BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MTECH **SEMESTER : II**
BRANCH: CS & IT **SESSION : SP/22**

SUBJECT: CS601 – GRAPH THEORY

TIME: 2hrs **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 13 questions each of 5 marks and total 65 marks.
2. Candidates may attempt any 10 questions maximum of 50 marks.
3. The missing data, if any, may be assumed suitably.

Q.1 Show that the maximum number of edges in a simple graph with n vertices is n(n-1)/2. [5]

Q.2 Discuss whether the following graphs are Hamiltonian and/or Eulerian. Show the Hamiltonian circuit or path – if exists. Check whether the graph is arbitrarily traceable or not. [5]

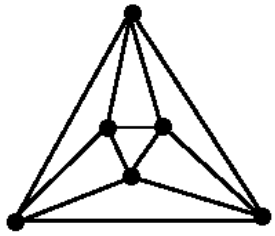

Figure 1

Q.3 Define spanning tree. Show that a Hamiltonian path is a spanning tree. [5]

Q.4 Can you construct the graph if you are given all its spanning trees? Explain with example. [5]

Q.5 Find all possible un-labelled trees for n=6? [5]

Q.6 Draw an isomorphic graph of the graph given in Figure 1. Then prove that your graph is isomorphic to this graph.

Q.7 Find the Dual of the graph in Figure 1. [5]

Q.8 Find the fundamental cutset matrix of the graph in Figure 1 and represent the matrix using identity matrix. [5]

Q.9 What are the set of information represented by the value of an off-diagonal entry and diagonal entry of the square of an adjacency matrix. [5]

Q.10 Explain with suitable example: Euler digraph or 2-isomorphism. [5]

Q.11 Minimize the following Boolean function using graph covering: (X' denotes: not X) [5]

ABC'D' + ABC'D + AB'C'D + ABCD + AB'CD + ABCD' + AB'CD'

Q.12 Prove: the vertices of every planar graph can be properly colored with 5 colours. [5]

Q.13 What do you mean by Uniquely Colorable Graphs? Find a graph that is uniquely colorable. Also find a graph that is not uniquely colorable. Explain. [5]

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