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

Total No. of Questions : 09

B.Tech Only for Bio Tech (2018 Batch) (Sem.–1)

BASIC MATHEMATICS-I

Subject Code : BTAM-107-18

Paper ID : [75371]

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. a) The roots of a quadratic equation are 1 / 3 and -2. Determine the equation.

b) Determine the 9th term of the series 2, 7, 12, 17, ...

c) Prove that $\frac{1+\cot\theta}{1+\tan\theta} = \cot\theta$.

d) Simplify $\frac{2}{(1+i)^4}$.

e) Prove that $\cos(y-\ \pi) + \sin\left(y+\frac{\pi}{2}\right) = 0$.

f) Write any two properties of determinants.

g) Find the value of x and y from the matrices $3\begin{bmatrix} x & y \\ 2 & 5 \end{bmatrix} = \begin{bmatrix} x & 5 \\ -1 & 10 \end{bmatrix} + \begin{bmatrix} 6 & x+y \\ 7 & 5 \end{bmatrix}$.

h) If $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 0 & 1 & 2 \\ 3 & 1 & 0 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 & 0 \\ 3 & 2 & 1 \\ 1 & 0 & 1 \end{bmatrix}$ then find AB or BA, whichever exists.

i) Find mean deviation of the data 4.8, 4.2, 5.1, 3.8, 4.4, 4.7, 4.1 and 4.5.

j) Define coefficient of correlation between two variables.

SECTION-B

2. a) The sum of 7 terms of an *AP* is 35 and the common difference is 1.2. Determine the 1st term of the series.

   b) If the population of Great Britain is 55 million and is decreasing at 2.4% per annum, what will be the population in 5 years time?

3. a) Expand $\frac{1}{\sqrt{1-2t}}$ in ascending powers of t as far as the terms in t^3.

   b) Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

4. a) Reduce sin37°cos21° + cos37°sin21° to the sine of one angle,

   b) Show that $\tan\left(x+\frac{\pi}{4}\right)\tan\left(x-\frac{\pi}{4}\right)=-1$.

5. a) Find the middle term of $\left(2p-\frac{1}{2q}\right)^{10}$.

   b) Prove that cot2x + cosec2x = cot x.

SECTION - C

6. a) Find the inverse of the matrix $\begin{bmatrix}1 & 3 & 3\\ 1 & 4 & 3\\ 1 & 3 & 4\end{bmatrix}$.

   b) *If* $\begin{vmatrix}a & a^2 & a^3-1\\ b & b^2 & b^3-1\\ c & c^2 & c^3-1\end{vmatrix}=0$, in which $a\neq b\neq c$ show that $abc = 1$.

7. a) Solve the equations $3x + y + 2z = 3, 2x - 3y - z = -3, x + 2y + z = 4$ by Cramer's rule.

b) Prove that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc\left(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$.

8. Find standard deviation of the data :

70-80	**80-90**	**90-100**	**100-110**	**110-120**
12	18	35	42	50

9. a) Two regression equations of the variables x and y are: x–19.13–0.87 y and $y = 11.64–0.50x$. Find mean of x and y.

b) Find the coefficient of correlation from the data :

78	89	97	69	59
125	137	156	112	107