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

Total No. of Questions : 18

B.Tech.(CSE) (2018 Batch) (Sem.–3)

MATHEMATICS-III

Subject Code : BTAM304-18

M.Code : 76438

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

Solve the following :

1) Evaluate the limit for the function $f(x, y) = \frac{2x - y}{2x + y}$ if exists as $(x, y) \downarrow (0, 0)$

2) Evaluate the integral $\int_0^1 \int_{y^2}^{1+y} \int_0^{1-x} x\,dz\,dx\,dy$

3) Check the convergence of the following sequences whose nth term is given by $a_n = \frac{n^2 - 1}{n^2 + 1}$

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4) State Leibnitz test for convergence of an alternating series.

5) Write down the Taylor's series expansion for ln $(1 + x)$ about $x = 0$.

6) Define Clairaut's equation and obtain its general solution.

7) Solve the differential equation $\frac{dy}{dx} + y \tan x = 3e^{-\sin x}$

8) Define Exact differential equation and obtain the necessary condition for M $(x, y)\,dx$ + N $(x, y)\,dy = 0$ to be exact.

9) Solve the differential equation $\frac{d^2y}{dx^2} - 14\frac{dy}{dx} + 49y = 0$

10) Find particular integral for $\frac{d^2y}{dx^2} + y = x^2$

SECTION-B

11) Find the minimum value of the function $x^2 + y^2 + z^2$ subjected to $x + y + z = 3a$.

12) Evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dy dx$, by changing into polar coordinates.

13) Discuss the convergence of the series : $\frac{1^2}{4^2} + \frac{1^2 5^2}{4^2 8^2} + \frac{1^2 5^2 9^2}{4^2 8^2 12^2} + \ldots$ to ∞

14) Solve the differential equation :

$(xy^2 + e^{\frac{1}{x^3}})dx - x^2 y dy = 0$

15) Solve the differential equation $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 13y = e^{3x} \sin 4x$

SECTION-C

16) a) Find the interval of convergence for the infinite series : $x + \frac{x^3}{3} + \frac{x^5}{5} - \ldots$ to ∞ .

b) Find the area bounded by the parabola $y = x^2$ and line $y = 2x + 3$

17) a) Solve the differential equation $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$.

b) Solve the differential equation $xp^2 - 2yp + x = 0$, where $p = \frac{dy}{dx}$

18) a) Apply method of variation of parameters to solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = e^x \tan x$,

b) Solve $x^2 \frac{d^2y}{dx^2} + 3x\frac{dy}{dx} + 5y = \sin(\ln x)$

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.