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TCS–304/TIT–304

B. Tech. (CS/IT) (Third Semester)
Mid Semester EXAMINATION, 2017
GRAPH THEORY

Time : 1:30 Hours] [*Maximum Marks : 50*

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Write True *or* False : (1×5=5 Marks)

   (a) All regular graphs are complete graph.

   (b) If G is a simple graph of order n and G′ is its complement, then $G+G' = K_n$.

   (c) Any graph of order 5 can have vertices with degree 3, 5, 3, 1, 0.

   (d) A tree is an acyclic connected graph.

   (e) Spanning trees will have at-least 2 pendant vertices.

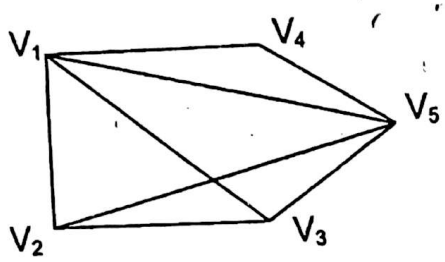
2. Attempt any *five* parts : (3×5=15 Marks)

   (a) Prove that number of odd vertices in any graph is always even.

(b) Define a Di-graph with an example.

(c) "K_5 is a planar graph"–state whether its correct statement or not. Justify your answer.

(d) What is the circuit-rank for the graph given below ?



(e) Define path and trail. Discuss some basic properties of both.

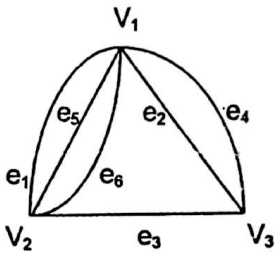
(f) A complete bi-partite graph $K_{m,n}$(given : $n > m$) is having maximum degree 8 total size 40. Then calculate the values of m and n.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Prove that a non-empty and non-trivial simple graph has at least two vertices of equal degree.

(b) What are Euler trails and Euler circuits ? If the below mentioned graph has any Euler trail and Euler circuit then mention (any *one* trail and one circuit if exist).



(c) A salesman has to visit 5 cities A, B, C, D and E. The distance (in km) between the cities are as follows :

	A	B	C	D	E
A	—	7	6	8	4
B	7	—	8	5	6
C	6	8	—	9	7
D	8	5	9	—	8
E	4	6	7	8	—

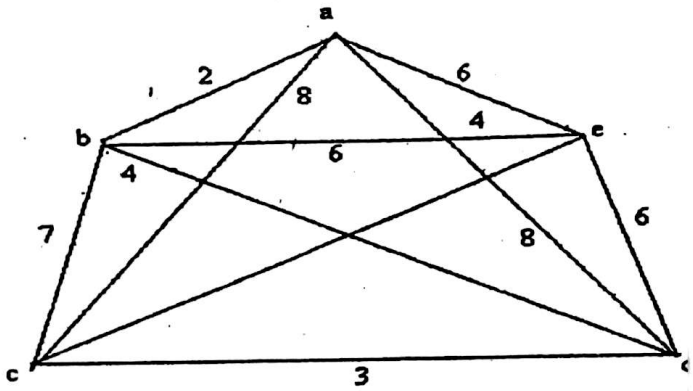
A salesman starts from his home city A and passes through each city exactly once and returns to his home city in shortest possible distance. The what distance has he travelled.

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Insert values given below and form the binary search tree (BST) for it :

Values are in order : 20, 4, 10, 30, 49, 6, 35, 32, 5, 9, 27, 39, 1

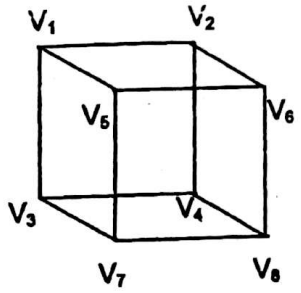
(b) Find all the MST (minimum spanning trees) for the graph given below (using Prim's algorithm).



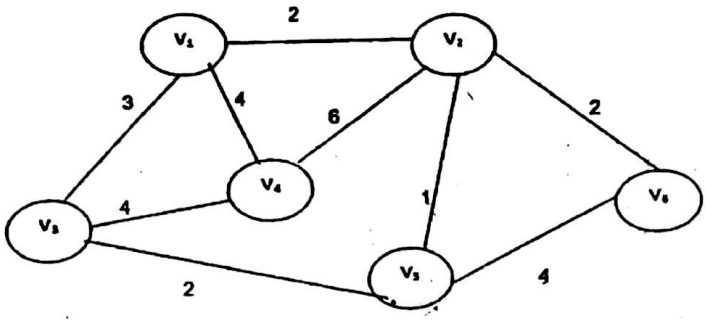
(c) Give definition and important properties of these (with examples)—Binary Tree, Spanning Tree, Bi-partite graph and Complete bi-partite graph.

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) What is planar graph ? State whether the graph given below is planar or not. If planar then draw the plane graph for it. (Name the edges by yourself).



(b) Find the shortest path from vertex V_3 to vertex V_6 in the graph given below-(using Dijkstra's algorithm).



(c) Obtain a minimum spanning trees (MST) using Kruskal's algorithm for the graph below.