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

Total No. of Questions : 09

B.Tech.(CSE)/(EE)/(Civil Engg.) (Sem.–2)

MATHEMATICS-II

Subject Code : BTAM-201-18

M.Code : 76254

Date of Examination : 18-07-22

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

Answer briefly :

1. a) For what value of a and b , the differential equation $(x^3 + y)\,dx + (ax + by^3)\,dy = 0$ is exact.

   b) Solve the differential equation: $yp^2 + (x - y)\,p = x$.

   c) Solve : $9\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + y = 0$

   d) Find the I.F by inspection : $xdx + ydy + 4y^3\,(x^2 + y^2)\,dy = 0$.

   e) What is Lagrange's linear differential equation? Give an example.

   f) Form the partial differential equation for the function $z = (x^2 + a)\,(y^2 + b)$.

   g) Find the complementary function for the differential equation: $(D_x^3 - D_y^3)\,z = x^3y^3$

   h) Classify the differential equation: $2\frac{\partial^2 z}{\partial x^2} - 2\frac{\partial^2 z}{\partial x \partial y} + 5\frac{\partial^2 z}{\partial y^2} = 0$.

i) What do you mean by boundary conditions?

j) Write down Laplace equation in three dimensions.

SECTION-B

2. Solve $\frac{d^3y}{dx^3} + 3\frac{d^2y}{dx^2} + 2\frac{dy}{dx} = xe^x$

3. Solve $(1 - 6x)\ \frac{dy}{dx}$, in series.

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

   $p + 3q = 5z - \tan(3x - y)$

5. Solve : $(p + q)(px + qy) = 1$, by Charpit's method.

SECTION-C

6. Find the general solution of the differential equation : $r - s + q - z = \cos(x + 2y) + e^y$.

7. Find the deflection $u(x, y, t)$ of the square membrane with $a = b = c = 1$. If the initial velocity is zero and the initial deflection $f(x, y) = A \sin \pi x \sin 2\pi y$.

8. Solve two-dimensional wave equation.

9. Solve the Laplace equation $u_{xx} + u_{yy} = 0$ in the rectangle $0 < x < 3$, $0 < y < 2$ and also satisfying the boundary conditions $u(x, 0) = 0$, $u(x, 2) = 0$ for $0 \le y \le 2$ and $u(0, y) = 0$, $u(3, y) = f(y)$, for $0 \le y \le 3$ where $f(y) = \begin{cases} y, & 0 \le y \le 1 \\ 2 - y, & 1 \le y \le 3 \end{cases}$.

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