AC-3104

Second Year B. Sc. (Sem. IV) Examination

April / May – 2015

Mathematics : CCM - 403 (CS)

Time : 3 Hours] [Total Marks : **70**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **SECOND YEAR B. SC. (SEM. 4)**

Name of the Subject :

☛ **MATHEMATICS : CCM - 403 (CS)**

☛ Subject Code No. : **3 1 0 4** ☛ Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) All questions are compulsory.
(3) Figures to the right indicate full marks.
(4) Follow usual notations.
(5) Use of Scientific non-programmable calculator is allowed.

1 Answer any five from the following questions : **10**

(i) Define with illustration: a walk and a path.
(ii) Can a null graph is connected?
(iii) Draw two non-isomorphic, simple planner graphs with 6 nodes and 9 edges.
(iv) Draw a graph that has harmitian path but not harmitian circuit.
(v) Does there exist a tree without edges? Explain.
(vi) Draw all binary trees with 6 leaves.
(vii) Draw a connected graph that becomes disconnected when any edge is removal.
(viii) In a m-ary tree what is the degree of interior vertices and leaves?

2 (a) Justify the statements. **5**
A connected graph G is an Euler Ograph iff it can be decomposed into circuits.

OR

If a graph has exactly two vertices of odd degree, then there must be a path joining these two vertices.

OR

(a) If $G=\{V, E\}$ is a simple connected planar graph with more than one edge then prove that it must satisfy the following inequalities : **5**

(i) $2|E|\geq 3R$

(ii) $|E|\leq 3|V|-6$.

(b) Attempt any two of the following : **10**

(i) Define :
Open walk.
Fusion
Harmitian path.

(ii) How many edges must be drawn in order to obtain a planner graph with 5 nodes that defines 7 regions? Draw such graph.

(iii) Explain seating problem.

(iv) Prove that, a connected graph G is an Euler graph iff it can be decomposed into circuits.

3 (a) Prove that a connected grpah G is Euler graph iff every vertex of G is of even degree. **5**

OR

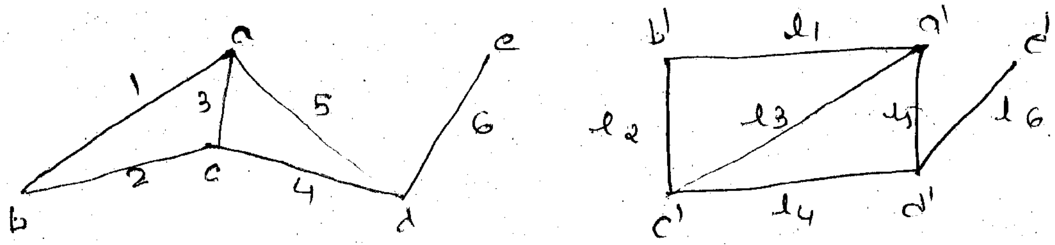
(a) Prove that a simple graph with n vertices and k components can have at most $\frac{(n-k)\,(n-k+1)}{2}$ edges. **5**

(b) Attempt any two of the following : **10**

(i) Determine the maximal edge connectivity of a connected graph with 5 nodes and 8 edges. Draw a graph in which the connectivity is met and one in which it is not.

(ii) Prove that every tree with at least two vertices has at least two pendant vertices.

(iii) Show that the following graphs are isomarphic :



(iv) Prove that A tree with n vertices have n-1 edges.

4 (a) Define : **5**

(i) Planner

(ii) Spanning tree

(iii) Rooted tree

(iv) Arithmetic tree

(v) The height of a rooted tree.

OR

(a) Prove that a digraph G is an Euler digraph iff G is connected and is balanced. **5**

(b) Attempt any two of the following : **10**

(i) Draw two ternary trees with 11 leaves.

(ii) Explain the teleprinter's problem.

(iii) How many edges are there in a diagraph with 5 nodes, each of which has degree 2 ? Draw such a digraph.

(iv) Find the weight of the cycle C = (b, d, e, f, b) from the following figure.

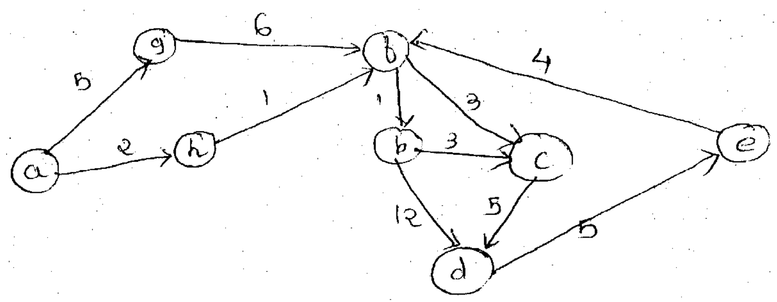


Fig.

5 (a) Explain Prim's algorithm to obtain spanning tree with illustration. **5**

OR

(a) Prove that rooted tree with n nodes has n–1 edges. **5**

(b) Attempt any two of the following : **10**

(i) Let G be a connected graph with n nodes.

(a) G is a tree if and only if G has exactly 1 simple path between any two nodes.

(b) G is a tree if any only if a has exactly n–1 edges.

(ii) Draw a graph with 4 nodes and 7 edges.

(iii) Draw two distinct (non-isomorphic) graphs.

(iv) Prove that a graph is a tree iff it is minimally connected.
