

**W-3311**  
**M.A./M.Sc.(Fourth Semester) Examination, June-2020**  
**MATHEMATICS**  
**Paper - 401**  
**Partial Differential Equation**

*Time : Three Hours*

Maximum Marks : 85 (For Regular)

Minimum Pass Marks : 29

Maximum Marks : 100 (For Private)

Minimum Pass Marks : 34

**Note :** Attempt **All** questions.

**Unit-I**

Q.1. Find the general solution of the differential equation.

$$x^2 \frac{\partial z}{\partial x} + y^2 \frac{\partial z}{\partial y} = (x + y)z$$

**Unit-II**

Q.2. Reduce the following equation into canonical form and then solve it.

$$y u_{xx} + (x + y) u_{xy} + x u_{yy} = 0$$

**Unit-III**

Q.3. Find the solution of 3-dimension Laplace equation

$$u_{xx} + u_{yy} + u_{zz} = 0 \text{ by method of separation of variables.}$$

**Unit-IV**

Q.4. Solve the 1-dimension heat equation  $\frac{\partial u}{\partial t} = k \frac{\partial^2 u}{\partial x^2}$  with boundary conditions.

$$u(0, t) = 0, \quad u(l, t) = 0, \quad u(x, 0) = x(l^2 - x^2)$$

**Unit-V**

Q.5. Solve the equation  $\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$  with conditions  $y(0, t) = 0, y(c, t) = 0, y(x, 0) = f(x),$

$$y_t(x, 0) = 0 \text{ where } 0 < x < c, t > 0.$$

