



Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Electrical Engg./ECE) (Sem.-2)

**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  $3x^2 y^2 - x^2 y^2 dx + x^2 (\ln x) dy = 0$  exact?
- 2) Find the general solution of the Clairaut's equation  $y = px + p^3$ .
- 3) Find the Wronskian of the equation  $(D^2 + 1)y = \operatorname{cosec} x$ .
- 4) Solve the first order non-linear PDE  $p^3 - q^3 = 0$ .
- 5) Give the classification criteria of 2<sup>nd</sup> 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  $\nabla$  and  $\nabla^2$ .
- 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  $\frac{dy}{dx} = 4y - 2x$ .

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

13) Solve the 3 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  $\frac{du}{dt} = t$ ,  $u(1) = 2$ . Estimate  $u(1.2)$  using Runge Kutta method of 4<sup>th</sup> order upto 3 decimals. (Take  $h = 0.1$ ).

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

b) Solve the partial differential equation  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y^2} = 0$ .

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

$$\frac{dy}{dx} = 2y^2, (0, 1) \text{ y } 2$$

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.**

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