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

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. Show that the limit for the function $f(x, y) = \dfrac{2x - y}{2x + y}$ does not exists as $(x, y) \to (0,0)$.

2. Evaluate the integral $\int_0^1 \int_0^x e^{y/x}\, dy dx$

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

4. State Leibnitz test for convergence of an alternating series $x = \dfrac{\pi}{2}$

5. Write down the Taylor's series expansion for cos x about $x = \dfrac{\pi}{2}$.

6. Solve by reducing into Clairaut's equation: $y = px + p^2$, where $p = \dfrac{dy}{dx}$

7. Solve the differential equation $\dfrac{dy}{dx} + y = x$

8. Determine whether the differential equation is exact, if found exact solve it.

$(x^2 + y^2)\, dx + 2xydy = 0$

9. Solve the differential equation $16\frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 5y = 0$

10. Find Particular solution of the differential equation :

$$\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = e^{3x}$$

SECTION-B

11. Find the maximum and minimum distance of the point (1, 2, –1) from the sphere $x^2 + y^2 + z^2 = 24$.

12. Evaluate $\iint_D e^{-(x^2+y^2)} dydx$, where D is the region bounded $x^2 + y^2 = 1$

13. For what value(s) of x does the series converge (i) conditionally (ii) absolutely?

$x - \frac{x^2}{2} + \frac{x^3}{3} - \quad ----$ to ∞. Also find the interval of convergence.

14. Solve the differential equation by finding integrating factor

$(xy + 1)\, ydx + x(1 + xy + x^2y^2)dy = 0$

15. Solve the differential equation $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = xe^{3x} + \sin 2x$

SECTION-C

16. a) Show that the series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges for $p > 1$ and diverges for $0 < p \leq 1$.

b) Using double integration, find the area bounded between the parabolas $y^2 = 4ax$ and $x^2 = 4ay$.

17. a) Solve the Bernoulli's equation $\frac{dy}{dx}+\frac{y}{x}y=\frac{y}{x^2}$

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

18. a) Solve by Method of Variation of parameters

$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = \frac{e^{2x}}{x}$$

b) Find the complete solution of $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = e^{2x} \sin 2x$

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.