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

Total No. of Questions : 09

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

1. Answer the following :

a) Define an onto function, also give an example of an onto function.

b) Find the domain of the function $f(x) = \log(\sin x)$, $\in 0 \le x \le 2\pi$.

c) Give an example of a function which is continuous but not differentiable.

d) Find the derivative of $e^{x \sin x}$ with respect to x.

e) Find partial derivative of f *w.r.t.* x, if $f(x, y) = \dfrac{xy}{xy + \cos x}$.

f) Solve $\int \log x \, dx$.

g) Evaluate the integral $\int e^x \sin x \, dx$.

h) Form a differential equation representing the family of curves $y = mx$ where, m is arbitrary constant.

i) Form a differential equation whose order is 2 and degree is 3.

j) Define a homogeneous function of degree n also give one example of a homogeneous function of degree 2.

SECTION-B

2. a) Find all points of discontinuity of the function defined by

$$f(x)=\begin{cases}\dfrac{|x|}{x}, & if\ x\neq 0\\ 0, & if\ x=0\end{cases}$$

b) Differentiate $\tan^{-1}\left(\dfrac{\sin x}{1+\cos x}\right)$ *w.r.t.* x.

3. Differentiate the function $x^{\sin x}+(\sin x)^x$ *w.r.t.* x.

4. a) Find the interval in which the function $f(x)=x^{4/3}-4x^{1/3}$ is increasing and decreasing.

b) Find maxima and minima, if any, of the function $f(x)=\sin x+\cos x$, $0<x<\pi/2$.

5. a) Show that the function $f(x,y)\begin{cases}\dfrac{x^3y}{x^6+y^2} & (x,y)\neq(0,0)\\ 0 & (x,y)=(0,0)\end{cases}$ is not continuous at (0, 0), also check whether its partial derivatives f_x and f_y exist at (0, 0).

b) Find the local extreme values of the function

$$f(x, y)=4x^2-6xy+5y^2-20x+26y$$

SECTION-C

6. a) Find the area lying above x-axis and included between the circle $x^2+y^2=8x$ and inside of the parabola $y^2=4x$.

b) Solve the integral $\int\dfrac{x^2}{1-x^6}dx$.

7. a) Evaluate $\int_0^{\pi}\dfrac{x\sin x}{1+\cos^2 x}dx$.

b) Solve the integral Evaluate $\int \frac{(3\sin\theta - 2)\cos\theta}{5 - \cos^2\theta - 4\sin\theta} d\theta$.

8. Solve the differential equation

$$(x\,dy - y\,dx)\,y \sin\frac{y}{x} = (y\,dx + x\,dy)\,x\cos\frac{y}{x}.$$

9. a) Find general solution of the following differential equation

$$\cos^2 x \frac{dy}{dx} + y = \tan x \quad (0 \le x \le \pi/2)$$

b) Form the differential equation representing the family of curves $y = ae^{3x} + be^{-2x}$, where a and b are arbitrary constants.

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.