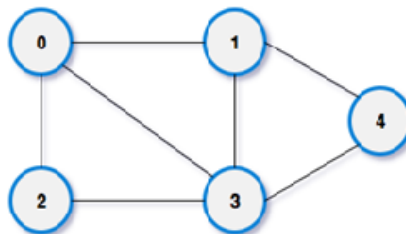


(3 Hours)

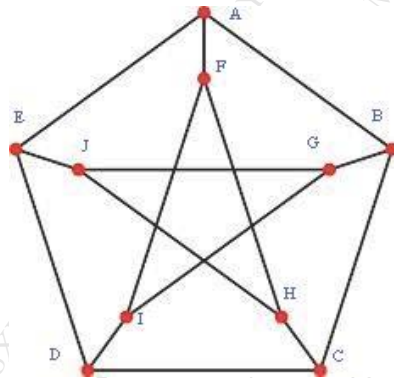
Marks: 80

- N.B (1) Question No1 is compulsory.  
 (2) Attempt any three questions out of remaining five questions.  
 (3) Assume necessary data but justify the same  
 (4) Figures to the right in parenthesis indicate full marks
1. (a) Write converse , inverse and contrapositive of the following statement. (05)  
 “ If weather will not be good then train will not be on Time. “  
 (b) Obtain the disjunctive normal form of  $(P \rightarrow Q) \wedge (\neg P \wedge Q)$  (05)  
 (c) What is the solution of the recurrence relation  $a_n = a_{n-1} + 2a_{n-2}$ , with (05)  
 initial condition  $a_0 = 2, a_1 = 7$   
 (d) Establish the following result using truth tables. (05)  
 $(P \rightarrow Q) \wedge (Q \rightarrow R) \rightarrow (P \rightarrow R)$
2. (a) State the “Tower of Hanoi” problem and obtain the corresponding (10)  
 recurrence relation indicating the initial conditions . Solve the recurrence  
 relation.  
 (b) Explain with suitable example:- (10)  
 (1) Predicate  
 (2) Proposition
3. (a) Determine whether the relation R on a set A is reflective ,irreflexive, (10)  
 asymmetric, antisymmetric or transitive.  
 $A = \text{set of all positive integers, } aRb \text{ iff } a \leq b+1$   
 (b) Find the Adjacency List and matrix of the following graph. (10)



4. (a) Find the particular solution of  $a_r + 5a_{r-1} + 6a_{r-2} = 3r^2$ . (10)
- (b) Show by mathematical induction, that for all  $n \geq 1$ , (10)
- $$1+5+9+\dots+(4n-3) = n(2n-1)$$

5. (a) Find the Hamilton circuits and path of the graph. (05)



- (b)  $A = \{a, b, c, d\}$  (10)
- $R = \{(b, a), (c, a), (c, b), (d, a), (d, b), (d, c), (a, a), (b, b), (c, c), (d, d)\}$  is  $R$  is Partial order relation ?

6. (a) Let  $A = \{1, 2, 3, 6, 12, 18\}$  and relation  $R$  be defined on  $B$  by  $xRy$  if and only if (10)

“ $x$  divides  $y$ ”. Show that  $R$  is a partial order relation

1. Draw the diagram and Hasse diagram of  $R$
2. Determine all minimal & all maximal elements.
3. find all least and greatest elements.
4. Give upper bounds and LUB of  $A = \{2, 3, 6\}$
5. Give all lower bounds and the GLB =  $\{2, 3, 6\}$

- (b) Determine the validity of the following argument using deduction method: (10)

“ If I study then I will pass examination . If I do not go to picnic ,then I will study. But I failed examination. Therefore , I went to picnic”

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