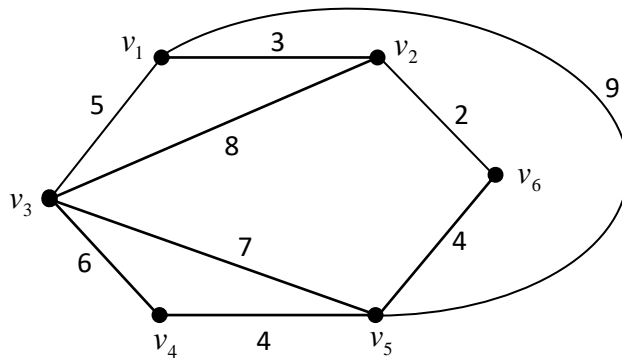


BCA II Semester
(TBC-204) Discrete Mathematical Structures & Graph Theory
Assignment

Date of Submission : 26-7-2021

NOTE: Attempt all questions. Make one pdf only and filename should be your Rollno and Name. You must sign on every page. Submit your file on the link given below.

1. Define symmetric and skew symmetric matrix with the help of suitable examples.
2. Solve the following system of linear equations using rank and matrix inverse method.
$$\begin{aligned}2x + 4x - y &= 5 \\ -x + 5y - 2z &= 2 \\ 3x - 2y + 2z &= 3\end{aligned}$$
3. Find the eigen values of the matrix $A = \begin{bmatrix} 4 & 3 & 1 \\ 2 & 1 & -2 \\ 1 & 2 & 1 \end{bmatrix}$ and eigen vectors, Also verify Cayley Hamilton theorem for matrix A. Hence find A^{-1}
4. Express the function $F = xz + x'y$ as a sum of minterms and maxterms.
5. Simplify the following Boolean functions using Karnaugh map
 - (i) $xy'z + xy'z' + xy'z' + xyz'$
 - (ii) $x'y'z + x'y'z' + x'y'z + xyz$
6. Define Boolean algebra and its various laws.
7. Prove that if a graph G (connected or disconnected) has exactly two vertices of odd degree, there must be a path joining the two vertices.
8. Prove that a disconnected simple graph G (without self loops and parallel edges) with n vertices and k components can have at most $\frac{(n-k)(n-k+1)}{2}$ edges.
9. Define a tree, rooted tree, binary tree and full binary tree with help of suitable examples.
10. Define height of a binary tree. Find the minimum and maximum height of a full binary tree.
11. What do you mean by a planar graph? Check whether $K_{2,3}$ is a planar graph?
12. Find the minimal spanning tree using Kruskal's algorithm in the graph given below.



13. Using Dijkstra algorithm, find the shortest path of every vertex from v_1 .
14. What do you mean by colouring of a graph. Define proper colouring and chromatic number of a graph.
15. Prove that for a complete graph of n vertices, the chromatic polynomial is $P_n(\lambda) = \lambda(\lambda-1)(\lambda-2)\dots(\lambda-n+1)$.

Submission Link: <https://forms.gle/jj3BiGToKbzHm83x5>