Sr. No. 322103

Mar. 2022

B.Sc.(Chem.) I SEMESTER

Basic Algebra (OMTH-102)

Time: 90 Minutes **Max. Marks:25**

Instructions:
1. *It is compulsory to answer all the questions (1 marks each) of Part -A in short.*
2. *Answer any three questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART -A

Q1 (a) If A and B are orthogonal Matrices . Prove that AB is also orthogonal. (1)

(b) Define Complement of sets and difference of sets. (1)

(c) Write down the Range and Domain of $cot^{-1}x$ (1)

(d) Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 7 \\ 3 & 6 & 10 \end{bmatrix}$ (1)

(e) Find the value of determinant $\begin{vmatrix} 2 & 5 & 4 \\ 1 & 4 & 3 \\ 6 & 8 & 10 \end{vmatrix}$ (1)

(f) If $A = \begin{bmatrix} x+3 & 2y+x \\ z-1 & 4a+6 \end{bmatrix}$ *and* $B = \begin{bmatrix} 0 & -7 \\ 3 & 2a \end{bmatrix}$ then what will be the values of x,y,z and a so that A=B? (1)

(g) Find the Domain of the function $\frac{3x-4}{x^2-4}$ (1)

(h) Write down all the subsets of {2,5,7}. (1)

(i) If A={1,2,3,4}, B={2,4,5,8} and C={3,4,5,6,7}, Find$A \cap (B \cup C)$. (1)

(j) Define Proper and Improper subsets. (1)

PART -B

Q2 (a) Show that $\begin{vmatrix} 1 & x & x^2 - yz \\ 1 & y & y^2 - zx \\ 1 & z & z^2 - xy \end{vmatrix} = 0$ (5)

Q3 Determine the value of a and b for which the system $\begin{bmatrix} 3 & -2 & 1 \\ 5 & -8 & 9 \\ 2 & 1 & a \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} b \\ 3 \\ -1 \end{bmatrix}$ has (5)

i) a unique solution ii) no solution iii) an infinite number of solutions

Q4 Simplify $\cos\theta \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} + \sin\theta \begin{bmatrix} \sin\theta & -\cos\theta \\ \cos\theta & \sin\theta \end{bmatrix}$ (5)

Q5 (a) Find the Principle value of $sin^{-1}\left(\frac{1}{2}\right)$ (3)

(b) Find the value of Trigonometric function cot x = 3/4, x lies in third quadrant. (2)

Q6 (a) In a survey of 400 students in school, 100 were listed as drinking apple juice, 150 as drinking orange juice and 75 listed as drinking both apple and orange juice. Find how many students were drinking neither apple juice and nor orange juice ? (3)

(b) In a class of 25 students , 12 have taken Mathematics , 8 have taken Mathematics but not Biology. Find the number of students who have taken both Mathematics and Biology and students who have taken Biology and not mathematics. Each student have taken either Mathematics and Biology. (2)

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