier series of periodic function $f(x) = xsinx$,0 < x < 2π with period 2π . (11)

Module 1V

19 a) Solve p - 2q = $3x^2$ sin(y+2x). (5)

b) Solve r + s - 6t = y sinx. (6)

OR

20 a) Solve $x(y - z)p + y(z - x)q = z(x - y)$. (5)

b) Solve $(D^2 - 2DD' - 15D'^2)$ z = 12xy. (6)

Module V

21 A tightly stretched string of length L is fixed at both ends. Find the displacement u(x,t) if the string is given an initial displacement f(x) and an initial velocity g(x). (10)

OR

22 A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially in a position given by $u = v_0 sin^3\left(\frac{\pi x}{l}\right), 0 \le x \le l$. If it is released from rest from this position, find the displacement function $u(x, t)$ (10)

Module VI

23 The ends A and B of a rod of length L are maintained at temperatures 0^0C and 100^0C respectively until steady state conditions prevails. Suddenly the temperature at the end A is increased to 20^0C and the end B is decreased to 60^0C. Find the temperature distribution in the rod at time t. (10)

OR

24 Find the temperature distribution in a rod of length 2 m whose end points are maintained at temperature zero and the initial temperature is (10)

$f(x) = 100(2x-x^2)$, $0 \leq x \leq 2$

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