SESSIONAL EXAMINATION
DGIT
THIRD SEMESTER [B.TECH] OCT'20

Paper Code:BSC-MATH-203G	**Subject: Mathematics-III**

Time: One Hour Thirty Minutes **Max. Marks: 30**

Note: Attempt any *three* questions including Q.no. 1 which is compulsory. All questions carry equal marks.

Q.1.Attempt any two questions: (5 X2 =10)

a. Let f: $R^2 \to R$ be defined by f(x,y) = $\begin{cases} \frac{x^2-y^2}{x^2+y^2}, & (x,y) \neq (0,0) \\ 0, & (x,y) = (0,0) \end{cases}$

Prove that $\lim_{(x,y) \to (0,0)} f(x,y)$ does not exist.

b. Find first order partial derivatives of u=y^x

c. Evaluate $\int_0^3 \int_0^1 x^2 + 3y^2 dydx$

d. Define Homogenous functions.

e. Evaluate $\int_0^a \int_0^a \int_0^a xy + yz + zx \, dxdy \, dz$

Q.2. (a) If u= $\frac{x^2y^2}{x+y}$, Prove that $x\frac{\partial^2 u}{\partial x^2} + y \frac{\partial^2 u}{\partial x \partial y} = 2\frac{\partial u}{\partial x}$ (10)

OR

(b) A rectangular box, open at the top, is to have a given capacity. Find the dimensions of the box requiring least material for its construction. (10)

Q.3. (a) Evaluate by changing the order of integration of $\int_0^a \int_y^a \frac{x}{x^2+y^2} \, dxdy$ (10)

OR

(b) Determine the area of region bounded by the curve xy=2, 4y= x^2, y=4 (10)

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