DCCA101

Reg. No.

I Semester B.C.A. Degree Examination, April - 2023

COMPUTER APPLICATIONS

Discrete Structures

Paper : CA-CIT

(NEP 2021 Onwards Scheme)

Time : 2½ Hours **Maximum Marks : 60**

Instructions to Candidates:

Answer any **Four** questions from each part.

PART - A

Answer any **Four** questions. Each question carries **2** marks. **(4×2=8)**

1. Define power set with an example.
2. Construct the truth table for the proposition $(p \vee \sim q)$.
3. Define Equivalence Relation.
4. If $\begin{vmatrix} 1 & 2 & -1 \\ 3 & x & -2 \\ 1 & 2 & -3 \end{vmatrix} = 0$ then find x?
5. Define pseudo graph with an example.
6. Write the planar representation of graph K_4.

PART - B

Answer any **Four** questions. Each question carries **5** marks. **(4×5=20)**

7. Show that the proposition $(p \rightarrow q) \leftrightarrow \sim p \vee q$ is a Tautology.
8. Prove by mathematical induction $1^2 + 2^2 + 3^2 + \ldots\ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$, $\forall$ positive integers 'n'.
9. State and prove Pigeonhole principle.

[P.T.O.

10. Find the rank of the matrix $\begin{bmatrix} 1 & 1 & 1 & 6 \\ 1 & 2 & 3 & 14 \\ 1 & 4 & 7 & 30 \end{bmatrix}$.

11. Find the inverse of the matrix $\begin{bmatrix} 1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}$.

12. Define the following terms.

 i) Path

 ii) Circuit

 iii) Walk

 iv) Trail

 v) Loop

PART - C

Answer any **Four** questions. Each question carries **8** marks. **(4×8=32)**

13. a) If $A=\{1,3,5,7,6\}$, $B=\{2,4,6,1,7\}$ and $C=\{3,7,11,5\}$ verify $A\cup(B\cap C)=(A\cup B)\cap(A\cup C)$.

 b) In a group of 80 people, 42 like Coffee, 60 like Tea and each person like atleast one of the two drinks. Find how many people like both Coffee and Tea? **(4+4)**

14. a) Let A = {1,2,3,4,6}, R is a relation on A defined by $R=\{(a,b):a,b\in A \text{ "}a \text{ divides } b\text{"}\}$ Write (i) matrix representation of R. (ii) Digraph of R.

 b) If $f:R\to R$ is defined by $f(x)=4x+5$ then show that f is invertible. **(4+4)**

15. a) Write the converse, Inverse and contrapositive of the given statement "If two integers are equal then their squares are equal".

 b) How many arrangements can be made from the letters of the word "ASSASSINATION"? In how many of these arrangements do the four S's not come together? **(3+5)**

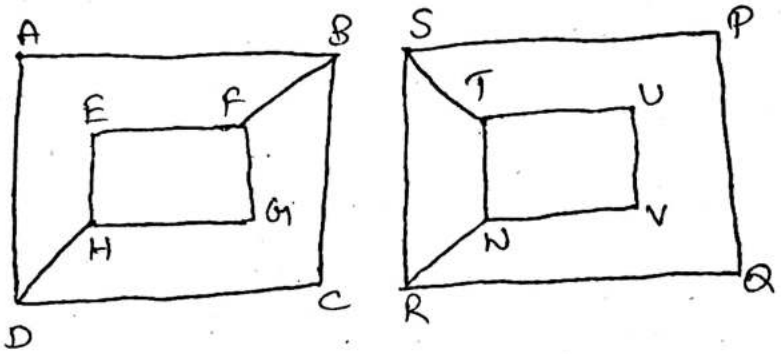
16. a) If $A = \begin{bmatrix} 5 \\ 2 \\ -3 \end{bmatrix}$ and $B = [-1 \quad 4 \quad 6]$ show that $(AB)' = B'A'$.

b) Solve the following system of equations

$$3x - 2y + 3z = 8$$
$$2x + y - z = 1$$
$$4x - 3y + 2z = 4$$

(3+5)

17. a) Examine whether the following graphs are Isomorphic (or) not



b) Define spanning tree with an example. (6+2)

18. Find the minimum weight spanning tree by Prim's Algorithm. (8)