Roll No…………………….. **Total No. of Printed Pages: 01**

Total No. of Questions: [09]

B.Sc. – M.Sc. (Forensic Science) (Semester – 2nd)

DIFFERENTIAL EQUATIONS - II

Subject Code: BSNMS1206

Paper ID: 23480119

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section-A **(2 marks each)**

Q1. Attempt the following questions

a) What is the method of separating variables for PDEs?
b) Differentiate between linear and non linear PDE?
c) What is D'Alembert's method ? To what does it apply?
d) State Duhamel's Principle?
e) Write any two properties of fundamental solution?
f) What do you understand by Mean value property?
g) Differentiate between weak and strong maximum principle?
h) Define initial value problem with the help of example?
i) Write the PDE by eliminating arbitrary constants a &b from$z = ax^2 - by^2$
j) What do you mean by order and degree of PDE? Give one example.

Section-B **(5 marks each)**

Q2. $Solve\ (x^2 - y^2 - z^2)p + 2xyq = 2xz$ using Lagrange's method.

Q3. Form a partial differential equation by eliminating a, b, c from the relation $ax^2 + by^2 + cz^2 = 1$

Q4. Derive D'Alembert's method for the solution of wave equation?

Q5. Solve $k\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}\ for\ 0 < x < \pi, t > a\ if\ u_x(0, t) = u_x(\pi, t) = 0\ and\ u(x, 0) = sinx$

Q6. Verify that the Bessel function $J_{\frac{1}{2}}(x) = (sinx)(2/\pi x)^{1/2}$satisfies the Bessel equation of order 1/2

Section-C **(10 marks each)**

Q7.Find a complete integral, general integral and the singular integral of partial differential equation $2(z + xp + yq) = yp^2$ using Charpit's method.

Q8.Find the eigen values and eigen functions of the given Sturn Liouville boundary value problem $y'' + \lambda y = 0, y'(0) = 0 = y'(\pi)$

Q9.Form a PDE by eliminating arbitrary functions f and g from the relation $z = yf(x) + xg(y)$