Mathematics-III (BSC301) Calculus and Ordinary Differential Equations

Time: 90 minutes   **Max Marks : 15**

Q1. (i) Solve the differential equation   (2)

$$(1 + y^2)dx = (tan^{-1} y - x)dy$$

(ii) Solve the differential equation   (2)

$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 3x^2 e^{2x} \sin 2x$$

Q2. Solve $xp^2 - 2yp + x = 0$. (Use solvable for y)   (2)

Q3. Find the integrating factor and then solve the differential equation

$$(2xy^4 e^y + 2xy^3 + y)dx + (x^2 y^4 e^y - x^2 y^2 - 3x)dy = 0$$ (3)

Q4. Solve the differential equation

$$x^2 \frac{d^2y}{dx^2} - x\frac{dy}{dx} - 3y = x^2 \log x$$ (3)

Q5. Solve the differential equation by method of variation of parameters   (3)

$$x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = x^2 \log x$$