Roll No. | | | | | | | | | | | | | Total No. of Pages : 03

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 this differential equation $x^2\left(\frac{d^2y}{dx^2}\right)^3 + y\left(\frac{dy}{dx}\right)^4 + y^4 = 0$ linear?

2) Is this differential equation $(e^y + 1)\cos x\, dx + e^y \sin x dy = 0$ exact?

3) Write the solution of the Clairaut's equation $y = px + \cos^{-1}(p + 1)$.

4) Find complete solution of $\frac{\partial^2 z}{\partial x^2} - 4\frac{\partial^2 z}{\partial x \partial y} + 4\frac{\partial^2 z}{\partial y^2} = 0$.

5) Find particular integral of $\frac{\partial^2 z}{\partial x^2} - 7\frac{\partial^2 z}{\partial x \partial y} + 12\frac{\partial^2 z}{\partial y^2} = e^{x-y}$.

6) Give geometric interpretation of Newton Raphson method.

7) Give the Gauss's forward interpolation formula.

8) Write the formula for Simpson's $\frac{3}{8}$ rule.

9) Give the Adam's predictor corrector formula.

10) Write the one dimensional heat equation.

SECTION-B

11) Solve :

a) $\frac{dy}{dx} = \frac{2xy\cos x^2 - 2xy + 1}{x^2 - \sin x^2 - 3}$.

b) $\tan y \frac{dy}{dx} + \tan x = \cos y \cos^2 x$.

12) a) Solve $(x^2D^2 - 2xD - 4)\, y = x^4$.

b) Solve using method of variation of parameters $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}$.

13) Solve a) $yzp + zxq = xy$.

b) $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial^2 z}{\partial y^2} = \cos(3x + y)$.

14) a) Solve the PDE $(D + D' - 1)(D + 2D' - 3)\, z = 4 + 3x + 6y$.

b) Using method of separation of variables, solve $3\frac{\partial u}{\partial x} + 2\frac{\partial u}{\partial y} = 0$ with $u(x, 0) = 4e^{-x}$.

SECTION-C

15) a) Find a root of $\cos x = xe^x$ using regula falsi method correct upto three decimal places.

b) Using interpolation, find missing values in the following table :

x	45	50	55	60	65
y	3.0	-	2.0	-	-2.4

16) a) Estimate $f(38)$, using Gauss backward difference formula :

x	20	25	30	35	40	45
$f(x)$	354	332	291	260	231	204

b) Estimate $\int_0^2 e^x dx$, using Trapezoidal rule by taking 10 intervals.

17) a) Use Taylor's series method to find the value of y at $x = 0.2$ upto 3 decimals, where $y(0) = 0$, $\frac{dy}{dx} = 1 - 2xy$.

b) Use Runge-Kutta method of order 4 to find the value of y at $x = 0.1$ upto 3 decimals, where $y(0) = 1$, $\frac{dy}{dx} = x + y$.

18) Using Crank-Nicholson method, solve the PDE $2\frac{\partial^2 f}{\partial x^2} = \frac{\partial f}{\partial t}$; $0 < t < 1.5$, $0 < x < 4$ subject to conditions $f(x, 0) = 50(4 - x)$, $f(0, t) = 0$, $f(4, t) = 0$.

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.