

Roll No.

Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Electrical Engg./ECE) (2018 & Onwards) (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 $\left(3x^2y + \frac{y}{x}\right)dx + (x^3 + \ln x)dy = 0$ exact?
- 2) Find the general solution of the Clairaut's equation $y = px + p^3$.
- 3) Find the Wronskian of the equation $(D^2 + 1)y = \operatorname{cosec} x$.
- 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 Δ and μ .
- 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 $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0$ 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 $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 3y = 0$ with $y(1) = 0$, $y'(1) = -2$.
- b) Solve the partial differential equation $\frac{\partial^2 z}{\partial x^2} + 5\frac{\partial^2 z}{\partial x \partial y} + 6\frac{\partial^2 z}{\partial y^2} = e^{x-y}$.
- 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.