P P SAVANI UNIVERSITY

Second Semester of B. Sc. (I.T.) Examination

May 2019

SESH1061 Discrete Mathematics For Computer Application

22.05.2019, Wednesday **Time: 12:30 p.m. To 03:00 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1 Do as directed. (Any Five) **[05]**

(i) If a matrix has 12 elements, what are the possible orders it can have ?

(ii) Define Bounded Lattice.

(iii) Define Complement of an element in a Lattice.

(iv) Define sublattice of a Lattice.

(v) Is $(Z,\cdot)$ a group ? If not, state which property fails.

(vi) State Lagrange Theorem for Groups.

(vii) Define Monoid.

Q - 2 (a) Solve the system of equations by matrix method **[05]**

$$x + y + z = 3,\quad x + 2y + 3z = 4,\quad x + 4y + 9z = 6$$

Q - 2 (b) If $A = \begin{bmatrix} -1 & -1 \\ 2 & -2 \end{bmatrix}$, verify that $A^2 + 3A + 4I = 0$ and hence find A^{-1}. **[05]**

OR

Q - 2 (a) Solve the system of equations by matrix method **[05]**

$$x + y + 2z = 3,\quad 2x - y + 3z = 4,\quad 5x - y + 8z = 10$$

Q - 2 (b) Define Diagonal matrix, Scalar matrix, Singular matrix, Row matrix and Column matrix. **[05]**

Q - 3 (a) Show that $G = \{0,1,2,3,4,5\}$ is a cyclic group under addition modulo 6. **[05]**

Q - 3 (b) Let R be the group of real numbers under addition and R^+ be the group of positive real numbers under multiplication. Let $f: R \to R^+$ be defined as $f(x) = e^x$ then show that f is an isomorphism. **[05]**

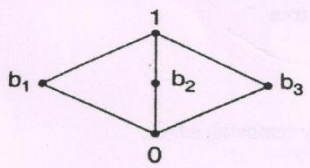
OR

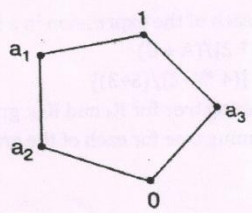
Q - 3 (a) Let $S = N \times N$. Let $*$ be the operation on S defined by $(a,b) * (a',b',) = (aa',bb')$ Define $f : (S,*) \to (Q,+)$ by $f(a,b) = a/b$. Show that f is homomorphism. **[05]**

Q - 3 (b) Define Transposition, Even permutation and Odd Permutation. Determine whether $h = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 1 & 5 & 6 & 3 & 2 & 4 \end{pmatrix}$ is even or odd permutation. **[05]**

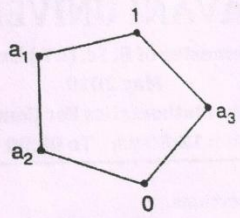
Q - 4 Attempt any One. **[05]**

(i) Which of the following lattice are Distributive? Justify your answer.





(ii) Determine whether the lattice given below is modular or not.



SECTION – II

Q - 1 Do as directed. (Any Five) **[05]**

(i) Draw graph K_5.

(ii) Define Spanning Tree.

(iii) How many edges are there in $K_{3,4}$ graph.

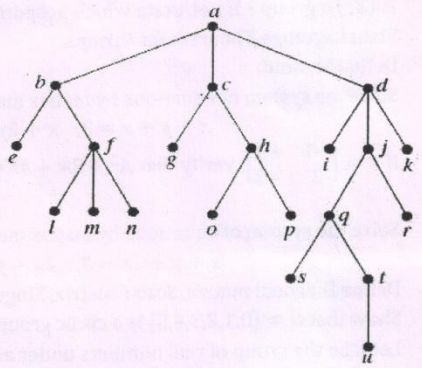
(iv) Define Euler Path.

(v) Define Hamiltonian Circuit.

(vi) Define Pseudo graph.

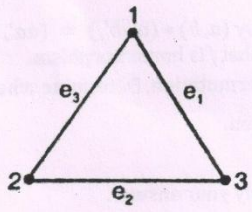
(vii) What is the value of the expression $123 + -$.

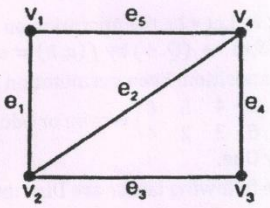
Q - 2 (a) Answer these questions about the rooted tree illustrated **[05]**



(a) Which vertex is the root?
(b) What are the levels of a and q?
(c) Which vertices are internal?
(d) Which vertices are leaves?
(e) What is the height of this rooted tree?

Q - 2 (b) Find the incidence matrix of each of the following graphs **[05]**



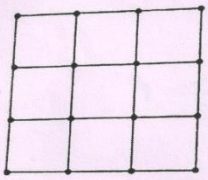


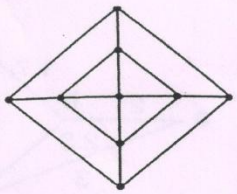
OR

Q - 2 (a) Represent each of the expression in a binary tree **[05]**
(i) $[(A - B) \uparrow 2]/(A + B)$
(ii) $(X+7) * [(4 *Y+Z)/(S+3)]$

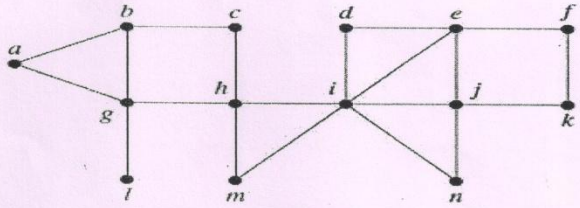
Q - 2 (b) Find a spanning tree for K_4 and $K_{1,6}$ graph. **[05]**

Q - 3 (a) Find a spanning tree for each of the graphs by removing edges. **[05]**



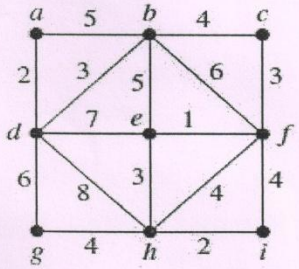


Q - 3 (b) Use breadth-first search to produce a spanning tree for the given simple graph. **[05]**

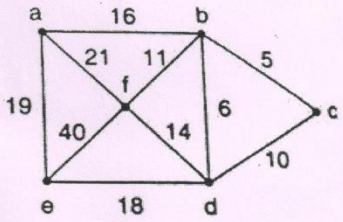


OR

(a) Use Prims algorithm to find a minimum spanning tree in the graph **[05]**

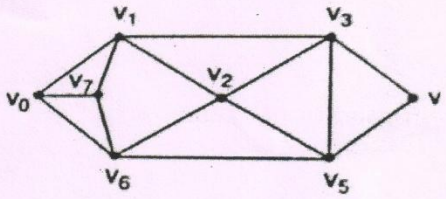


Q - 3 (b) Using Kruskal's Algorithm find a minimum spanning tree for the given weighted graph. **[05]**



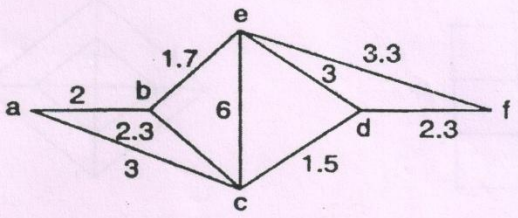
Q-4 Attempt any One. **[05]**

(i) Determine whether the given graph has a Hamiltonian circuit. If it does find such a circuit. **[05]**



(ii) Use Dijkstra's Algorithm to find the shortest path between vertices a and f in the given

weighted graph



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