

OR

a. Form the partial differential equation by eliminating the arbitrary function form 6  $f\left(\frac{xy}{z}, z\right) = 0.$ (06 Marks) b. Solve  $\frac{\partial^2 z}{\partial y^2} = z$ , given that when y = 0,  $z = e^x$  and  $\frac{\partial z}{\partial v} = e^{-x}$ . (07 Marks) c. Find all possible solutions of one dimensional heat equation  $\frac{\partial u}{\partial t} = C^2 \frac{\partial^2 u}{\partial x^2}$ using the method of separation of variables. (07 Marks) Test for convergence of the series  $\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!} x^n, (x > 0).$ 7 a. (06 Marks) Solve the Bessel's differential equation leading to  $J_n(x)$ . b. (07 Marks)

c. Express  $f(x) = x^4 + 3x^3 - x^2 + 5x - 2$  interms of Legendre's polynomials. (07 Marks)

- Test for convergence of the series  $\sum_{n=1}^{\infty} \frac{n^2}{2^n}$ . 8 a. (06 Marks)
  - If  $\alpha$  and  $\beta$  are two distinct roots fo  $J_n(x) = 0$ . Prove that  $\int x J_n(\alpha x) J_n(\beta x) dx = 0$ . If  $\alpha \neq \beta$ . b.
  - (07 Marks) c. Express  $f(x) = x^3 + 2x^2 - x - 3$  interms of Legendre's polynomials. (07 Marks)

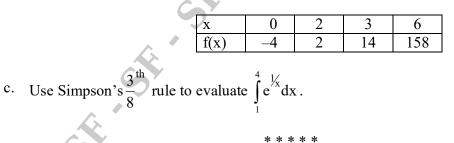
- Find the real root of the equation :  $x^3 2x 5 = 0$  using Regula Falsi method, correct to 9 a. three decimal places. (06 Marks)
  - Use Lagrange's formula, find the interpolating polynomial that approximates the function b. described by the following data :

Х	0	1	2	5
f(x)	2	3	12	147

Evaluate  $\int_{0}^{1} \frac{x dx}{1 + x^2}$  by Weddle's rule, taking seven ordinates and hence find log e<sup>2</sup>.

## OR

- Find the real root of the equation  $xe^{x} 2 = 0$  using Newton Raphson method correct to 10 a. three decimal places.
  - b. Use Newton's divided difference formula to find f(4) given the data :



2 of 2