B.Sc/BCA DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, DECEMBER 2021

Second Semester

Complementary Course - MM2CMT03 - MATHEMATICS - DISCRETE MATHEMATICS (II)

(Common for B.Sc Computer Science Model III, B.Sc Cyber Forensic Model III, Bachelor of Computer Applications)

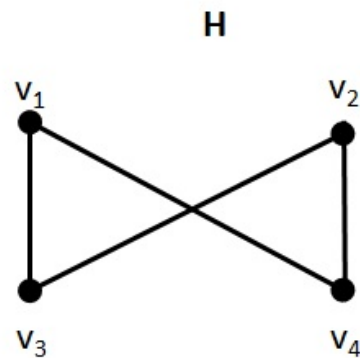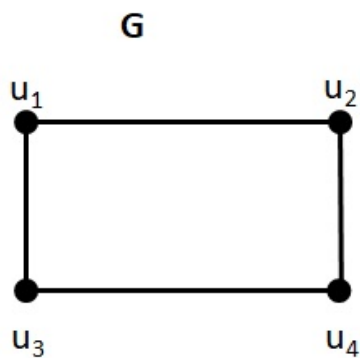2017 ADMISSION ONWARDS

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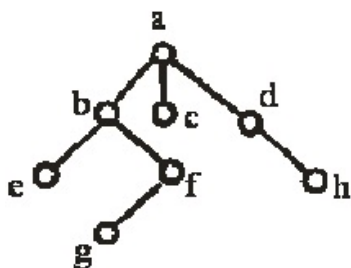Time: 3 Hours   Max. Marks : 80

Part A

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Show that the following graphs G and H are isomorphic

2. Define weakly connected graph.

3. Define Hamilton circuit.

4. Draw the subtrees with vertex 'b' as the root.

5. Find a Binary search tree for ' coconut , papaya , jackfruit , grapes ,orange

6. What is a ' Postorder ' traversal of a rooted tree ?

7. What is the value of Prefix expression ^ - * 3 3 * 4 2 5

8. Write the Distributive laws .

9. Check whether the following matrix is symmetric or not.

$$\begin{pmatrix} 1 & 5 & 4 \\ 5 & 3 & 2 \\ 4 & 2 & 7 \end{pmatrix}$$

10. Define rank of a matrix.

11. Write the congugate of the matrix $\begin{pmatrix} 3i & 2 \\ 2+5i & 1-i \end{pmatrix}$

12. Find the characteristic equation of the matrix $\begin{pmatrix} 3 & 2 \\ 9 & 6 \end{pmatrix}$

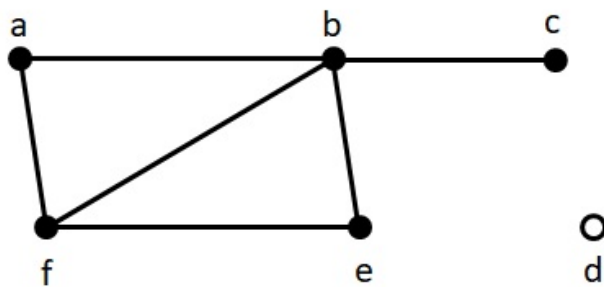(10×2=20)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Find the number of vertices, number of edges and the degree of each vertex in the given graph and identify all isolated and pendant vertices.

14. Draw an undirected graph represented by the adjacency matricx

(a) $\begin{bmatrix} 1 & 2 & 0 & 1 \\ 2 & 0 & 3 & 0 \\ 0 & 3 & 1 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$

15. Suppose that someone starts a chain letter .Each person who receives the letter is asked to send it on to four other people . Some people do this , but others do not send any letters .How many people have seen the letter including the first person , if no one receives more than one letter and if the chain letter ends after there have been 100 people who read it but did not send it out ? how many people sent out the letter ?
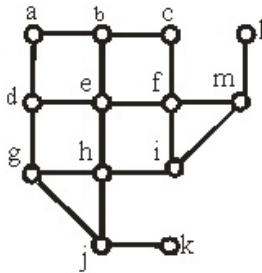
16. Define spanning tree of a connected graph. Find the spanning tree of the following graph by explaining the procedure.
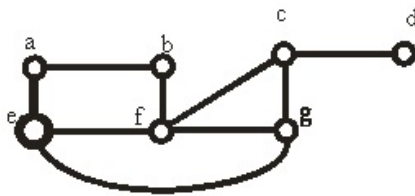
17. Find DFS spanning tree for the following graph starting from the vertex ' a '.

18. Use a table to express the following boolean functions

1) F (x , y , z) = $\bar{x}y + \bar{y}z$

2) F (x , y , z) = $(x + y)\bar{z}$

19. Find the sum of products expansion for the function F (x , y , z) = $(x + y)\bar{z}$

20. Explain row canonical form and normal form of a matrix.

21. Check whether the following system is consistent or not.

$x + 2y + 3z = 2$

$2x - 3y + 5z = 1$

$-x + y + 5z = 7$

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. Draw graph models, stating the type of graph used, to represent airline routes where every day there are four flights from Boston to Newark, two flights from Newark to Boston, three flights from Newark to Miami, two flights from Miami to Newark, one flight from Newark to Detroit, two flights from Detroit to Newark,three flights from Newark to Washington, two flights from Washington to Newark, and one flight from Washington to Miami, with (a) an edge between vertices representing cities that have a flight between them.. (b) an edge between vertices representing cities for each flight that operates between them.. (c) an edge between vertices representing cities for each flights that operates between them plus a loop for a specal sightseeing trip that takes off and lands in Miami.

23. (a) Explain BFS spanning tree of a connected graph.

(b) Find BFS spanning tree of the following graph starting from the vertex ' a ' by explaining steps.
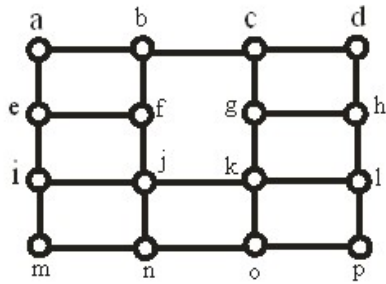
24. Construct circuits that produce the following outputs 1) $(x + y)\bar{z}$ 2) $(x + y + z)(\bar{x}\bar{y}\bar{z})$

25.

Find rank by row canonical form $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 3 & 5 & 4 \\ 6 & 9 & 1 & 0 \\ 8 & 5 & 0 & 2 \end{pmatrix}$

(2×15=30)