

2311001101040001
EXAMINATION DECEMBER 2024
BACHELOR OF SCIENCE (INFORMATION
TECHNOLOGY) (MASTER OF SCIENCE
(INFORMATION TECHNOLOGY) 5 YEAR
INTEGRATED COURSE)(NCF-NEP)(FIRST SEMESTER)
MDC-102-MATHEMATICS - I - LEVEL 4

[Time: As Per Schedule]

[Max. Marks : 50]

Instructions:

1. Fill up strictly the following details on your answer book

- a. Name of the Examination: **BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY) (MASTER OF SCIENCE (INFORMATION TECHNOLOGY) 5 YEAR INTEGRATED COURSE) (NCF-NEP) (FIRST SEMESTER)**
 - b. Name of the Subject: **MDC-102 MATHEMATICS - I – LEVEL 4**
 - c. Subject Code No: **2311001101040001**
2. Sketch neat and labelled diagram wherever necessary.
 3. Figures to the right indicate full marks of the question.
 4. All questions are compulsory.
 5. There are four questions in this question paper

Seat No:

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Student's Signature

Q.1 A. ATTEMPT ANY TWO.

6

1. Define the following terms with an illustration.
(1) Identity matrix (2) skew symmetric matrix (3) Transpose of a matrix.
2. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then show that $A^2 - (a + d)A = (bc - ad)I$.
3. Find the value of $5^2 + 6^2 + 7^2 + 8^2 + 9^2 + \dots + 16^2$.

B. ATTEMPT ANY TWO.

6

1. Find the inverse of the matrix $A = \begin{bmatrix} 5 & 6 & 9 \\ 4 & 3 & 8 \\ 9 & 4 & 3 \end{bmatrix}$ using elementary row transformation.

2. Show that the matrices $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 4 \\ 5 & 11 \end{bmatrix}$ are commutative.
3. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a function defined as $f(x) = 2x + 1$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ defined as $g(x) = x^2$ then find $(f \circ g)$ and $(g \circ f)$.

Q.2 A. ATTEMPT ANY TWO

6

1. Solve the system of linear equations.

$$\begin{aligned} x + 3y - 2z &= 0 \\ 2x - y + 4z &= 0 \\ x - 11y + 14z &= 0 \end{aligned}$$

2. Find $5^2 + 6^2 + 7^2 + 8^2 + \dots + 14^2$.
3. For $A = \{1,2,3\}$ and $B = \{5,8,10\}$, if $R = \{(1,5), (1,8), (2,8), (2,10), (3,8)\}$ and $S = \{(1,8), (2,10), (3,8)\}$ then evaluate (i) R' , (ii) $R \cap S$, (iii) $R \cup S$, (iv) R^{-1} .

B. ATTEMPT ANY TWO.

6

1. Solve the system of linear equations:

$$\begin{aligned} x + y - 2z &= 3 \\ 3x + y - z &= 8 \\ 2x - y + z &= 0 \end{aligned}$$

2. Define the congruence relation and prove that congruence relation is equivalence relation.
3. Define multiplication of two matrices and if possible, find the

value of $(AB)C$ and BA for $A = \begin{bmatrix} 3 & -2 \\ -1 & 0 \\ 4 & 6 \end{bmatrix}$ and

$$B = \begin{bmatrix} 3 & 4 & 7 \\ -1 & 4 & -3 \end{bmatrix}, C = \begin{bmatrix} 3 & 2 & -1 \\ 1 & 0 & 4 \\ 5 & -5 & 7 \end{bmatrix}$$

Q.3 A. ATTEMPT ANY TWO.**6**

1. If X is Poisson variance such that $P(x = 2) = 9$. $P(x = 6)$ then find i) Parameter ii) coefficient of skewness.
2. Find the Mean, median, mode from the following data.

Class	20-25	25-30	30-35	35-40	40-45	45-50
Frequency	5	12	15	8	5	5

3. A bag containing 9 discs of which 4 are red, 3 are blue, 2 are yellow. The discs are similar in size and shape. A disc is drawn random from the bag. Calculate probability that it will be
(I) Blue (II) Not blue (III) Either blue or red

B. ATTEMPT ANY TWO.**6**

1. Find Harmonic mean.

Marks	20	30	40	50	60	70	80
No. of students	3	61	132	153	140	51	3

2. For two events A and B $P(A) = 1/2 = P(B)$ and $P(A \cup B) = 2/3$ then find $P(A' \cap B')$, $P(A' \cup B')$ and $P(A' \cap B)$.
3. For Poisson distribution if $P(x = 1) = P(x = 4)$ then find $P(x \leq 1)$.

Q.4 A. ATTEMPT ANY TWO.**6**

1. If A, B, C are three events defined on sample space such that,
 $P(A) = P(C) = \frac{1}{3}$, $P(B) = \frac{1}{4}$, $P(A \cap C) = P(B \cap C) = 0$ then find 1) $P(A \cap B')$, 2) $P(A' \cap B)$, 3) $P(A \cup B)$, 4) $P(A' \cap B' \cap C')$
2. State the probability function of binomial distribution and obtain its variance.
3. Let $X \sim B(n, p)$ then
I) if $p = 0.6$, $E(x) = 6$ then find n and $var(x)$.
II) if $n = 25$, $var(x) = 6$ then find $E(x)$ and p .

B. ATTEMPT ANY TWO.**8**

1. In a factory Producing screws, three machines produce respectively 25%, 30%, and 45% of the total production out of which 5%, 4% and 2% are defective respectively. One screw draw from random from the production and found that defective, what is the probability that it is produced by machine III.
2. For the following data

X	0	1	2	3
P(x)	4k	8k	k	14k

Find: I) constant k

II) probability for $x = 3$

3. Calculate coefficient of variation from the following data

Age(in years)	0-9	10-19	20-29	30-39	40-49	50-59
No. of persons	13	38	67	76	22	4
