

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(IT) (Sem.-3)

MATHEMATICS-III

Subject Code : BTAM/304/18

M.Code : 76393

Date of Examination : 15-06-2024

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 contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

(a) Change the order of integration in $\int_{y=0}^1 \int_{x=0}^{y+4} \frac{2y+1}{x+1} dx dy$.

(b) Show that $f_{xy} = f_{yx}$ for all $(x, y) \neq (0, 0)$, when $f(x, y) = x^y$.

(c) Evaluate $\int_0^1 \int_0^1 (xy) dx dy$.

(d) Test the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{n^4}$.

(e) Give an example of a sequence which is bounded above but not bounded below.

(f) Check whether the Differential equations $y'' + y' + yx^2 = 0$ is Linear and Non linear?

(g) Solve $xyy' = 1 - x^2$.

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

(i) Solve the differential equation $4 \frac{d^2y}{dx^2} - 4y' + 1 = 0$.

(j) Solve the differential equation $x^2 \frac{d^2y}{dx^2} - 2xy' + 2y = 0$.

SECTION-B

2. State and prove Cauchy convergence criterion for sequences.
3. Find the extreme value of $x^2 + y^2$ when $x^4 + y^4 = 1$.
4. Find the solution of the Bernoulli equation $y' + y - xy^{5/3}$.
5. Solve the initial value problem $(2xy + e^y) dx + (x^2 + xe^y) dy = 0, y(1) = 1$.
6. Solve $(1 + 2x)^2 y'' - 6(1 + 2x)y' + 8y = 0$.

SECTION-C

7. Using the method of variation of parameters and the given linearly independent solutions, find a particular integral and the general solution of the differential equation $x^2 y'' - 2xy' + 2y = x^3 + x, y_1 = x, y_2 = x^2$.
8. (a) Find the solution of $xy' + y = y^2$.
(b) Discuss the convergence or divergence of the series $\sum_{n=2}^{\infty} \frac{1}{[\log(\log n)]^n}$.
9. Evaluate $\iiint_T x^2 y \, dx \, dy \, dz, T : x^2 + y^2 \leq 1, 0 \leq z \leq 1$.

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.