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**DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD -402 103
Semester Winter Examination:-Nov.- 2019**

Branch: Information Technology
Subject:- Discrete Structures and Applications(BTITC403)
Date:- 30/11/2019

Sem.:- IV
Marks: 60
Time:- 3 Hr.

Instructions to the Students

1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

- | | (Marks) |
|---|---------|
| Q.1. (a). Obtain the DNF of following by using truth table method.
i) $(p \rightarrow q) \wedge (\sim p \wedge q)$ ii) $(p \rightarrow (q \rightarrow r)) \wedge (\sim p \rightarrow (\sim p \wedge \sim r))$ | (8) |
| (b). Prove by indirect method. For all integers m and n, if m and n are odd integers, then $m + n$ is an even integer. | (4) |
| Q.2. (a). Explain: i) Power set ii) The addition principal for disjoint set
iii) Properties of set difference iv) Cardinality of set | (2x4) |
| (b). State pigeonhole principal with suitable example. | (4) |
| Q.3. (a). What is transitive closer of a relation? Find R^* and draw its diagraph using Warshall algorithm, if $A = \{a, b, c, d\}$ and $R = \{(a, b), (b, d), (a, c), (c, b)\}$ Draw its diagraph. | (8) |
| (b). 51 numbers are chosen from the integers between 1 and 100 inclusively. Prove that 2 of the chosen integers are consecutive. | (4) |
| Q.4. (a). Explain: i) Transitive relation ii) Surjection & Bijection
iii) Inverse and injective iv) Equivalence relation | (2x4) |
| (b). State and explain rule of inference | (4) |
| Q.5. (a). Explain Handshaking lemma principal? A connected planar graph has nine vertices having degrees 2, 2, 2, 3, 3, 3, 3, 4, 4, 4 & 5. how many edges are there? How many faces are there? | (8) |
| (b). For each binary operation * defined below, determine whether * is commutative or associative.
(i) On Z , define $a * b = a - b$
(ii) On Q , define $a * b = ab + 1$ | (2x2) |
| Q.6. (a). Explain i) Complete graph ii) Regular graph iii) Bipartite graph
iv) Degree and adjacency of vertex. | (2x4) |
| (b). Explain lattice and its operator with the help of example. | (4) |

Paper End