Progressive Education Society's

Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16, NEP 2020 (Autonomous)

End Semester Examination: Nov/Dec 2023

***Total No. of Questions**: 3* ***Total No. of Pages**: 3*

First Year B.Sc.(Regular)

MAT11208 : Foundation Course in Mathematics

(Semester I)

Program: B.Sc. Code (BScGen03) **Credits:** 2
Program Specific: Mathematics **Time:** 2 Hours
Course Type: Minor **Max. Marks:** 30
SET: A

Instructions to the candidate:

1) *All sections are compulsory.*
2) *Figures to the right indicate full marks.*
3) *Draw a well labelled diagram wherever necessary.*

SECTION: A

Q1) Select correct alternative. **[10 X 1= 10]**

i) $A = \{ x \in \mathbb{N} / x \text{ is negative} \}$ is

a) infinite set b)power set c)empty set d)set of negative natural numbers

ii) $(A \cup B)^c$ =

a) $A \cap B$ b) $A \cup B$ c) $A^c \cup B^c$ d) $A^c \cap B^c$

iii) If A is a subset of X then $A \cap A^c$ =

a) A b) A^c c) $\emptyset$ d) X

ix) Truth value of p v q is false when

a)both p and q both are false b)p is false but q is true

c)p is true but q is false d)both p and q are true

v) A statement which is always false is called as

a)negation b)tautology c)contradiction d)contingent

vi) If p and q are two statements where $p \rightarrow q$ then $q \rightarrow p$ is

a)converse of $p \rightarrow q$ b)inverse of $p \rightarrow q$

c)contrapositive of $p \rightarrow q$ d)negation of $p \rightarrow q$

P.T.O.

vii) Order of the matrix A is 3x5 and order of the matrix B is 5x4 then order of the matrix AB is

a) 3x4 b) 4x3 c) 5x5 d) 3x3

viii) If determinant of the matrix A is zero then the matrix A is called as

a) zero Matrix b) diagonal Matrix

c) non-Singular Matrix d) singular Matrix

ix) The matrix $\begin{bmatrix} 4 & 0 & 0 \\ 6 & 5 & 0 \\ -2 & -4 & -3 \end{bmatrix}$ is a

a) upper triangular Matrix b) scalar matrix

c) lower triangular Matrix d) diagonal Matrix

x) Determinant of a following matrix can be evaluated if the matrix is

b) A_{2x1} b) A_{3x4} c) A_{3x3} d) A_{2x6}

SECTION : B

Q.2) Solve any FIVE of the following. **[5 x 2 = 10]**

i) Define a) Finite set b) Empty set

ii) State De Morgan's laws.

iii) If X = {0, 1 , 2 , 4 , 7 , 9 , 10 , 13 , 15 , 16 , 20}. and A = { 0 , 4 , 10 , 15 , 20} , B = { 1 , 2 , 4 , 10 , 16}. Find a) $A \cup B$ b) $A \cap B$

iv) If p : 3 is an even number , q : Today is Sunday.

Find a) $p \leftrightarrow q$ b) $p \vee \sim q$

v) Find the value of 3A + B where A = $\begin{bmatrix} 2 & 4 \\ -1 & 0 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$

vi) Verify whether the matrix A is singular matrix , where A = $\begin{bmatrix} 6 & 15 \\ 4 & 10 \end{bmatrix}$

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vii) Find $(A + B)^T$ where

$$A = \begin{bmatrix} 4 & 5 \\ 3 & 4 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 3 & 2 \\ -1 & -1 \end{bmatrix}$$

SECTION: C

Q.3) Solve any Four of the following. **[4 x 2.5 = 10]**

i) Write the power set of $A = \{2 , 3 , 5 \}$.

ii) Prepare the truth table for $(p \rightarrow q) \vee (q \rightarrow p)$.

iii) Using truth table show that $(p \vee \sim q) \vee (\sim p \wedge q)$ is tautology.

iv) Find AB where $A = \begin{bmatrix} 5 & 1 \\ 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 \\ 3 & 4 \end{bmatrix}$

v) Find determinant of the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & -1 & 0 \\ 4 & 0 & 3 \end{bmatrix}$

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