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SVIS 327 A-2K14

B.Sc. VIth Semester Degree Examination
Mathematics
(Graph Theory - II)
Paper - 6.3 (d)

Time :3 Hours Maximum Marks : 80

Instructions to Candidates:-

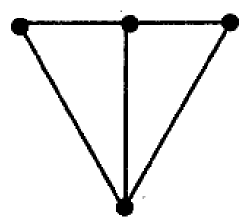
*Answer **all** sections.*

Section - A

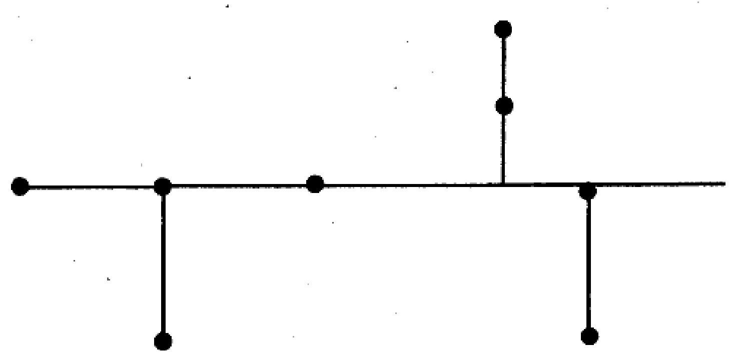
Answer any **10** of the following : **(10×2=20)**

I. Define a tree and draw a tree with Six vertices.

II. Define a spanning tree and draw three spanning trees of the following graph



III. Find the number of Cut-Vertices of the following graph



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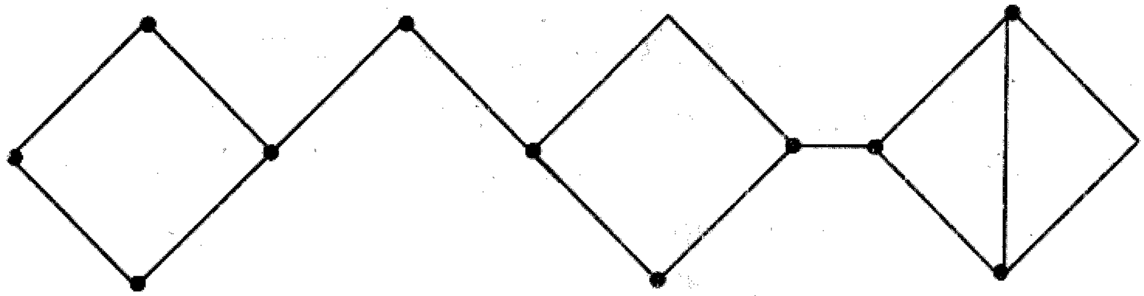
IV. Find the number of Blocks of the following graph.



V. Prove that $K_{n,n+1}$ is "Non Hamiltonian" $\forall\ n \geq 1$.

VI. Let $F_1 = (V_1, E_1)$ be a forest of 7 trees, where $|E_1| = 40$ Find $|V_1|$

VII. State Mengers theorem.

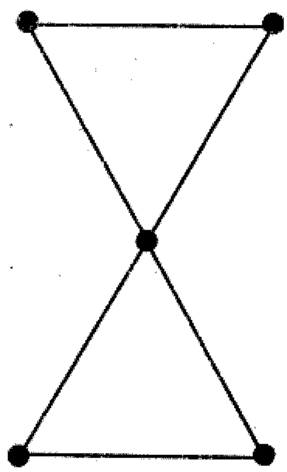
VIII. Show that Hamiltonian path is spanning tree.

IX. State Konigsberg's Bridge problem with figure.

X. Prove that K6 graph is Hamiltonian cycle but not Eulerian.

XI. How many vertices are in a tree with 26 edges.

XII. Define Eulerian path verify the following graph has an Eulerian cycle.



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Section - B

Answer any **5** of the following : **(5×6=30)**

I. Prove that every edge is a Bridge if and only if every spanning tree of G contains an edge.

II. a) Define the terms Bridge, Block and Cut - Vertices.

b) Give an example of a graph with 6 vertices which has Cut-Vertex but not contain a bridge.

III. Let T be a tree with 50 edges. The removal of certain edges from T yields two different trees T_1 & T_2 Given that the number of vertices in T_1 equals the number of edges in T_2 Find the number of vertices and edges in T_1 & T_2 .

IV. Prove that a (p, q) graph is a tree if and only if it is acyclic and $p = q + 1$.

V. i) Give an example of a graph which is both Eulerian and Hamiltonian.

ii) Give an example of a graph with 4 vertices which is Hamiltonian but not Eulerian.

iii) Give an example of a graph G such that G & $\overline{G}$ are both Eulerian and Hamiltonian.

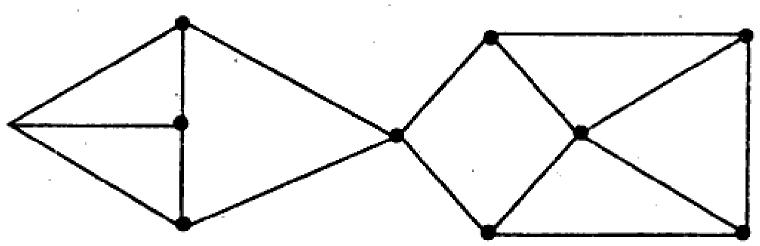
VI. Define a Hamiltonian-Path. Draw a complete graph K_7 Find there are three mutually edge-disjoint Hamiltonian cycles and hence draw them.

VII. Explain the "Travelling Sales Man" problem.

Section - C

Answer any **5** of the following : http://www.karnatakastudy.com **(5×6=30)**

I. Write the Whitneys Inequality. Find $X(G)$, $\lambda(G)$ and $\delta(G)$ of the graph



Hence verify the Whitneys Inequality.

II. Let G be a graph of order $p \geq 3$ If $\deg(V) \geq p/2 \forall$ Vertex of G then prove that G is Hamiltonian.

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III. Show that if a (p, q) graph is a forest with K components then prove that $q = p - k$.

IV. In a Binary tree on n vertices show that the number of Pendent vertices is equal to $\frac{n+1}{2}$

Is it possible to draw a tree with 5 vertices having degree 2, 2, 3, 3, 5.

V. Prove that a connected graph G is Eulerian if and only if it can be decomposed into Circuits.

VI. Prove that every block of a connected graph G is Eulerian then G is Eulerian.

VII. Define a binary tree. Show that the number of vertices in a binary tree is odd.

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