DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

Supplementary Semester Examination – 2023

Course: B. Tech. **Branch : Computer Engineering and Allied** **Semester : III**

Subject Code & Name: Discrete Mathematics [BTCOC302]

Max Marks: 60 **Date: 10/08/2023** **Duration: 03:00 Hrs.**

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 Attempt the following questions. **[12]**

A) a) Use the following statements **Apply**

p: Mohan is rich

q: Mohan is happy

write the following statement in symbolic form

i) Mohan is rich but unhappy. ii) Mohan is poor but happy.

iii) Mohan is neither rich nor happy.

b) Construct the truth table for the $p \vee \neg(p \wedge q)$ statement form.

B) a) Write the following statements using quantifier variables and predicate symbols **Understand**

i) All birds can fly.

ii) Some men are genius.

iii) Each integer is either even or odd.

b) In survey of 120 people, it was found that 65 read News read magazine, 45 read Times, 42 read Fortune;20 read both Network and Times, 25 read both Network and Fortune, 15 read both Time and Fortune; and 8 read all the three magazine. Find the number of people who read exactly one magazine.

Q.2 Solve Any Two of the following. **[12]**

A) Let $A = \{1, 2\}$ and $B = \{a, b, c\}$ Find **Understand**

i) A X B

ii) B X A

iii) A X A.

B) Solve $a_r = a_{r-1} - 6a_{r-2} = -30$ given $a_0 = 20$, and $a_1 = 5$. **Apply**

C) a) Let R be the relation on the set of real numbers such that xR y if and only if x and y are real numbers that differ by less than 1, that is $|x - y| < 1$. Show that R is not an equivalence relation.

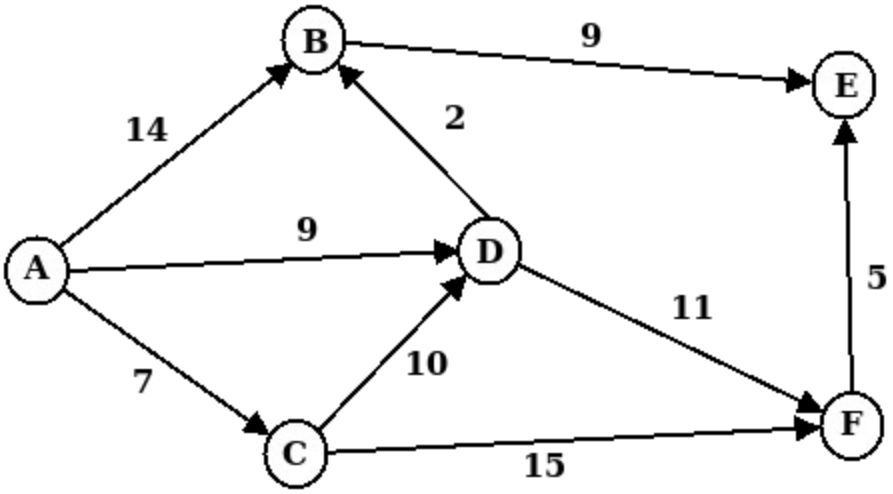
b) Define composite function. Let f and g be the functions from the set of

integers to the set of integers defined by f(x) = 2x + 3 and g(x) = 3x + 2. What is the composition of f and g? What is the composition of g and f ?

Q. 3 Solve Any Two of the following. **[12]**

A) Define the terms: Simple Path, Null Graph, Complete Graph, Planner Graph. Find the Hamiltonian path and Hamiltonian circuit in the complete graph $K_{4,3}$. **Understand**

B) Compute the shortest distance between source A to destination E using Dijkstra's algorithm for the following graph. **Understand**



C) i. Write a Handshaking Lemma for a graph having Vertices V = (G, E) and Edges E. **Understand**

ii. How many edges are there in a graph with 10 vertices each of degree six?

iii. Define Chromatic Number with suitable example.

Q.4 Attempt the following questions. **[12]**

A) Consider the following rooted tree and give the answer for following: **Understand**

(i) Find the ancestor of *f.*

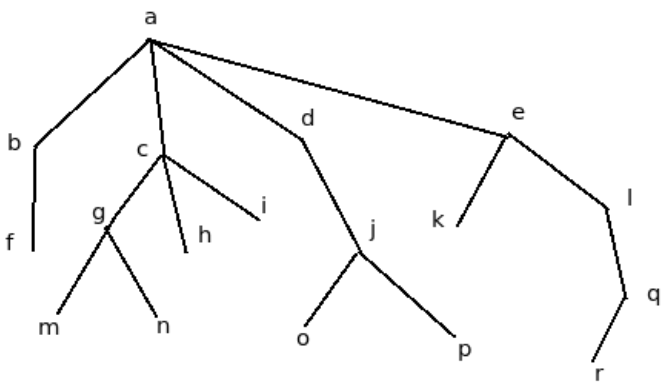
(ii) Find the Descendant of *j.*

(iii) How many terminal vertices are there?

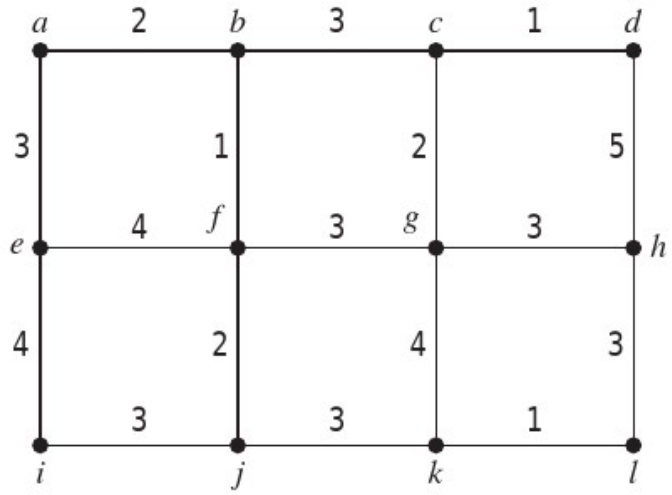
(iv) Draw the subtree rooted at e.

(v) Find the siblings of g.

(vi) Write the internal vertices of the tree.



B) Use Prim's algorithm and Kruskal's to find a minimum spanning tree in the graph shown in Figure. **Apply**



Q. 5 Attempt the following questions. **[12]**

A) Consider the binary operation defined on the set $A = \{a, b, c, d\}$ by following table. Find: **Understand**

*	a	b	c	d
a	a	c	b	d
b	d	a	b	c
c	c	d	a	a
d	d	b	a	c

(i) C * d and d * c

(ii) b * d and d * b

(iii) a * (b * c) and (a * b) * c

B) Consider the group G = {1, 2, 3, 4, 5, 6} under multiplication modulo 7. **Understand**

i) Find multiplication table of G.

ii) Find 2^{-1}, 3^{-1}.

iii) Find the orders and subgroups generated by 2 and 3.

***** End *****