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

Total No. of Questions : 18

B.Tech. (Electrical Engg./ECE) (2018 & Onwards) (Sem.–2)
B.Tech. (Automation & Robotics)/ (Civil Engg.)/ (Computer Science & Engineering)/ (Electrical & Electronics Engineering)/ (Electronics & Electrical Engineering)/ (Mechanical Engineering)

# MATHEMATICS-II

Subject Code : BTAM-202-18
M.Code : 76255

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) Is the differential equation $\left(3x^2y + \frac{y}{x}\right)dx + (x^3 + \ln x)dy = 0$ exact?

2) Find the general solution of the Clairaut's equation $y = px + p^3$.

3) Find the Wronskian of the equation $(D^2 + 1)\, y = \text{cosec}\, x$.

4) Solve the first order non-linear PDE $p^3 - q^3 = 0$.

5) Give the classification criteria of 2nd order partial differential equation.

6) Define the order of convergence of iterative methods.

7) Write Gauss forward formula for central difference interpolation.

8) Write Simpson's $\frac{1}{3}$ rule of numerical integration.

9) Define the operators $\Delta$ and $\nabla$.

10) Using Euler's method, evaluate $y(0.1)$ correct to 3 decimals, $y' - y^2 = 0$, $y(0) = 1$.

## SECTION-B

11) Solve the differential equation $\frac{dy}{dx} + 4y = 2x + 4x^2$.

12) Solve the differential equation $(D^2 + 2D + 1)\, y = 2e^{3x}$.

13) Solve the $3\frac{\partial}{\partial} - \frac{\partial}{\partial} = 0$ using separation of variables with $u(x, 0) = 4e^{-x}$.

14) Find $f(0.07)$, using Newton's forward difference formula, given that $f(0.05) = 0.0500$, $f(0.10) = 0.0999$, $f(0.15) = 0.1987$, $f(0.20) = 0.2571$.

## SECTION-C

15) Given the initial value problem $\frac{du}{dt} = e^t - t$, $u(1) = 2$. Estimate $u(1.2)$ using Runge Kutta method of 4th order upto 3 decimals. (Take $h = 0.1$).

16) a) Solve the Cauchy-Euler equation $x^2 \frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 3y = 0$ with $y(1) = 0$, $y'(1) = -2$.

b) Solve the partial differential equation $\frac{\partial^2}{\partial^2} - 5\frac{\partial^2}{\partial x\, \partial y} + 6\frac{\partial^2}{\partial^2} = e^{x+y}$.

17) a) Find $\sqrt[3]{25}$ using Newton Raphson method.

b) Evaluate $\int_0^1 \frac{1}{1+x}\, dx$, using Trapezoidal rule by taking 7 subintervals.

18) a) Using Taylor's series, find value of $y$ at $x = 0.1$ upto 3 decimals from $\frac{dy}{dx} = x^2 y + 1, y(0) = 1$.

b) Using finite difference method, solve $y'' + y + 1 = 0$, $y(0) = y(1) = 0$ (Take $h = 1/3$).

**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.**