

Roll No.

Total No. of Pages : 02

Total No. of Questions : 07

B.Sc.(IT) (Sem.-2)
MATHEMATICS-II (Discrete)
Subject Code : BS-104
Paper ID : [B0406]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY.
2. Attempt any FOUR questions from SECTION-B.

SECTION-A**(10 × 2 = 20 Marks)**

- I. Explain the following :
 - (a) Cardinality of a set
 - (b) Relation
 - (c) Composition of a Function
 - (d) State Principle of Mathematical Induction
 - (e) How many permutations of the letter of word APPLE are there ?
 - (f) Fibonacci Sequence
 - (g) Prove $(p \rightarrow q) \wedge p \Rightarrow q$
 - (h) Boolean Algebra
 - (i) Biconditional statement
 - (j) Complement of a set

SECTION-B**(4 × 10 = 40 Marks)**

2. (a) Draw Venn diagram of sets A, B and C where $A \subseteq B$, sets A and C are disjoint, but B and C have elements in common.
- (b) Consider R be the relation on $A = \{1,2,3,4\}$ defined by $R = \{(1,1), (2,2), (2,3), (3,2), (4,2), (4,4)\}$. Show that R is neither reflexive nor transitive.

3. Out of 8 gentlemen and 5 ladies a committee of 5 is to be formed. Find the number of ways in which this can be done so as to include at least 3 ladies.

4. Prove the following proposition :

$$p(n) ! 1 + 4 + 7 + \dots + (3n - 2) = \frac{n(3n-1)}{2}$$

5. Solve $T(k) - 7T(k-1) + 10T(k-2) = 6+8k$ with $T(0) = 1$ and $T(1) = 2$

6. (a) Verify that the proposition $(p \wedge q) \wedge \sim (p \vee q)$ is a contradiction.

(b) Define inverse, converse and contrapositive of a statement. Also give example.

7. (a) Explain principle of Duality for Boolean algebra.

(b) State and prove De-Morgan's law of Boolean algebra.

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