

CDOE
BACHELOR OF COMPUTER APPLICATIONS
B.C.A. Sem-I : WINTER :- 2021
SUBJECT: MATHEMATICAL FOUNDATIONS

Day : Monday
Date 14-02-2022

W-3299-2021

Time : 10:00 AM-01:00 PM
Max. Marks: 80

N.B.:

- 1) Attempt **ANY FIVE** questions from Section – I and attempt **ANY TWO** questions from Section – II.
- 2) Answers to both the sections should be written in **SEPARATE** answer books.
- 3) Use of logarithmic table and pocket **CALCULATOR** is allowed.
- 4) Figures to the right indicate **FULL** marks.

SECTION – I

- Q.1 a)** Write Division algorithm and explain it with one example. [05]
- b)** Find the value of $|AB|$ if $A = \begin{vmatrix} -1 & -1 \\ 3 & 1 \end{vmatrix}$ and $B = \begin{vmatrix} 4 & 1 \\ -3 & 3 \end{vmatrix}$. [05]
- Q.2 a)** Two dice are thrown randomly. Find the probability that the sum of the numbers appears at upper face of dice is more than 7 or both the numbers are odd. [05]
- b)** Construct truth table for $(p \rightarrow q) \vee r$. [05]
- Q.3 a)** If U is Universal set such that: [05]
 $U = \{x / x \text{ are all natural numbers less than } 28\}$
 $A = \{1, 2, 3, 5, 8, 13, 21\}$
 $B = \{1, 2, 3, 5, 7, 13, 17, 19, 23\}$
Then find: **i)** $(A \cup B)'$ **ii)** $A \cap B$ **iii)** $A \cap B'$ **iv)** $A' \cup B'$.
- b)** If A is Singular Matrix then find 'x' for $A = \begin{bmatrix} 2 & -4 & 3 \\ x & 0 & 2 \\ 5 & 2 & -4 \end{bmatrix}$. [05]
- Q.4 a)** Elaborate concept of ordered and unordered partitions. [05]
- b)** Discuss 'Pigeonhole Principle' with suitable example and applicability. [05]
- Q.5** Write short note on **ANY TWO** of the following: [10]
a) Mathematical Induction
b) Quantifiers
c) Invertible Function
- Q.6 a)** Elaborate Binomial Distribution in detail. [05]
- b)** Find $\bar{a} \times \bar{b}$, if $\bar{a} = \bar{i} + 3\bar{j} - 5\bar{k}$ and $\bar{b} = 2\bar{i} + 4\bar{j} - 2\bar{k}$. [05]
- Q.7** There are 5 girls and 4 boys in a group. Find the number of ways in which a committee of 5 students can be formed under the following conditions: [10]
a) There are 2 boys in the committee.
b) There are at least 2 girls in the committee.
c) There are at most 2 girls in the committee.
d) There is exactly one girl in the committee.
e) There is no restriction on the number of boys and girls in the committee.

P.T.O.

SECTION – II

Q.8 a) Find Inverse of matrix A. If $A = \begin{bmatrix} -3 & 2 & 6 \\ 2 & 1 & 0 \\ 3 & -3 & 2 \end{bmatrix}$. [10]

b) Write an algorithm to compute even numbers between 1 to 100. [05]

Q.9 a) Prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ for all sets of A, B, C. [07]

b) Solve the following equation by matrix method: [08]

$$2x + 3y + 4z = 12$$

$$x + y + z = 3$$

$$2x - y + z = 4$$

Q.10 a) Find $A.B^T$ for $A = \begin{bmatrix} -3 & 2 & 6 \\ 3 & 2 & 5 \\ 3 & 0 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 6 & 2 & 3 \\ -1 & 0 & 2 \\ -1 & 2 & -1 \end{bmatrix}$. [10]

b) Find the value of 'x' if [05]
 $4\log_2 16 + 8x\log_2 32 + \log_2 64 = 32$.

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