

Roll No. _____

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SVIS 331 A-15
B.Sc. VIth Semester Degree Examination
Mathematics
(Graph theory - II)
Paper - 6.3 (d)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

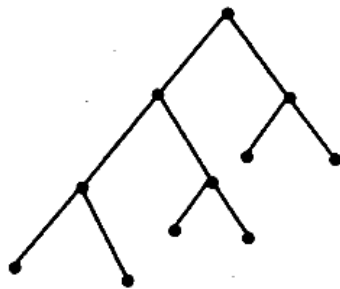
Answer All Sections

SECTION -A

Answer any **Ten** of the following.

(Marks : $10 \times 2 = 20$)

1. Define the terms
 - i) Cut vertex
 - ii) Bridge.
2. Draw a connected graph with 5 vertices and 7 edges which contains two blocks.
3. Find the sum of path length of given binary tree.



4. Give an example of tree whose complement is also tree.
5. Find three spanning trees of K_5 .

6. Show that the number of vertices in a binary tree is odd.
7. Define vertex connectivity and Edge connectivity.
8. If G be a graph with $K(G) = 1$. What are the possible values of $K(G-V)$ and $\lambda(G-V)$.
9. Which of following graphs are separable and non separable
 - i) $K_{2,2}$
 - ii) $K_{1,4}$
10. Define Eulerian trail Eulerian cycle.
11. Show that If C_p is a cycle with $p \geq 3$ Then $\lambda(C_p) = 2$.
12. Give an example of a graph G with 5 vertices such that both G and \bar{G} are Hamiltonian graphs.

SECTION - B

Answer any Five of the following.

(Marks : $5 \times 6 = 30$)

13. Prove that a connected graph G with at least 3 vertices is a block if and only if any two vertices of G lies on a common cycle.
14. a) Define
 - i) Eccentricity $e(v)$
 - ii) Radius $r(G)$
 - iii) Diameter $d(G)$b) For any connected graph G show that $r(G) \leq d(G) \leq 2r(G)$
15. Prove that a graph G is a tree if and only if every two distinct vertices of G are joined by unique path.

16. Draw all binary trees with five end vertices. Find the path length of each.
17. Suppose that a tree T has N_1 Vertices of degree 1, N_2 Vertices of degree 2, N_3 Vertices of degree 3..... N_k vertices of degree k than prove that $N_1 = 2 + N_3 + 2N_4 + 3N_5 + \dots + (k-2)N_k$
18. a) Define
- A rooted tree
 - Balanced tree
- b) If T is a binary tree of height h and with p vertices then prove that $P \leq 2^{h+1} - 1$.
19. Prove that a (p,q) graph is a tree if and only if it is acyclic and $p = q+1$

SECTION - C

Answer any Five of the following.

(Marks : $5 \times 6 = 30$)

20. Let G be graph with $K(G) = 1$ Then find the values of following
- $K(G-e)$
 - $\lambda(G-v)$
 - $\lambda(G-e)$.
21. Which of the following graphs are separable or non separable
- C_6
 - K_4-v
 - K_3-e

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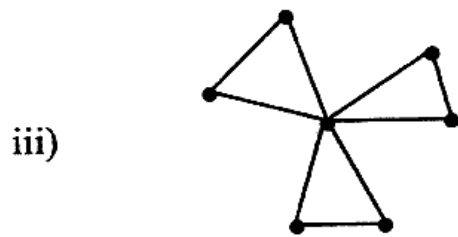
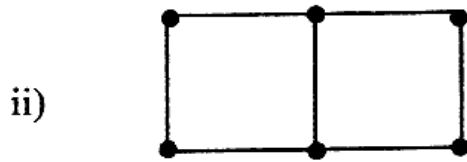
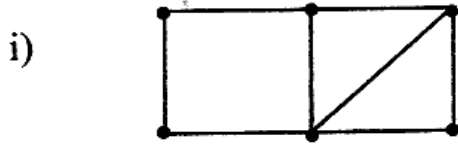
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22. Prove that if a (p,q) graph G is connected then $q \geq \frac{Pn}{2}$.
23. Let G be graph of order $P \geq 3$ If $\deg(V) \geq \frac{P}{2}$ for every vertex of G then prove that G is Hamiltonian.
24. Define eulerian trail and eulerian cycle and state which of the following is eulerian and non eulerian.



25. Let G be Non-trivial connected graph then G contains Eulerian trail Iff G has exactly two odd vertices.
26. Explain the Chinese post man problem with graphical representation.