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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** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **SIX** questions carrying **TEN** marks each and students has to attempt any **FOUR** questions.

SECTION-A1. **Write short notes on :**

- (a) Find all partitions of the Set $A = \{1, 2, 3\}$.
- (b) Let $P(n)$ be a statement. " $4^n > n$ ", if $P(n)$ is true, prove that $P(n + 1)$ is also true.
- (c) Find characteristic equation of

$$S(n) - 5S(n - 1) + 6S(n - 2) = 0$$
- (d) In how many ways can 6 beads of different colours form a necklace ?
- (e) Define one-one and onto function.
- (f) Write truth table for $(\sim p) \wedge (\sim q)$.
- (g) Define Boolean Algebra.
- (h) Prove by using Boolean algebra B that $a + \bar{a} \cdot c = a + c$.
- (i) In how many ways can a committee of 5 members be formed from 3 men and 3 women.
- (j) In how many ways can a cricket eleven be selected from 16 players when one particular player is always selected ?

SECTION-B

2. (a) Find all the partitions of set $A = \{a, b, c, d\}$.
- (b) If R is the relation in $N \times N$ defined by $(a, b) R (c, d)$ iff $a + d = b + c$, show that R is an equivalence relation.
3. (a) Is $f(x) = \frac{x-1}{x+1}$ invertible in its domain? If so, find f^{-1} .
- (b) Let $f: R \rightarrow R$, $g: R \rightarrow R$ defined by $f(x) = 2x + 1$, $g(x) = \frac{x}{3}$, verify that $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$.
4. Show by method of induction that
- (a) $2 \cdot 7^n + 3 \cdot 5^n - 5$ is divisible by 24, $n \in N$.
- (b) Find the number of ways in which 5 boys and 5 girls can be seated in a row so that
- (i) No two girls sit together.
- (ii) All girls sit together and all boys sit together.
5. (a) A box contains 5 different red and 6 different blue balls. In how many ways can 6 balls be selected so that there are atleast two balls of each colour.
- (b) How many words can be formed by taking 4 letters at a time out of the letters of the word 'MATHEMATICS'.
6. Solve $S_n - 7S_{n-1} + 10S_{n-2} = 6 + 8n$ with $S_0 = 1$, $S_1 = 2$.
7. (a) Write down :
- (i) Contrapositive of $p \rightarrow \sim q$
- (ii) Contra positive of converse of $p \rightarrow \sim q$
- (iii) Inverse of converse of $p \rightarrow q$.
- (b) For any a, b in a Boolean Algebra, prove that $(a \cdot b)' = a' + b'$.