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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 $\frac{d^2y}{dx^2} + 2y = x^2 e^{3x} + e^x \cos(2x)$.
4. If $u = \sin^{-1} \frac{x+y}{\sqrt{x+y}}$, 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 $x \frac{d^2y}{dx^2} + \frac{dy}{dx} - y = 0$.
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.