PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2018
(Sixth Semester)

Branch – **MATHEMATICS**

GRAPH THEORY

Time : Three Hours Maximum : 75 Marks

SECTION-A (20 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 2 = 20)

1 Define a pendant vertex.

2 Define an Euler graph.

3 Define a spanning tree.

4 Define a rotted tree.

5 Define a planar graph.

6 Write any two common properties in two graphs of kuratowski.

7 Define incidence matrix of a graph.

8 Define adjacency matrix of a graph.

9 Define simple diagraph.

10 Define a strongly connected digraph.

SECTION - B (25 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Define the following with an example:
(i) Isolated vertex (ii) Null graph.

OR

b Define isomorphic graphs with an example.

12 a Prove that there is one and only one path between every pair of vertices in a tree T.

OR

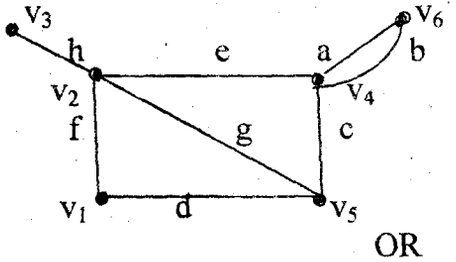
b Define a rooted tree and binary tree.

13 a Write the various steps involved in reduction.

OR

b Define homeomorphic graphs with an example.

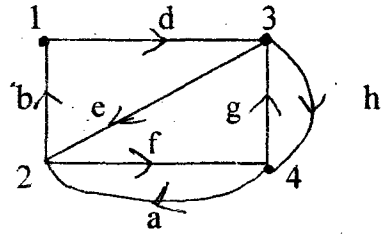
14 a Write the circuit matrix for the following graph:



OR

b If B is a circuit matrix of a connected graph G with e edges and n vertices, prove that rank of B = e-n+1.

15 a Write Kirchhoff matrix for the following digraph.



OR

b Explain digraph with an example.

SECTION - C (30 Marks)

Answer any **THREE** Questions
ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

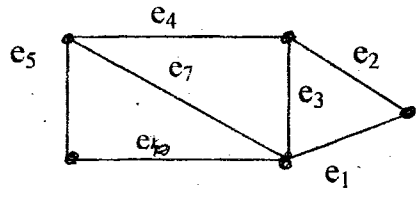
16 Prove that a simple graph with n vertices and k components can have at most $\frac{(n-k)(n-k+1)}{2}$ edges.

17 Prove that every tree has either one or two centers.

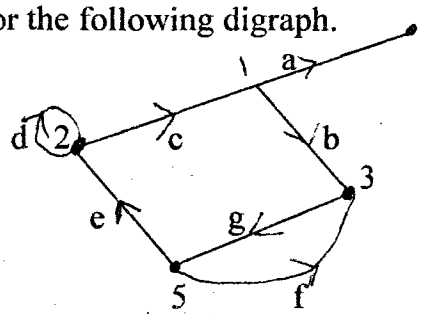
18 Prove that a connected planar graph with n vertices and e edges has (e-n+z)regions.

19 i) Define a path matrix.

ii) Write the fundamental circuit matrix for the following graph:



20 Define the adjacency matrix of a digraph. Also write the adjacency matrix for the following digraph.



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