21CSC1C4L

Sl. No.

M.Sc. I Semester Degree Examination, April/May - 2024
COMPUTER SCIENCE
Discrete Mathematical Structures
(NEP)

Time : 3 Hours   Maximum Marks : 70

Note :   Answer **any five** of the following questions with Question No. **1 (Q1) compulsory.**

1.   (a)   Consider the following propositions :   **7**
- p : It is raining.
- q : I will carry an umbrella.
- r : I will go for a walk.

Construct the conditional propositions for the following statements :

(i)   If it is raining, then I will carry an umbrella.

(ii)   I will go for a walk if it is not raining.

(iii) I will carry an umbrella if and only if it is raining.

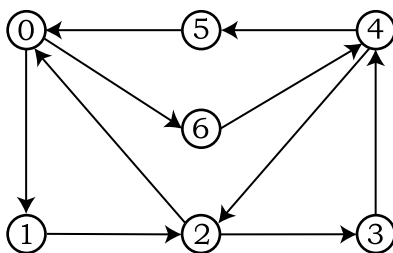   (b)   Prove the logical equivalence of the following statements using truth tables :   **7**

(i) $\neg(p \wedge q)$ and $(\neg p \vee \neg q)$

(ii) $p \rightarrow q$ and $\neg p \vee q$

(iii) $(p \wedge q) \vee r$ and $(P \vee r) \wedge (q \vee r)$

2.   (a)   By Mathematical induction, prove that $2+4+6...2n = n(n+1)$ **7**

   (b)   Given A = {The set of integers}, R = {(a, b)E A X A |a<b}. Examine R for   **7**

(i)   Symmetry

(ii)   Asymmetry

(iii) Antisymmetry

3.   (a)   Given the graph G :   **7**
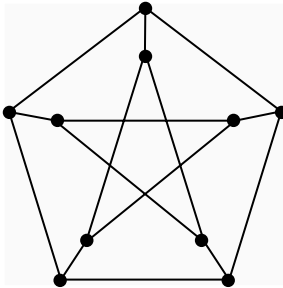

Determine whether the given graph is Hamiltonian Graph or not.

(b)   Consider the graph G :   **7**
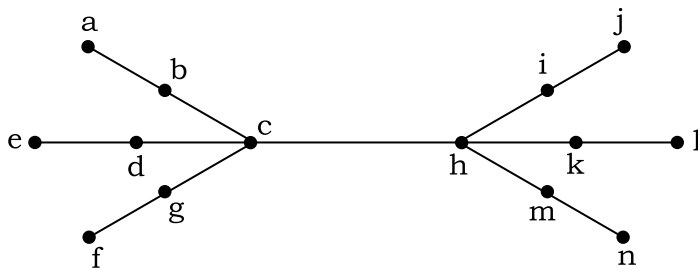

     (i)   Determine the chromatic number of graph G.

     (ii)   Provide a proper vertex coloring of graph G using the minimum number of colors.
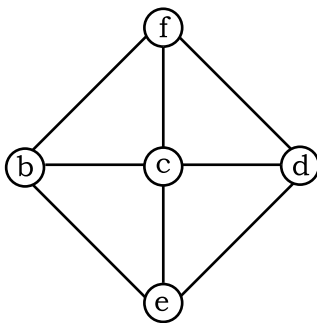
4.   (a)   For the given tree below find :   **7**

     (i)   distance

     (ii)   eccentricity

     (iii)   centre

(b)   Define spanning Tree. Find all the spanning trees of the below graph.   **7**

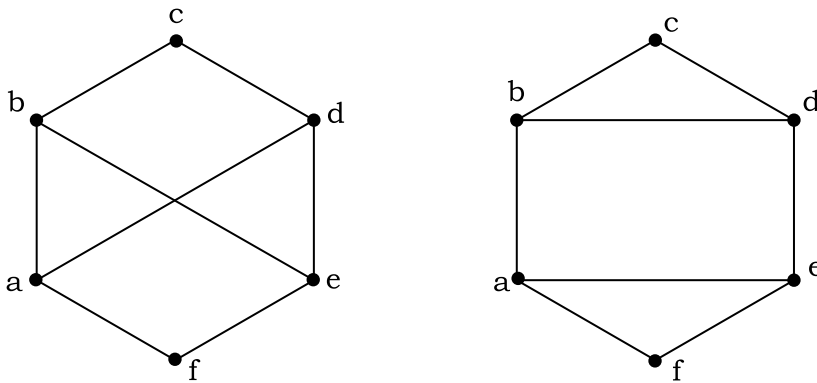**5.**   (a)   Show that $(Z, +)$ is an abelian group.   **7**

    (b)   Find the weights of the given words   **7**

     (i)   1011

     (ii)   0110

     (iii)   1110

     (iv)   011101

     (v)   11111

     (vi)   010101

6. (a) Consider the relation R on the set A = {1, 2, 3, 4} defined by R = {(1, 1), (2, 2),   **7**
(3, 3), (4, 4), (1, 2), (2, 1)}.

   (i)   Prove that relation R is an equivalence relation.

   (ii) Determine the equivalence classes of relation R.

(b) Show that the given two graphs are isomorphic or not.   **7**

7. (a) Given an undirected, edge weighted graph find the minimal spanning tree   **7**
and total weight of the minimal spanning tree.
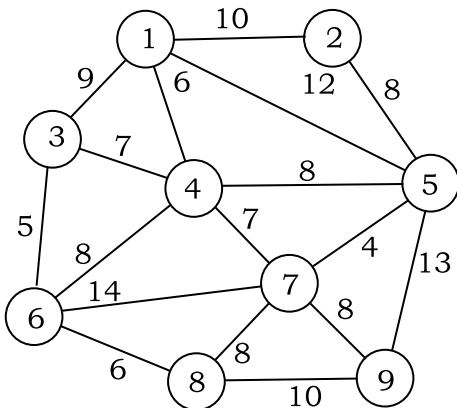
(b) Define Coding. Discuss an application of group theory in cryptography.

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8. Write short notes on the following :   **5+5+4**

(a) Planar graph and non-planar graph

(b) Prism's algorithm

(c) Tautology & contradiction

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