

Roll No.

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Total No. of Pages : 02

Total No. of Questions : 08

BCA / B.Sc.(IT), / DEP / DCA (Sem.-1)

MATHEMATICS-I

Subject Code : BSBC-103/BSIT-103

M.Code : 10045

Date of Examination : 06-07-21

Time : 2 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE question(s), each question carries 12 marks.

1. a) In a survey of reading habits of 100 students, it was found that 50 use the university library, 40 had their own library and 30 borrowed from their friends. It was also found that 20 students used both the university library and their own library, 15 uses their own library and also borrowed from their friends while 10 use University library and also borrowed from their friends. How many students used at least three sources of the books? How many of them used University library only, their own library only and borrowed books from their friends only?
- b) If set A = Set of all rational numbers and set B = $\{x : x^2 - 4x + 2 = 0\}$ then write $A \cup B$, $A \cap B$, $A \setminus B$ and $B \setminus A$.
2. a) State and Prove De-Morgan's law for difference of sets.
- b) Show that the relation R on a given set A = {1, 2, 3, 4, 5} given as R = {(a, b) : |a - b| is even} Prove that, R is an equivalence relation.

3. a) Find the value of $[a \ b] \begin{bmatrix} c \\ d \end{bmatrix} + [a \ b \ c \ d] \begin{bmatrix} a \\ b \\ c \\ d \end{bmatrix}$.

b) Find the values of a, b, c, if matrix A is given $= \frac{1}{3} \begin{bmatrix} a & 2 & 2 \\ 2 & 1 & b \\ 2 & c & 1 \end{bmatrix}$ obeys the law $AA' = I$

where dash denote transpose of matrix A.

4. a) Prove that $p \rightarrow (\sim q \vee r) = (p \wedge q) \rightarrow r$
- b) Prove that if a man is a bachelor, he is unhappy. If a man is unhappy, he dies young. Therefore bachelors die young. Test the validity of the argument.

5. a) A tree with n vertices will have exactly $(n - 1)$ edges. Prove this statement.
 b) Define the following :
 Hamiltonian circuit, Rooted tree, Binary tree, Complete graph, Regular graph and Isomorphic graphs.
6. a) What will be the recurrence relation for 1, 7, 31, 127, 499?
 b) What is the solution to the recurrence relation if $S(n) = 5S(n - 1) + 6S(n - 2)$.
7. a) If $A = \begin{bmatrix} 1 & 3 & 2 \\ 0 & 5 & 7 \\ 6 & 4 & 8 \end{bmatrix}$ find the value of $A^2 + 7A + 3I$, where I denotes identity matrix.
 b) Prove that $A \subset B$ if and only if $B^c \subset A^c$, where c denotes complement of set.
8. Prove by Principle of Mathematical Induction that $5^{2n+1} + 2^{2n+1}$ is divisible by 7 for all $n \geq 0$.

Note: Any student found attempting answer sheet from any other person(s), using incriminating material or involved in any wrong activity reported by evaluator shall be treated under UMC provisions.

Student found sharing the question paper(s)/answer sheet on digital media or with any other person or any organization/institution shall also be treated under UMC.

Any student found making any change/addition/modification in contents of scanned copy of answer sheet and original answer sheet, shall be covered under UMC provisions.