

Instructions to the Students:

1. Assume suitable data wherever necessary.

(Level/CO) Marks

Q.1 Select any one option from the following questions.

1. The cardinality of $A = \{5, 6, 3, 2, 3, 2\}$ is

- a) 6
- b) 5
- c) 4
- d) 3

CO1

2. In a conditional statement, the first part is the antecedent and the second part is the...

CO1

- a) Predicate
- b) Consequent
- c) Subject
- d) Disjunct

3. A function is said to be _____ if and only if $f(a) = f(b)$ implies that a

CO2

$= b$ for all a and b in the domain of f .

- a) One-to-many
- b) One-to-one
- c) Many-to-many
- d) Many-to-one

4. Let f and g be the function from the set of integers to itself, defined by $f(x) = 2x$

CO2

+ 1 and $g(x) = 3x + 4$. Then the composition of f and g is _____

- a) $6x + 9$
- b) $6x + 7$
- c) $6x + 6$
- d) $6x + 8$

5. A coin is tossed 3 times. Find out the number of possible outcomes.

CO2

- a) None of these
- b) 8
- c) 2
- d) 1

6. Letters of SAP taken all at a time can be written in

CO2

- a) 2 ways
- b) 6 ways
- c) 24 ways
- d) 120 ways

Q.2 Solve Any Two of the following.

- 1) Give reasons for each step needed to show that the following argument is valid.

CO1

$[p \wedge (p \rightarrow q) \wedge (s \vee r) \wedge (r \rightarrow !q)] \rightarrow (s \vee t)$

Steps Reasons

- 1) p

- 2) $p \rightarrow q$

- 3) q

- 4) $r \rightarrow !q$

- 5) $q \rightarrow !r$

- 6) $!r$

- 7) $s \vee r$

- 8) s

- 9) $\therefore s \vee t$

3 X 2

6

(B) Prove following for all $n \geq 1$ by the principle of mathematical induction.
 $1^2 + 3^2 + 5^2 + \dots + (2n-1)^2 = n(2n-1)(2n+1)/3$ CO2

(C) List all the combinations of size 3 that result for the letters m, r, a, f and t. CO2

Q. 3 Solve Any One of the following.

(A) In how many ways can 12 different books be distributed among 4 children so that a) each child gets three books? b) the two oldest children get four books each and the two youngest get two books each? CO2

(B) Let $p(x)$, $q(x)$ and $r(x)$ be the following open statements. CO1

$p(x): x^2 - 7x + 10 = 0$

$q(x): x^2 - 2x - 3 = 0$

$r(x): x < 0$

a) determine the truth or falsity of the following statements, where the universe is all integers. If a statement is false, provide a counterexample or explanation.

1) $\forall x [p(x) \rightarrow \neg r(x)]$ 2) $\exists x [q(x) \rightarrow r(x)]$

b) find the answers to part a) when the universe consists of all positive integers.

*** End ***