Roll No…….. **Total No. of Printed Pages: 01**
Total No. of Questions: [09]

B.Sc. (Hons.) Chemistry (Semester – 3rd)
MATHEMATICS-III
Subject Code: BMATH5301
Paper ID: [19131622]

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:

a Define the linear Bernoulli equations.
b Write the condition for exact differential equation.
c Define the order of differential equation with examples
d What is meant by the degree of a differential equation?
e Write the Laplace equation with example.
f Write the one dimensional heat equation.
g Define the first order partial differential equations with example.
h Determine the partial derivative of the function: f (x, y) = 3x + 4y.
i Give one example of a second-order partial differential equation.
j Write the one dimensional wave equation.

Section – B **(5 marks each)**

Q2 Find the solution for the differential equation $(2xy - \sin x)\,dx + (x^2 - \cos y)\,dy = 0$.

Q3 Show that if a is a constant, then *u(x,t)=sin(at) cos(x)* is a solution to $\frac{\partial^2 u}{\partial t^2} = a^2 \frac{\partial^2 u}{\partial x^2}$

Q4 Solve $2\frac{\partial^2 z}{\partial x^2} + 5\frac{\partial^2 z}{\partial x\,\partial y} + 2\frac{\partial^2 z}{\partial y^2} = 0.$

Q5 Solve $\frac{d^2 y}{dx^2} + 4y = 0.$

Q6 Solve $(1-x)\,dy + (1-y)\,dx = 0.$

Section – C **(10 marks each)**

Q7 Solve $y + px = x^4\, p^2.$

Q8 Solve $\frac{d^2 y}{dx^2} - 2\frac{dy}{dx} - 3y = 5$.

Q9 By eliminating the arbitrary functions, obtain the partial differential equations from

$$z = f(x + c\,t) + g(x - c\,t).$$