Roll No. | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech. (Sem.–2)**

# MATHEMATICS-II

**Subject Code : BTAM-201-18**

**M.Code : 91957**

**Date of Examination ; 23-01-2023**

**Time : 3 Hrs.** **Max. Marks : 60**

**INSTRUCTIONS TO CANDIDATES :**

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION - B & C have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.**
4. **Select atleast TWO questions from SECTION - B & C.**



## SECTION-A

1. a) What do you mean by exact differential equation?

   b) Find the integrating factor of differential equation : $(3xy^2 - y^3)\, dx + (2x^2y - xy^2)\, dy = 0$.

   c) Write down Cauchy - Euler differential equation.

   d) Find the I.F $x^2y\, dx - (x^3 + y^3)\, dy = 0$.

   e) Form the partial differential equation for the function, $ax^2 + by^2 + z^2 = 1$.

   f) Write down the Auxiliary equation of Charpit's method.

   g) Write down the general linear partial differential equation of 2nd order.

   h) Write down two-dimensional heat equation.

   i) Write down two-dimensional Laplace equation in polar form.

   j) Classify the differential equation: $x^2 \dfrac{\partial^2 z}{\partial t^2} - \dfrac{\partial^2 z}{\partial x^2} + z = 0$.

## SECTION-B

2. Solve $(D^2 + D + 1)\, y = (1 + \sin x)^2$.

3. Solve $(2x + x^3)\dfrac{d^2y}{dx^2} - \dfrac{dy}{dx} - 6xy = 0$, in series.

4. Solve the following Lagrange's partial differential equation:

   $5p - 6q = 5x^4 \cos(6x + 5y)$.

5. Solve $p^2 + q^2 - 2px + 2qy = -1$, by Charpit's method

## SECTION-C

6. Solve the differential equation $y\dfrac{\partial^2 z}{\partial x \partial y} - \dfrac{\partial z}{\partial x} = xy^2 \cos(xy), y > 0$

7. A tightly stretched string of length $l$ has its ends fastened at $x = 0, x = l$. The mid points of string is then taken to a height $h$ and then released from rest in that position. Find the displacement of a point of the string at time $t$ from the instant of release.

8. Solve $3\dfrac{\partial u}{\partial x} + 2\dfrac{\partial u}{\partial y} = 0$, where $u(x,0) = 4e^{-x}$

9. Reduce $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = 0$ into polar co-ordinates.



**NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.**