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 $f(x, y) = \dfrac{2x-y}{2x+y}$ if exists as $(x, y) \to (0, 0)$

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 $a_n = \dfrac{n^2+1}{n^2-1}$

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 $\dfrac{dy}{dx} - y\tan x = 3e^{-\sin x}$

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 $\dfrac{d^2y}{dx^2} - 14\dfrac{dy}{dx} + 49y = 0$

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

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 : $\dfrac{1^2}{4^2} + \dfrac{1^2 5^2}{4^2 8^2} + \dfrac{1^2 5^2 9^2}{4^2 8^2 12^2} + ... \text{ to } \infty$

14) Solve the differential equation :

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

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

SECTION-C

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

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

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

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

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

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

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.