School of Computing Science and Engineering

B.Tech CSE

ETE - Jun 2023

Time : 3 Hours **Marks : 100**

Sem II - E1UJ204T - BBS01T1009

Discrete Mathematics

Your answer should be specific to the question asked

Draw neat labeled diagrams wherever necessary

1. Find the minimum number of students in a class to be sure that three of them are born in the same month. K3 CO2 (5)

2. Differentiate between Pseudo graph and Multigraph with suitable examples. K2 CO1 (5)

3. Determine whether these Statements are true/false. K1 CO1 (5)

a) If monkeys can fly, then 1 + 1 = 3

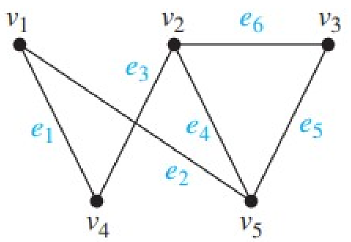
b) If 1 + 1 = 2 then 2 + 3 = 5

c) 1 + 1 = 3 if and only if monkeys can fly

d) 0 > 1 if and only if 2 > 1

4. Consider the argument: “If I invest in the Gold, then I will get rich” “if I get rich, then I will be happy” therefore” if I invest in the gold, then I will be happy” check whether the given argument is valid or not. K2 CO3 (10)

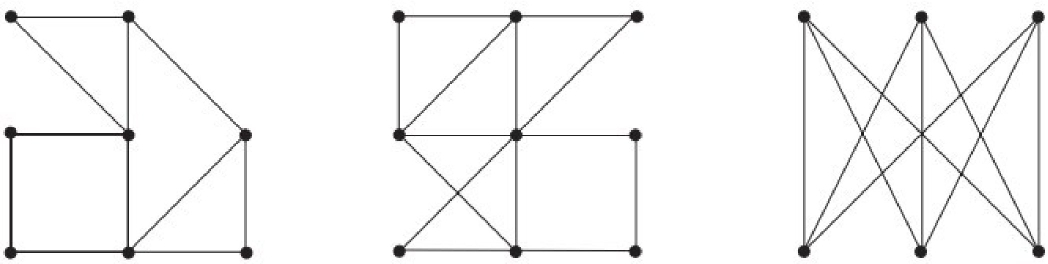
5. Find the adjacency matrix A of the following graph K1 CO2 (10)



Also draw the multigraph G corresponding of the following incidence matrix

$$\begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 \end{bmatrix}.$$

6. Consider the following graphs. Which of them are traversable, that is, have Euler paths? Which are Eulerian, that is, have a Euler circuit? For those that do not, explain why. K4 CO3 (10)



(a) (b) (c)

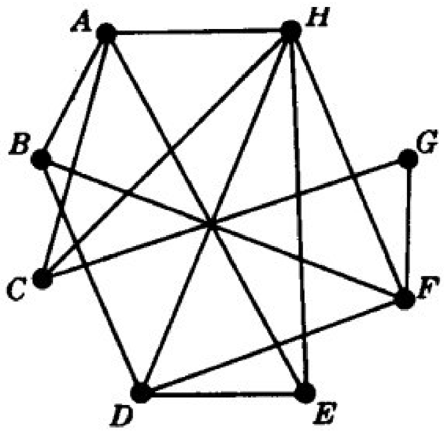
7) Show that the following logical expression K4 CO3 (10)

1. $(p \to q) \land (q \to r) \to (p \to r)$ is a tautology.
2. $(p \to r) \land (q \to r)$ and $(p \lor q) \to r$ are logically equivalent.

OR

PTO

Write down any **Algorithm** to coloring the following graph, and hence find the chiromantical number. K4 CO3 (10)



8. (i) Let A be the set of all integers and a relation R on A is defined as R = {(x, y): x -y is divisible by 3}, Prove that R is an equivalence relation. K3 CO4 (15)

(ii) Give an example of a relation which is:

a) Reflexive and transitive but not symmetric
b) Symmetric and transitive but not reflexive
c) Reflexive and transitive but neither symmetric nor anti symmetric

9. Show that the set $G = \{a - b\sqrt{3} : a, b \in Q\}$ is an abelian group. K3 CO4 (15)

10. Prove that the set $S = \{a + b\sqrt{2} : a, b \in Z\}$ is a ring with respect to usual addition and multiplication. K4 CO4 (15)

OR

Show that the "division relation" on the set $\{2,4,8,16,24,32\}$ is a partial order relation. Draw Hasse Diagram. Also find K4 CO4 (15)

1. maximal, maximum, minimal, and minimum elements
2. lower and upper bounds of $\{2,8\}$
3. least upper bound and greatest lower bound of $\{4,8,24\}$, if exists