

# 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.

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

CO2

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 \_\_\_\_\_

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

CO2

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

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

CO2

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

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

Q.2 Solve Any Two of the following.

3 X 2

- 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)  $\therefore s \vee t$

(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.

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

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

\*\*\* End \*\*\*