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CS 131402 BINA CHOWDHURY CENTRAL LIBRARY
(GIMT & GIPS)

Azara, Hatkhowapara,

Roll No. of candidate

Guwahati - 781017

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2019

B.Tech. 4th Semester End-Term Examination

Computer Science

BASIC GRAPH THEORY

(New Regulation)

(w.e.f. 2017-2018)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following (True or False)

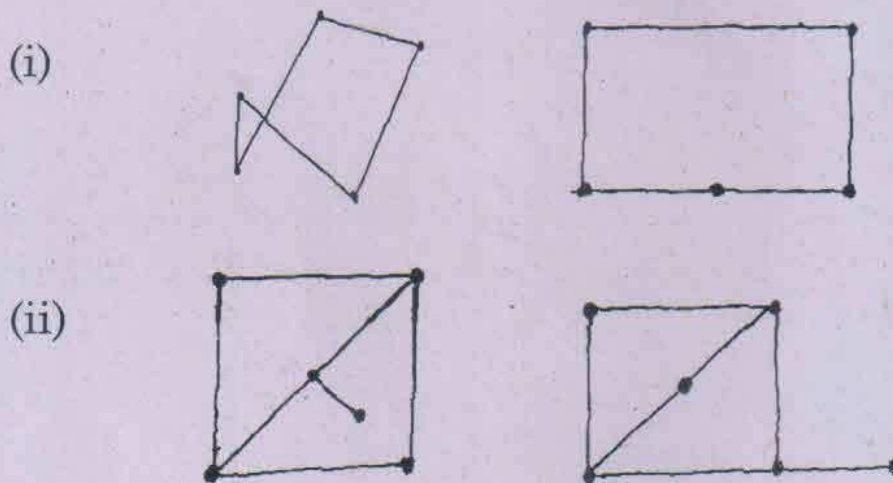
(10 × 1 = 10)

- (i) A connected graph with a circuit is called a tree
- (ii) A graph having same number of vertices and edges is a regular graph.
- (iii) A graph consisting of only isolated vertices is 0-Chromatic.
- (iv) Digraph in which for every edge from vertex a to b, there is another edge from b to a is called simple symmetric graph.

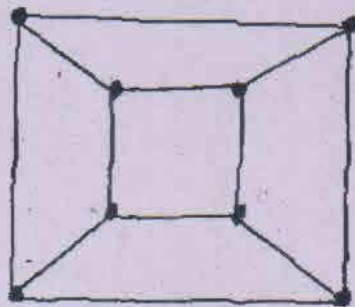
[Turn over

- (v) A graph with no edge is called totally connected graph.
- (vi) A graph which can be colored with four colors is planar.
- (vii) An Euler graph has no isolated vertex.
- (viii) To make n -vertex graph connected we need at least $(n-1)$ edges.
- (ix) A digraph having no self loops or parallel edges is called asymmetric digraph.
- (x) The Konigsberg bridge problem has six bridges and four regions.

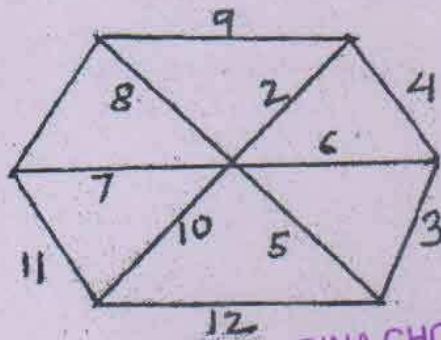
2. (a) Verify that the following graphs are isomorphic. (10+5)



(b) What is matching? Find number of matching for the graph given below.

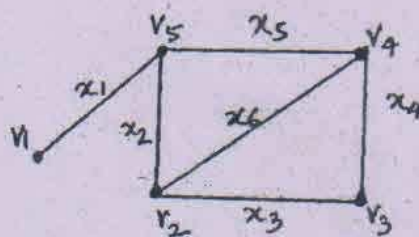


3. (a) When a graph is said to be planar one? Show that in any graph which is planar $V-E+F=2$ where V is the number of vertices and E is the number of edges and F is the number of faces. (5+5+5)
- (b) Find the minimum spanning tree using Kruskal's algorithm for the following graph.



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4. (a) Prove that Kuratowski's graphs are non planar. (5+5+5)
- (b) Explain with an example the maximum flow minimum cut problem.
5. (a) What are the various graph operation? Explain each with example. (10+5)
- (b) Define degree of a vertex in a graph. Prove that sum of the degrees of all the vertices in a graph is always even.
6. (a) Write the adjacency and incidence matrices of the following graph. (10+5)



- (b) Show that a graph is connected if and only if its complement is disconnected.
7. (a) Write Fleury's algorithm. Prove with an example if the graph is Eulerian then after applying fleury's algorithm we obtain a Eulerian circuit. (5+5+5)
- (b) Prove that tree with n vertices has $n-1$ edges.

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