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**SAINTGITS COLLEGE OF APPLIED SCIENCES**

**SECOND INTERNAL ASSESSMENT EXAMINATION, APRIL 2019**

**Department of Mathematics, Semester 2**

**DISCRETE MATHEMATICS II**

Total : **80 marks** Time:**3Hours**

**Section A**

*Answer any 10 questions. Each question carries 2 marks.*

1.Define complete graph

2. Is $C\_{6}$ bipartite? Why?

3. Draw a graph with adjacency matrix:

 $\left[\begin{matrix}\begin{matrix}0&1&1\\1&0&0\\1&0&0\end{matrix}&\begin{matrix}0\\1\\1\end{matrix}\\\begin{matrix}0&1&1\end{matrix}&0\end{matrix}\right]$

4. Define path in a graph

5. State Dirac’s theorem

6. Define spanning tree

7. What is the ordered rooted tree that represents the expression $( \left(x+y\right)\uparrow 2 )+((x-y)/3)$

8. Find the values of the Boolean function $F\left(x, y, z\right)= \overbar{x}y$

9. Write dual of the Boolean expression $xyz+ \overbar{x}\overbar{y}\overbar{z}$

10. Define skew symmetric matrix

11. Define rank of a matrix

12. Find rank of the matrix $\left[\begin{matrix}1\\-4 \end{matrix}\begin{matrix}2\\0\end{matrix}\begin{matrix} 3\\ 5\end{matrix}\right]$

 **(10 X 2 = 20 marks)**

**Section B**

*Answer any 6 questions. Each question carries 5 marks.*

13.Prove that a simple graph is bipartite if and only if it is possible to assign one of two different colors

 to each vertex of the graph so that no two adjacent vertices are assigned the same color

14.Explain Konigsberg Bridge Problem

15.Prove that a tree with n vertices has n -1 edges

16.What is the value of the prefix expression $+ \* + -5 3 2 1 4$

17.Write algorithm for Huffman coding

18. Find the sum of products expansion for the function $F\left(x, y, z\right)=(x+y)\overbar{z}$

19. Verify the Distributive Law $x+yz=\left(x+y\right)(x+z)$

20. Reduce the matrix A = $\left[\begin{matrix}1 \\\begin{matrix}2 \\3 \end{matrix}\end{matrix}\begin{matrix}2 \\\begin{matrix}-2 \\0 \end{matrix}\end{matrix}\begin{matrix}3 \\\begin{matrix}1 \\4 \end{matrix}\end{matrix}\begin{matrix}-2\\\begin{matrix}3\\1\end{matrix}\end{matrix}\right]$ to normal form and find the rank

21. A full m-ary tree with i internal vertices has $n=mi+1 vertices$

**(6 X 5 = 30marks)**

**Section C**

*Answer any 2 questions. It carries 15marks.*

22.a) Write the algorithm for backtracking

 b) How backtracking can be used to solve the n – queen problem on an $n ×n chessboard?$

23. Find preorder, inorder and postorder traversals of the given graph

24. Construct circuits that produce the following output

 a) $\left(x+y\right)\overbar{x}$ b) $\overbar{x} \overbar{( y+ \overbar{z})}$ c) $(x+y+z)( \overbar{x}\overbar{y}\overbar{z})$

25.a) Solve $x+y+z=4$

 $2x-y+2z=5$

 $x+y-z=2$ using Cramer’s rule

 b) Find row equivalent canonical form of the matrix

 $\left[\begin{matrix}1\\2\\3\end{matrix}\begin{matrix}1\\1\\ -3\end{matrix}\begin{matrix}1\\-3 \\ 1\end{matrix}\begin{matrix}2\\-6\\2\end{matrix}\right]$

 **(2 X 15 = 30 marks)**

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