

Enroll No.....

Roll No.....

JAMIA HAMDARD
B.Tech Food Technology
Department of Food & Technology (SIST)

1st Sem.
2019
B.Tech.

Examination: Odd Semester Examination 2019

Paper Name: Mathematics-I

Time: 3 Hours

Paper Code: BFTC-102

Maximum Marks: 70

Note: Mobile Phones or programmable calculator or any equipment with memory are not allowed inside the examination hall. Follow proper numbering for answering the questions.

Attempt all questions from section A (6*5=30), Any four questions from section B (4*10=40).

Section-A (Attempt all questions 6*5)

Question 1 (a). Define Function and Relation.

(b). Define Logarithmic and Exponential Function.

Question 2. Solve the following System of Equation for Consistency and hence Obtain (x, y, z) using

Creamer's Rule, $\frac{2}{x} + \frac{3}{y} + \frac{10}{z} = 4$, $\frac{4}{x} - \frac{6}{y} + \frac{5}{z} = 1$ and $\frac{6}{x} + \frac{9}{y} - \frac{20}{z} = 2$.

Question 3. Evaluate $\lim_{x \rightarrow \sqrt{3}} \frac{x^2 - 3}{x^2 + 3\sqrt{3} - 12}$.

Question 4. Differentiate $x^{\frac{2}{3}} + y^{\frac{2}{3}} = a^{\frac{2}{3}}$.

Question 5. Evaluate $\int x \log x \, dx$.

Question 6. Find the matrices P and Q such that P is symmetric and Q is skew-symmetric and $P+Q=A$ if

$$A = \begin{bmatrix} 3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2 \end{bmatrix}.$$

Section- B (Attempt any four questions 4*10)

Question 1(a). Define matrix. Construct a 4×4 matrix whose elements are given by

$$a_{ij} = \frac{(i-2j)^2}{2}.$$

(b). If $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$, then show that $(xA + yB)(xA - yB) = (x^2 + y^2)A$.

Question 2(a). Define Rank of the matrix.

(b). Using matrix method, find the rank of the matrix $A = \begin{bmatrix} 4 & 2 & 1 & 3 \\ 6 & 3 & 4 & 7 \\ 2 & 1 & 0 & 1 \end{bmatrix}$.

Question 3 (a). Evaluate $\lim_{x \rightarrow \pi} \frac{1}{\pi - x}$

(b). Find the value of the constant K so that the function given below is continuous at $x = 0$

$$f(x) = \begin{cases} \frac{1 - \cos 2x}{2x^2}, & x \neq 0 \\ K, & x = 0 \end{cases}$$

Question 4. (a). If $x\sqrt{1+y} + y\sqrt{1+x} = 0$, prove that $\frac{dy}{dx} = -\frac{1}{(1+x)^2}$

(b). $y = \frac{\sqrt{a} + \sqrt{x}}{\sqrt{a} - \sqrt{x}}$.

Question 5. Define concavity, convexity and point of inflexion. Also find all the points of maxima and minima and the corresponding maximum and minimum values of the function $f(x) = x^3 - 6x^2 + 9x - 9$.

Question 6. (a). Evaluate $\int \sin x \log (\cos x) dx$

(b). Evaluate $\int \frac{1}{1 - \sin x} dx$
