

**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  $f(x,y) = \frac{x^2 + 2y^2}{x^2 + y^2}$  then show that  $\lim_{(x,y) \rightarrow (0,0)} f(x,y)$  does not exist.

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

- d) Evaluate  $\lim_{(x,y) \rightarrow (1,0)} e^{xy}$

- 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  $f(x,y)=\begin{cases} 2-\frac{x^2y^2}{x^2+y^2} & \text{for } (x,y) \neq (0,0) \\ A & \text{for } (x,y)=(0,0) \end{cases}$ . Find the value of A which will make  $f$  continuous at origin.
4. If  $f(x,y)=x^2ye^y$ , then evaluate  $f_{xy}$ ,  $f_{xx}$ ,  $f_{yy}$  and  $f_{xxx}$ .
5. Find one parameter family solution of  $y = px + p^2$ , where  $p = \frac{dy}{dx}$ .
6. Find the power series solution of  $(x^2-1)\frac{d^2y}{dx^2} + 3x\frac{dy}{dx} + xy = 0$ , 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.**