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SVS-N- 340- B-18

B.Sc Vth Semester Degree Examination

MATHEMATICS

(Graph Theory - I)

Paper -5.3

(New)

Time : 3 Hours Maximum Marks : 80

Instruction to Candidates:

Answer all the sections.

SECTION - A

I. Answer any **TEN** of the following. **(10×2=20)**

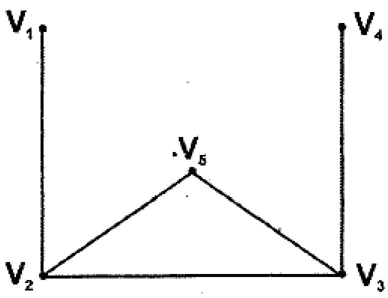
1. Define the term multigraph and peseudograph.

2. Define order and size of a graph G.

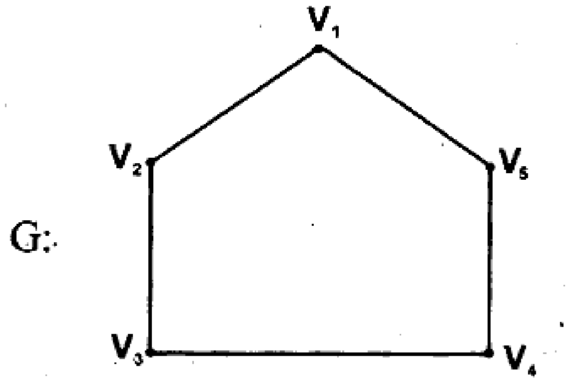
3. Define a null graph. Draw a null graph with 4 vertices.

4. Define odd vertex and even vertex.

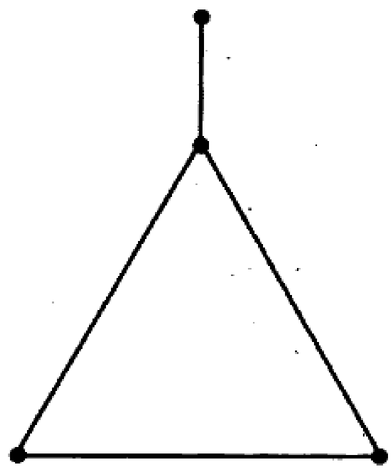
5. Find the degree of each vertex minimum and maximum degree of the graph shown below.



6. Write the complete of graph.



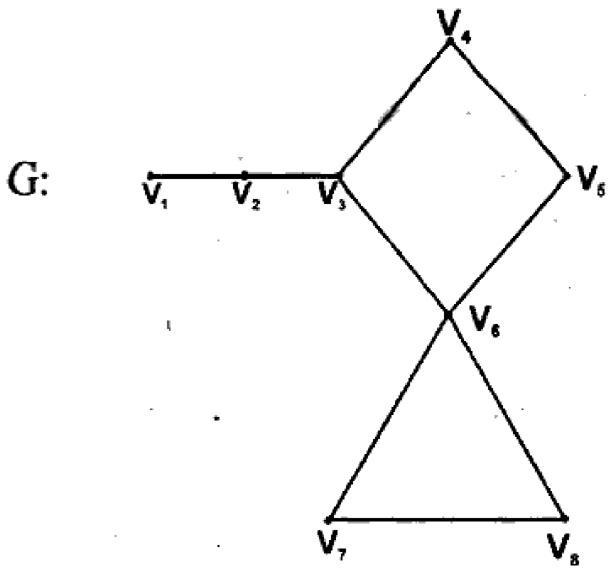
7. Draw the line graph L(G) of the graph G.



8. Show that $\overline{K}_p$ is a spanning sub graph k_p.

9. How many vertices and edges are there in complete bipartite graph $k_{7,11}$.

10. Find all the cut vertices in G.



11. Show that every edge of the p_5 is a bridge.

12. Draw all the trees with 6 vertices and $\Delta(T) \geq 6$.

SECTION - B

II. Answer any **FIVE** of the following. **(5×6=30)**

1. Show that the number of edges of an r-regular graph with p-vertices in $q = \frac{pr}{2}$, Does there exist a 4-regular graph with 5 vertices? If so, construct it.

2. Prove that every self- complementary graph has 4n or 4n+1 vertices.

3. If G is a (p,q) graph whose vertices have degree d_i, then show that L(G) has q- vertices and q_L edges where $q_L = \sum_{i=1}^{p} d_i^{\,2} - q$.

4. Show that the removal of a vertex v from $k_p\,(p \geq 2)$ produces a complete graph kp_{-1}

5. Show that a close walk of odd length contains a cycle.

6. Prove that a graph G with p-vertices and $\delta(G) \geq \frac{p-1}{2}$ connected.

7. Show that a non trivial graph is bipartite if and only if all of its cycles are even.

8. If a graph has exactly two vertices of odd degree then there exists a path Joining these two vertices.

SECTION - C

III. Answer any **FIVE** of the following. **(5×6=30)**

1. If G is tree.Then show that every district vertices of G are Joined by a unique path G.

2. Define eccentricity e(v), radius r(G) and diameter d(G) in connected graph and show that $r(G) \leq d(G) \leq 2r(G)$ in a connected graph.

3. Show that a graph G is connected Iff G contains a spanning tree.

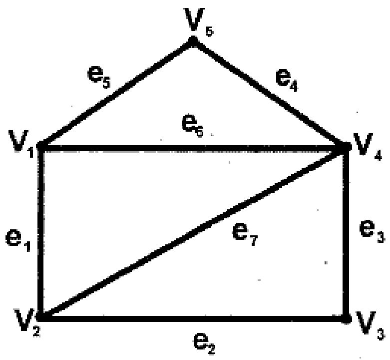
4. Define rooted and binary tree show that every binary tree T is a rooted tree.

5. Draw a 11- vertex binary tree.

   i) With maximum height.

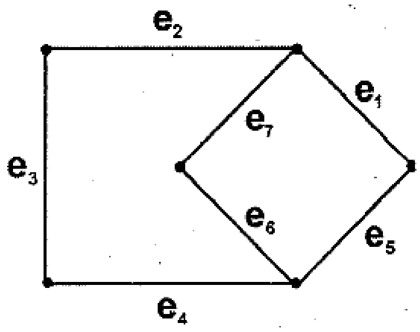
   ii) With minimum height.

6. Define incidence matrix and write the incidence matrix A(G) of graph G.



7. Draw the graph K_5 and find its adjacency matrix.

8. Find the cycle matrix C(G) of the graph G shown below. Also find the rank of the cycle matrix C(G).



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