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

Total No. of Questions : 18

B.Tech. (Bio Tech) (2018 & Onwards) (Sem.–2)

BASIC MATHEMATICS-II

Subject Code : BTAM-207-18

M.Code : 76258

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 & C have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.**
4. **Select atleast TWO questions from SECTION - B & C.**

SECTION-A

Answer the following :

1. Find domain and range of the relation R = $\{(x, y) : y = x + 5, x < 4, x, y \in N\}$.
2. Examine, if the relation R = {(2, 1), (3, 1), (4, 2)} is a function or not?
3. Draw the graph of exponential function $f(x) = e^x$.
4. Find the limit $\lim_{x \to 2}\left(\frac{x^2-4}{x^3-4x^2+4x}\right)$.
5. Find $\frac{\partial z}{\partial x}$ given that $z = x^3 + y^3 - 3axy$.
6. Evaluate the integral $\int \frac{x^3-1}{x^2} dx$.
7. Evaluate the integral $\int$ cosec x (cosec x + cot x) dx.
8. Evaluate $\int_1^2 \int_1^3 xy^2 dxdy$.
9. Define order and degree of a differential equation.
10. Solve $\frac{dy}{dx} = \frac{y^2-1}{4xy}$.

SECTION-B

11. a) Find the value of k, so that the function $f(x) = \begin{cases} kx^2, & if\ x \le 2 \\ 3, & if\ x > 2 \end{cases}$ is continuous at $x = 2$.

    b) Differentiate $x^{\sin x} + (\sin x)^{\cos x}$.

12. a) Differentiate $\sin(\tan^{-1} e^{-x})$.

    b) Find $\frac{dy}{dx}$, given that $y = \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, $0 < x < 1$.

13. a) Find local maximum and minimum values of $f(x) = 3x^4 + 4x^3 - 12x^2 + 12$.

    b) Find absolute maximum and minimum values of $f(x) = 2x^3 - 15x^2 + 36x + 1$, $x \in [1, 5]$.

14. a) Show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 2u \log u$ where $\log u = (x^3 + y^3) / (3x + 4y)$.

    b) If $u = x^2 \tan^{-1}\frac{y}{x} - y^2 \tan^{-1}\frac{x}{y}$, then find the value of $\frac{\partial^2 u}{\partial x \partial y}$.

SECTION-C

15. a) Integrate $\frac{\tan^4\sqrt{x}\sec^2\sqrt{x}}{\sqrt{x}}$.

    b) Integrate $\frac{(3\sin\phi - 2)\cos\phi}{5 - \cos^2\phi - 4\sin\phi}$.

16. Using double integration, find area of plate in the form of a quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

17. a) Evaluate $\int_{-1}^{1} 5x^4\sqrt{x^5+1}\,dx$.

b) Form a differential equation by eliminating the arbitrary constants a and b from $y = a \sin(x + b)$.

18. a) Find the general solution of the differential equation $\frac{dy}{dx} = \frac{1+x}{2-y}$, $y \neq 2$.

b) Rate of interest in a bank is 5% per year. An amount of Rs. 1000 is deposited with this bank, how much it worth after 10 years. Solve using differential equations. Given that $e^{0.5} = 1.648$).

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.