Roll.No. | 25PAMCT3010

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
M.Sc.Applicable Mathematics - END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - III
25PAMCT3010 - Advanced Graph Theory

Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

Section B

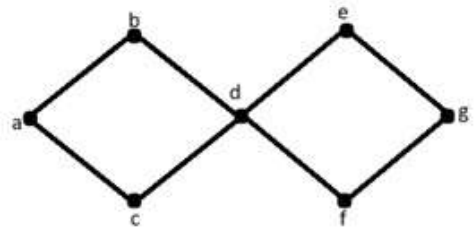
Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Prove that the maximum number of lines among all p points graph with no triangle is $[p^2/4]$.
2. Define binary tree and list out its property.
3. Prove that a connected graph G is di-orientable iff G has no bridges.
4. Prove that, for a flow f and a cut[S] of N, val(f) = val(fs) = $f + (S)f - (S)$.
5. Prove that every 3 regular graph without cut edges has a perfect matching
6. Define the following with examples.
   1. subgraph 2. Intersection of two graphs 3. Self complementary graph
7. A tree has 5 vertices of degree 2, 3 vertices of degree 3 and 4 vertices of degree 4. How many vertices of degree 1 does it have?
8. Explain the applications of directed graph in job sequencing problem.

Section C

I - Answer any **TWO** questions $(2 \times 10 = 20$ Marks)

9. Prove the following:
   1. The number of vertices of odd degree in a graph is always even.
   2. For a graph G, the sum of degree of vertices is equal to twice the number of edges.
10. Explain Breadth-First search algorithm. Using BFS algorithm to find a spanning tree of a graph given below.



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11. State and prove Moon's and Dirac's theorem which gives the relation between tournament and k-cycle.

12. Prove that a cubic graph has a 3-flow iff it is bipartite.

II - Compulsory question $(1 \times 10 = 10$ Marks)

13. State and prove Hall's Marriage theorem.

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