Roll No. ☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages : 02**

Total No. of Questions : 07

B.Sc. (CS) (2013 & Onwards)   (Sem.–2)
PARTIAL DIFFERENTIATION & DIFFERENTIAL EQUATIONS
Subject Code : BCS-201
M.Code : 71506

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.   **Answer the following :**

   a)   Define interior point and boundary point.

   b)   If $f(x, y) = \dfrac{x^2 + 2y^2}{x^2 + y^2}$ then show that $\underset{(x,y)\to(0,0)}{Lt} f(x, y)$ does not exist.

   c)   Discuss the continuity of $f(x, y)$ at (2, 1) where $f(x, y) = \begin{cases} \dfrac{x^2 - y^2}{x^2 + y^2} & for\,(x, y) \neq (0, 0) \\ 0 & for\,(x, y) = (0, 0) \end{cases}$

   d)   Evaluate $\underset{(x,y)\to(1,0)}{Lt}\, e^{xy}$

   e)   Define linear differential equation.

   f)   Define singular solution of a given differential equation.

   g)   Define homogeneous differential equation.

   h)   Define orthogonal trajectories.

   i)   Define separable equation.

   j)   Define the continuity of a function $f(x, y)$ at a point (a, b).

SECTION-B

2. State and prove Eulers homogenous theorem.

3. Consider the function $f(x,y) = \begin{cases} 2 - \dfrac{x^2 y^2}{x^2 + y^2} & for\ (x,y) \neq (0,0) \\ A & for\ (x,y) = (0,0) \end{cases}$. Find the value of A which will make f continuous at origin.

4. If $f(x, y) = x^2 y e^y$, then evaluate f_{xy}, f_{xx}, f_{yy} and f_{xxx}.

5. Find one parameter family solution of $y = px + p^2$, where $p = \dfrac{dy}{dx}$.

6. Find the power series solution of $(x^2 - 1)\dfrac{d^2 y}{dx^2} + 3x\dfrac{dy}{dx} + xy = 0$, about $x = 0$.

7. Find the solution of Legendre's equation of order n.

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.