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Total No. of Pages : 02

Total No. of Questions : 07

**B.Sc. (Computer Science) (2013 & Onwards) (Sem.-2)**  
**PARTIAL DIFFERENTIATION AND DIFFERENTIAL EQUATIONS**  
Subject Code : BCS-201  
Paper ID : [A2605]

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt ANY FOUR questions.

**SECTION-A****1. Write briefly :**

- (a) Write Bessel's differential equation.
- (b) What is the geometrical meaning of the equation  $\frac{d^2y}{dx^2} = 0$ .
- (c) Give an example of exact differential equation.
- (d) If  $f = \sin\left(\frac{x}{y}\right)$ , then find  $\frac{\partial^2 f}{\partial y^2}$ .
- (e) What is the Particular Integral of  $\frac{d^2y}{dx^2} - 4y = \sin(2x)$ ?
- (f) If  $f(x, y) = \frac{x^4 + y^4}{x^2 - y^2}$ , then what is the degree of  $f(x, y)$ ?
- (g) Solve  $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 0$ .
- (h) Write a short note on limit of functions of several variables.
- (i) Show that the equation  $(x^4 - 2xy^2 + y^4) dx - (2x^2y - 4xy^3 + \sin(y)) dy = 0$  is exact.
- (j) Write a short note on variation of parameters method.

**SECTION-B**

2. Solve  $(y^4 + 2y) dx + (xy^3 + 2y^4 - 4x) dy = 0$ .
3. Solve  $\frac{d^2 y}{dx^2} + 2y = x^2 e^{3x} + e^x \cos(2x)$ .
4. If  $u = \sin^{-1} \frac{x+y}{\sqrt{x} + \sqrt{y}}$ , prove that  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -\frac{\sin(u) \cos(2u)}{4 \cos^3(u)}$ .
5. Solve in series the differential equation  $x \frac{d^2 y}{dx^2} + \frac{dy}{dx} - y = 0$ .
6. Solve  $z(x+y)p + z(x-y)q = x^2 + y^2$ , where  $p$  &  $q$  have their usual meanings.
7. Prove that the system of confocal conic  $\frac{x^2}{a^2 + \lambda} + \frac{y^2}{b^2 + \lambda} = 1$ , is self-orthogonal.