

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Mid Semester Examination – March 2019

Course: B. Tech in Information Technology

Sem: IV

Subject Name: Discrete Structures and Applications

Subject Code: BTITC403

Max Marks: 20

Date: 13/03/2019

Duration:- 1 Hr.

Instructions to the Students:

1. Assume suitable data wherever necessary.

	(Level/CO)	Marks
Q.1 Select any one option from the following questions.		6
1. The cardinality of $A = \{5, 6, 3, 2, 3, 2\}$ is	CO1	
a) 6 b) 5 c) 4 d) 3		
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 $a = b$ for all a and b in the domain of f .	CO2	
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 $f(x) = 2x + 1$ and $g(x) = 3x + 4$. Then the composition of f and g is _____	CO2	
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. 3 X 2

-) 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) $\therefore s \vee t$

(B) Prove following for all $n \geq 1$ by the principle of mathematical induction. CO2

$$1^2 + 3^2 + 5^2 + \dots (2n-1)^2 = n(2n-1)(2n+1)/3$$

(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.

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(A) In how many ways can 12 different books be distributed among 4 children so CO2

that a) each child gets three books? b) the two oldest children get four books each and the two youngest get two books each?

(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 ***