(Following Roll No. to be filled by candidate)

Roll No. 1 3 0 4 3 1 0 0 5 7

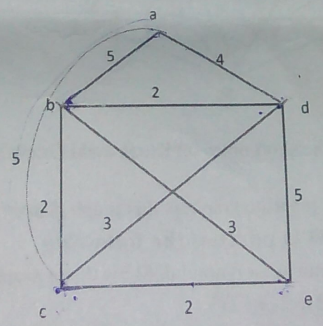
B.Tech.
FIFTH SEMESTER EXAMINATION 2015-16
ECS505
GRAPH THEORY

Time: 2 hours **Max Mark: 50**

Note

- Attempt all questions.
- Marks and number of question to attempt from the section is mentioned before each section.
- Assume missing data suitably .Illustrate the answer with suitable sketch.

1. **Attempt any FOUR parts of the following:** **[3x4]**
   a. What do you mean by subgraph? Discuss various types of subgraph
   b. Show that the maximum number of edges in a simple graph with vertices is n(n-1)/2.
   c. Define walk, path and circuit in a directed graph. What is the metric in a graph?
   d. Determine a minimum Hamiltonian circuit for graph below.



   e. Draw a graph with six vertices containing a Hamiltonian circuit but not on Eulerian circuit.
   f. Explain following operation on graphs
      (i) Union (ii) Intersection (iii) Decompostion.

2. **Attempt any TWO parts of the following** **[2x6]**
   a. Prove that an edge e of a connected graph is a bridge if and only if e belongs to every spanning tree of G.
   b. Determine all spanning trees for the graph

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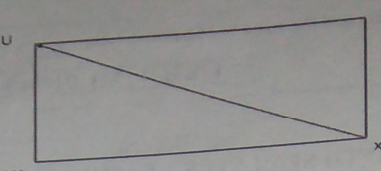
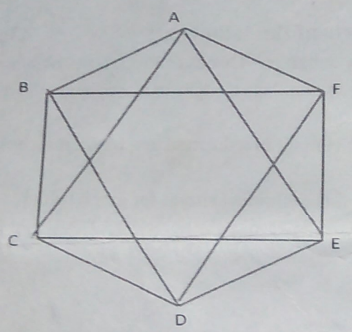


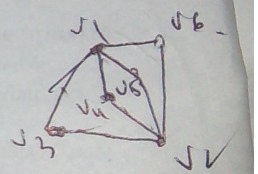
G:

   Which of these spanning trees are isomorphic?
   c. Explain Kruskal's algorithm in detail by an appropriate example.

3. **Attempt any TWO parts of the following** **[2x6]**
   a. A connected graph has 6 vertices. It has 2 vertices each of degree 4 and 4 vertices each of degree 2. In how many regions, does a representation of this planar graph split the plane?
   b. Draw a planar representation of a graph

i.

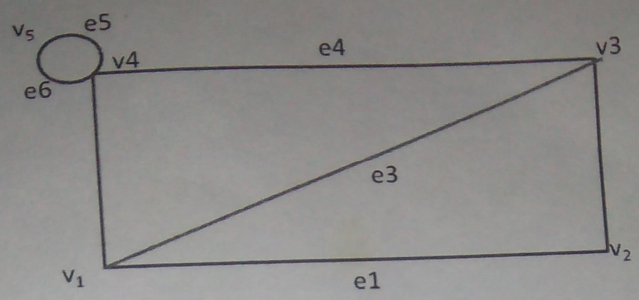




   (ii) Write short notes on Kuratowski Graph and Cut sets.

   c. Draw $K_{3,4}$ bipartite graph. Is this graph planar?

4. **Attempt any TWO parts of the following** **[2x7]**
   a. Define chromatic polynomial. Show that a graph with n vertices is a tree if and only if $P_n(\lambda)=\lambda(\lambda-1)^{n-1}$
   b. Describe various matrix representation of graph and write the incidence matrix of the graph.



0 c. Draw the graph (undirected graph) represented by following adjacency matrix A.

$$A = \begin{array}{c} \\ V1 \\ V2 \\ V3 \\ V4 \\ V5 \end{array} \begin{array}{c} \begin{array}{ccccc} V1 & V2 & V3 & V4 & V5 \end{array} \\ \begin{bmatrix} 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix} \end{array}$$