This question paper contains **2** printed pages]

R-54-2017

FACULTY OF SCIENCE

B.Sc. (Third Year) (Sixth Semester) EXAMINATION

MARCH / APRIL, 2017

MATHEMATICS

PAPER XVII (MT-305) (Old)

(Partial Differential Equations)

(Thursday, 30-03-2017) **Time : 10:00 am to 12:00 noon**

Time–2 Hours *Maximum Marks–40*

N.B. : – (i) All questions are compulsory.
(ii) Each question carries equal marks.

1. Answer *any five* of the following : 10

(i) How is method of multipliers used for solving linear partial differential equations of first order?

(ii) State the first order partial differential equation of standard form type II.

(iii) Define linear homogeneous partial differential equation of n^{th} order with constant coefficients.

(iv) State the rule for finding the particular integral of partial differential equation $f(D, D')z = e^{ax+by}$.

(v) State the wave equation.

(vi) Write down the Laplace equation in polar co-ordinates.

2. Answer *any two* of the following : 10

(a) Explain in detail the method of solving Lagrange's equation.

(b) Form a partial differential equation by eliminating arbitrary function f from the equation $z = f(x^2 - y^2)$.

(c) Solve $p - x^2 = q + y^2$.

3. Answer *any two* of the following : 10

(a) Explain Monge's method for solving non-linear partial differential equation of second order.

(b) Solve $\frac{\partial^2 z}{\partial x^2} + 4\frac{\partial^2 z}{\partial x \partial y} - 5\frac{\partial^2 z}{\partial y^2} = 0$.

(c) Solve $\frac{\partial^2 z}{\partial x^2} - \frac{\partial^2 z}{\partial y^2} = x - y$.

4. Answer *any two* of the following : 10

(a) Obtain the solution of wave equation by D'Almbert's method.

(b) Using method of separation of variables, solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$, where $u(x, 0) = 6e^{-3x}$.

(c) Solve $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$, satisfying the conditions $u(0, y) = u(l, y) = u(x, 0) = 0$.