

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

- Investigate the continuity of the function $f(x, y) = \begin{cases} \frac{xy}{x^2 + y^2}, & (x, y) \neq (0, 0) \\ 0, & (x, y) = (0, 0) \end{cases}$ at the origin.
- Test the convergence or divergence of the series : $\sum \frac{\sqrt{n}}{n^2 + 1}$.
- Find the general and singular solution of $\sin(px - y) = p$.
- Solve $xy(1 + xy^2) \frac{dy}{dx} = 1$.
- Find the complete solution of $\frac{d^3y}{dx^3} + y = 0$.
- Evaluate $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2) dx dy$.
- If $\phi(cx - az, cy - bz) = 0$, show that $\frac{a \partial z}{\partial x} = \frac{b \partial z}{\partial y} = c$.
- State Balzano Weirstrass theorem.

9. Determine the exactness of the differential equation : $\frac{2x}{y^2}dx + \frac{y^2 - 3x^2}{y^4}dy = 0$.
10. Examine for convergence : $1 + \frac{1}{2} + 2 + \frac{1}{3} + 3 + \frac{1}{4} + 4 + \dots \infty$.

SECTION-B

11. Find the points on the surface $z^2 = xy + 1$ nearest to the origin.
12. Evaluate by changing the order of integration : $\int_0^3 \int_1^{\sqrt{4-y}} (x + y) dx dy$.
13. Test for convergence : $1 + \frac{x}{2} + \frac{2!}{3^2}x^2 + \frac{3!}{4^3}x^3 + \frac{4!}{5^4}x^4 + \dots \infty$.
14. Solve : $(xy^3 + y) dx + 2(x^2 y^2 + x + y^4) dy = 0$.
15. Using method of variation of parameters, solve : $\frac{d^2y}{dx^2} + 4y = \tan 2x$.

SECTION-C

16. a) Solve : $x^2 \frac{d^2y}{dx^2} + 4x \frac{dy}{dx} + 2y = e^x$.
- b) Find particular integral of $(D^2 + 1)y = \cos(2x - 1)$.
17. a) If $z = \log(x^2 + xy + y^2)$, show that $x \frac{\partial z}{\partial x} + y \frac{\partial z}{\partial y} = 2$.
- b) Find the double integration, the area of the lemniscates $r^2 = a^2 \cos 2\theta$.
18. a) Test the series for absolute and conditional convergence :
- $$1 - \frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} - \frac{1}{4\sqrt{4}} + \dots \infty.$$
- b) For what values of x the following series of convergent : $x - \frac{x^2}{2^2} + \frac{x^3}{3^2} - \frac{x^4}{4^2} + \dots \infty$.

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.