Date:

Registration number:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27

BCA(DATA ANALYTICS) - II SEMESTER

SUPPLEMENTARY EXAMINATION: APRIL 2022

(Exam conducted in JULY 2022)

BCADA 2220 – DISCRETE MATHEMATICS IN REAL WORLD II

Time- 2 ½ hrs **Max Marks-70**

This question paper contains 3 printed pages and three parts

PART A

Answer all the questions **10 X 1 = 10**

1. The Matrix is a $\begin{bmatrix} 4 & 3 & 5 \\ 3 & 5 & 6 \\ 5 & 6 & 3 \end{bmatrix}$
   a. identity matrix
   b. symmetric matrix
   c. skew symmetric matrix
   d. none of the these
2. The determinant of identity matrix is?
   a. 1
   b. 0
   c. Depends on the matrix
   d. None of the mentioned
3. If determinant of a matrix A is Zero then
   a. A is a Singular matrix
   b. A is a non-Singular matrix
   c. Can't say
   d. None of the mentioned
4. The rank of the matrix $\begin{bmatrix} 3 & 1 & 0 \\ 0 & 8 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ is
   a. 1
   b. 2
   c. 3
   d. None of the above

5. For the solutions of system of equations of the form A X = B, then there exists the solution of the system of equations if
    a. Rank of A= Rank of [A:B]
    b. Rank of A > Rank of [A:B]
    c. Rank of A < Rank of [A:B]
    d. Rank of A ≠ Rank of [A:B]
6. What is the number of edges present in a complete graph having n vertices?
    a. (n*(n+1))/2
    b. (n*(n-1))/2
    c. n
    d. Information given is insufficient
7. Dijkstra's Algorithm cannot be applied on _____
    a. Directed and weighted graphs
    b. Graphs having negative weight function
    c. Unweighted graphs
    d. Undirected and unweighted graphs
8. Which of the following is true?
    a. Prim's algorithm can also be used for disconnected graphs
    b. Kruskal's algorithm can also run on the disconnected graphs
    c. Prim's algorithm is simpler than Kruskal's algorithm
    d. In Kruskal's sort edges are added to MST in decreasing order of their weights
9. The major objective of automata theory is to develop methods by which computer scientists can
    a. Describe and analyze the dynamic behavior of discrete systems
    b. Map the dynamic behavior of discrete systems
    c. describe and analyze the dynamic behavior of continuous systems
    d. None of the above
10. Characteristics of Finite state Machines include
    a. Input, output, states
    b. Input, output, results
    c. Input, output, performance
    d. None of the above

PART B

Answer any SIX questions **6 X 5 = 30**

11. If A = $\begin{bmatrix} 1 & 3 \\ 3 & 4 \end{bmatrix}$ and $A^2 - KA - 5I = 0$, then what is the value of K?
12. Find the rank of the matrix A where A is $\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$
13. Find whether the following system possess a non-trivial solution

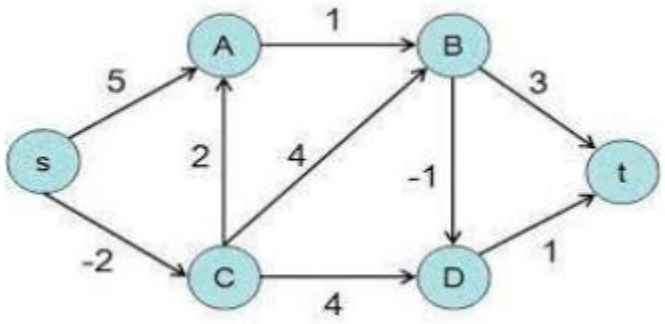
x-3y+2z = 0
7x-21y+14z = 0
-3x+9y-6z = 0

14. Examine the consistency the following system of equations

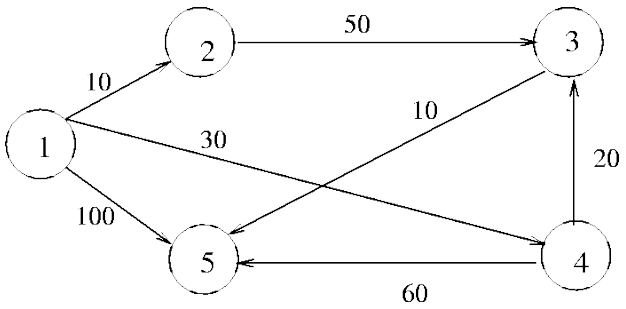
x – 7y +15z= - 14
2x+3y-4z= 6
3x-4y+11z= - 8
5x-y+7z= - 2

15. Define with diagram
    a) Connected Graph
    b) Weighted Graph
    c) Walk and Trail
    d) Incidence matrix
    e) Adjacency matrix

16. Estimate the minimum cost for the given tree implementing Kruskal's algorithm.



17. Write Dijkstra's Algorithm. Using Dijkstra's Algorithm find the shortest path between P and Y.

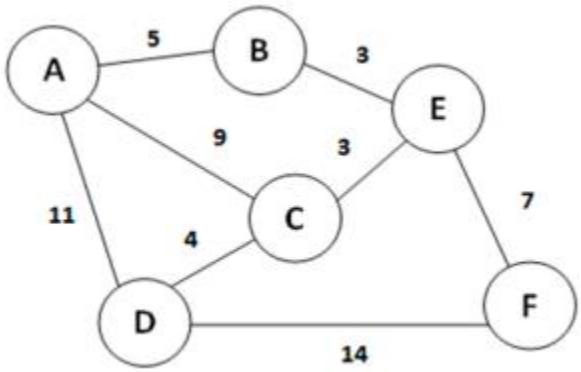


18. Define Finite State Machine.

PART C

Answer any THREE questions **3 X 10 = 30**

19. Find the eigen values and corresponding eigen vectors of the matrix A = $\begin{bmatrix} 4 & -1 \\ 1 & 2 \end{bmatrix}$
20. Test the following system for consistency and solve if it consistent
    x+2y-z=3
    3x-y+2z=1
    2x-2y+3z=2
21. Estimate the minimum cost for the given tree implementing prims algorithm.



22. Explain a (Simplified) Ticket Machine with diagram.