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

Total No. of Questions : 09

B.Tech. (Sem.–2)

MATHEMATICS-II

Subject Code : BTAM-202-18

M.Code : 91958

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) Find the integrating factor of differential equation: $(x^2 + y^2 + x)\,dx + xydy = 0; x > 0$.

   b) Solve the differential equation: $x^2\left(\frac{dy}{dx}\right)^2 + xy\frac{dy}{dx} - 6y^2 = 0$.

   c) Define homogeneous linear differential equation with constant coefficients.

   d) Find the differential equation of all spheres of fixed radius having centres in xy - plane.

   e) Solve the lagrange's equation: $p + q = 0$.

   f) Classify the differential equation: $\frac{\partial^2 y}{\partial t^2} = c^2\frac{\partial^2 y}{\partial x^2}$.

   g) What are the advantages of Regula Falsie method?

   h) What is the relation between ∇ and E ?

i) What is Simpson's $\frac{1}{3}$ - rule?

j) State Euler's modified iteration formula.

SECTION-B

2. Solve $y''' - y'' + 4y' - 4y = \sin 3x$.

3. Solve the differential equation $(1-x^2)\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = 0$.

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

   $(y+z)\,p + (z+x)\,q = (x+y)$

5. Solve the equation $p^2 = q + px$ Charpit's method.

SECTION-C

6. Use bisection method to solve the equation $x^3 + x^2 + x + 7 = 0$ correct to three decimal places.

7. Given that $\sum_{11}^{20} f(x) = 44060$, $\sum_{14}^{20} f(x) = 38220$, $\sum_{17}^{20} f(x) = 27178$, and $f(20) = 8450$. Find the value of $f(11)$.

8. Solve the initial value problem $y' = x(y-x)$, $y(2) = 3$ in the interval $[2, 24]$ using the classical Runge-Kutta fourth order with step size $h = 0.2$.

9. Tabulate the solution of $\frac{dy}{dx} = x + y$, $y(0) = 0$ for $0.4 \le x \le 1.0$ with $h = 0.1$ using Predictor Corrector formula.

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.