

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE
Supplementary Examination – Summer 2022

Course: B. Tech. Branch: Computer Science and Engineering Semester: III

Subject Code & Name: BTCOC302_Discrete Mathematics

Max Marks: 60

Date:

Duration: 3 Hr.

Instructions to the Students:

1. All the questions are compulsory.
2. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question.
3. Use of non-programmable scientific calculators is allowed.
4. Assume suitable data wherever necessary and mention it clearly.

(Level/CO) Marks

Q. 1 Solve Any Two of the following.

- | | | | |
|----|---|----------|----|
| A) | Explain with example, notation used and mathematical expression to describe following terms
1) Membership 2) Subset 3) Equality of two sets | (L1/CO1) | 06 |
| B) | Construct a truth table for each of these compound propositions and identify type of compound statements
a. $(p \wedge q) \rightarrow (p \vee q)$
b. $(q \rightarrow \neg p) \leftrightarrow (p \leftrightarrow q)$ | (L3/CO1) | 06 |
| C) | Test the validity of following statement:
If there is strike by student, then exam will be postponed.
Exam was not postponed.
Therefore, there were no strikes by students | (L3/CO1) | 06 |

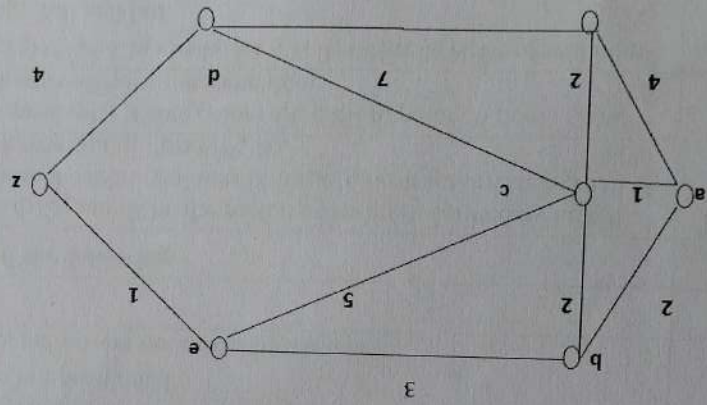
Q. 2 Solve Any Two of the following.

- | | | | |
|----|---|----------|----|
| A) | Let $A = \{1, 2, 3, 4, 6, 8, 12\}$ and R be the partial order on A defined by aRb if a divides b. Determine the relational matrix for R. Construct directed graph G on A. Draw Hasse diagram of Poset (A, R). | (L1/CO2) | 06 |
| B) | State Pigeon hole principle. If five colors are used to paint 26 doors show that at least Six doors will have the same door | (L3/CO2) | 06 |
| C) | Let $f(x) = 2x+3$, $g(x) = 3x+4$, $h(x) = 4x$ for $x \in R$, where R is set of real numbers. Find gof , fog , foh and hof . | (L1/CO2) | 06 |

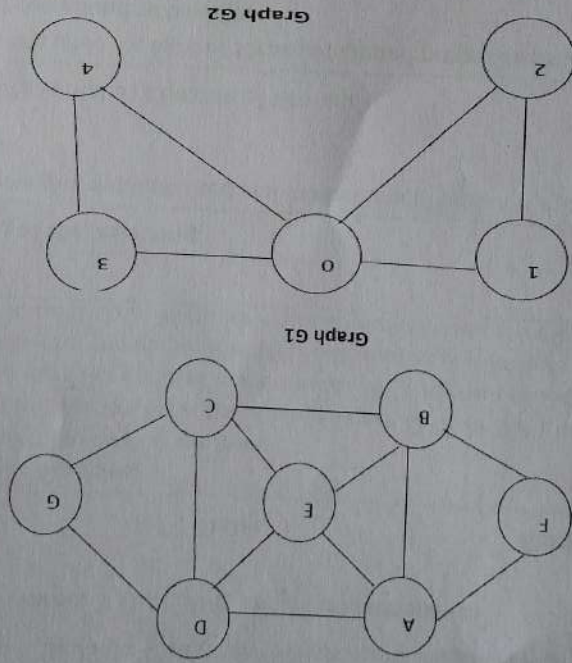
Q. 3 Solve Any One of the following.

- | | | | |
|----|---|----------|----|
| A) | Show that the maximum number of edges in a simple graph having n vertices is $n*(n-1)/2$. | (L1/CO3) | 06 |
| B) | Define Euler graph and Hamiltonian graph
1) For a given graph G1
a) Find a Hamiltonian path that begins at A and ends at E.
b) Find a Hamiltonian circuit that starts at A and ends with the pair of vertices E, A | (L1/CO3) | 06 |

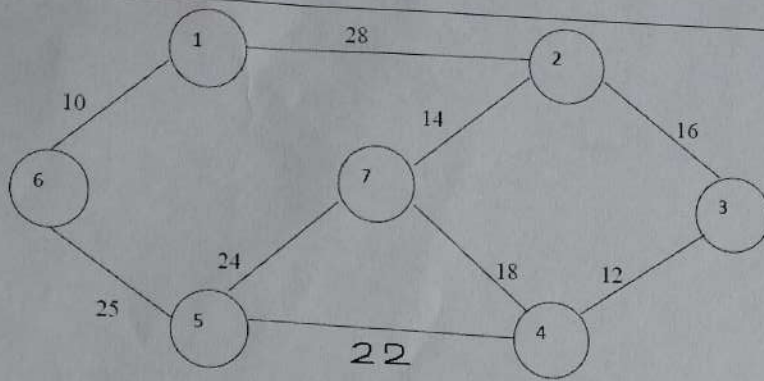
06	L3/CO3	Construct a minimum spanning tree (MST) for the given graph using Kruskal's.	B)
06	L1/CO3	Define the following with reference to tree with example a) Level and Height of a tree b) M-ary tree c) Fundamental Cut Sets	A)
Q.4 Solve Any Two of the following.			



06	(L3/CO3)	Find a shortest path between vertices a and z in the given graph using Dijkstra's algorithm.	C)
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c) Find a Hamiltonian path that begins at F and ends at G.
2) For a given graph G2 find Eulerian path and Eulerian cycle



C) Show that a tree with n vertices has $n-1$ edges

L1/CO3 06

Q. 5 Solve Any One of the following.

A) Define the following terms

- | | | |
|-------------------------|---------------|------------|
| 1. Algebraic structures | 2. Semi Group | 3. Monoids |
| 4. Ring | 5. Field | 6. Group |

L1/CO4 06

B) For each of following, determine whether the binary operations $*$ is commutative or associative?

L3/CO4 06

- i) N is the set of natural numbers and $a*b = a+b+2$ for all a, b from N
 ii) on N where $a*b = \min(a, b+2)$
 iii) on R where $a*b = a^b$

C) Determine whether $(Z, +, *)$ is a ring with the binary operations $x + y = x + y - 7$ And $x*y = x + y - 3xy$ for all $x, y \in Z$

L1/CO4 06

*** End ***

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