

16/12/19 (M)

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[This question paper contains 7 printed pages]

**Your Roll No.** : .....

**Sl. No. of Q. Paper** : **7465** **J**

Unique Paper Code : 32351303

Name of the Course : **B.Sc.(Hons.)**  
**Mathematics**

Name of the Paper : Multivariate Calculus

Semester : III

**Time : 3 Hours** **Maximum Marks : 75**

**Instructions for Candidates :**

- (i) Write your Roll No. on the top immediately on receipt of this question paper.
- (ii) **All** Sections are compulsory.
- (iii) Attempt any **five** questions from each **Section**.
- (iv) All questions carry equal marks.

P.T.O.

## Section-I

1. Given that the function

$$f(x,y) = \begin{cases} \frac{3x^3 - 3y^3}{x^2 - y^2} & \text{for } x^2 \neq y^2 \\ B & \text{otherwise} \end{cases}$$

is continuous at the origin, what is B ?

2. In physics, the *wave equation* is :

$$\frac{\partial^2 z}{\partial t^2} = c^2 \frac{\partial^2 z}{\partial x^2}$$

and the *heat equation* is :

$$\frac{\partial z}{\partial t} = c^2 \frac{\partial^2 z}{\partial x^2}$$

Determine whether  $z = \sin 5ct \cos 5x$  satisfies the wave equation, the heat equation, or neither.

18. Evaluate  $\iint_S 2x \, dS$  where S is the portion of the plane  $x + y + z = 1$  with  $x \geq 0, y \geq 0, z \geq 0$ .