



Reg. No. :

Name :

Eighth Semester B.Tech. Degree Examination, October 2014

(2008 Scheme)

08.805 (4) : GRAPH THEORY (Elective – III) (R)

(Common with F 08.805C)

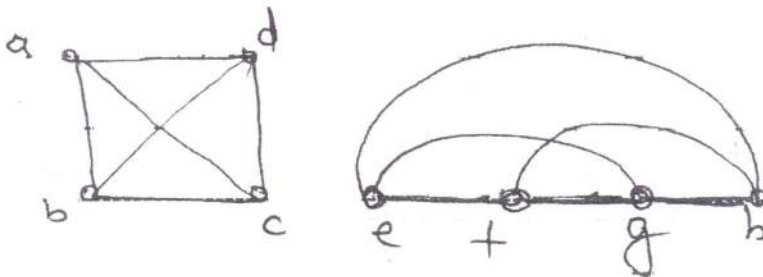
Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions. **Each** question carries **4** marks.

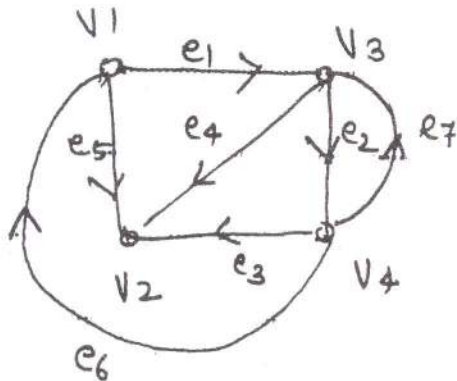
1. Explain any two applications of graphs.
2. Determine whether the following graphs are isomorphic or not.



3. Draw the graphs for the following :
 - a) Graph that is Euler and Hamiltonian
 - b) Graph that is Euler but not Hamiltonian
 - c) Graph that is Hamiltonian but not Euler.
4. Prove that the maximum number of edges in a simple graph with n vertices is $n * (n - 1) / 2$.
5. Find the no. of pendent vertices in a binary tree 'T', if 'n' is the total no. of vertices in T.
6. A connected planar graph has 10 vertices each of degree 3. Into how many regions does the representation of planar graph split the plane.



7. Define rank and nullity of a graph G .
8. Distinguish between strongly and weakly connected digraphs. What is meant by the condensation of a digraph ?
9. Find the incidence matrix of the following digraph.



10. What is meant by an m -cube ? Mention the properties of m -cubes.

PART – B

Module – I

11. a) Show that there is no graph G with $|V(G)| = 12$ and $|E(G)| = 28$ in which each vertex is of degree 3 or 6. 7
- b) Prove that a given connected graph G is Euler if and only if all vertices of G are of even degree. 8
- c) Define spanning tree. Show that the distance between the spanning trees of a graph is a metric. 5

OR

12. a) Prove that in a simple graph with ' n ' vertices and k -components can have at most $(n - k)(n - k + 1) / 2$ edges. 8
- b) Define binary trees. Draw binary trees with 11 vertices :
 - 1) having max height
 - 2) with minimum height. 6
- c) How many labelled trees can be constructed using 4 vertices ? Show all the labelled trees with four vertices. 6

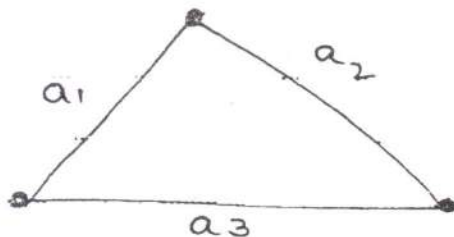


Module – II

- 13. a) Using Eulers formula show that Kwatowski's two graphs are not planar. 8
- b) Write short notes on the vector space associated with a graph. What is meant by the basis vectors of a graph ? Explain with an example. 8
- c) Is it true that duals of isomorphic graphs are isomorphic. Defend your answer. 4

OR

- 14. a) Prove that a graph has a dual if and only if it is planar. 8
- b) Prove that n-vertex digraph is strongly connected if and only if the matrix M defined by $M = X + X^2 + X^3 + \dots + X^n$ has no zero entry. X is the adjacency matrix. 5
- c) Check whether the two subspaces, circuit subspace and cut-set space of the graph given below are orthogonal complement or not. 7



Module – III

- 15. a) Explain the procedure to check whether two graphs are isomorphic. 4
- b) With flow chart explain the algorithm to find the spanning tree of a given graph. 16

OR

- 16. Obtain a graph that realizes the single contact function.

$$F_{ab} = x_1 x_2 x_3 x_5 x_7 + x_1 x_3 x_4 x_6 + x_1 x_5 x_6 x_8 + x_2 x_4 + x_2 x_3 x_5 x_8 + x_3 x_4 x_6 x_7 x_8 + x_5 x_6 x_7.$$
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