560078

DCCA-101

Reg. No. | | | | | | | | | |

I Semester B.C.A. Degree Examination, February/March - 2024

COMPUTER SCIENCE

Discrete Structures (Theory)

(NEP 2021 Scheme)

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

Instructions to Candidates:

Answer any Four questions form each part.

PART - A

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

1. If A = {1,2,3} and B = {2,3,4,5} then find
   i) AUB
   ii) B-A
2. Define an equivalence relation .
3. Construct a truth table for the proposition $\sim p \rightarrow q$
4. Define a scalar matrix with an example.
5. Define a regular graph with an example.
6. Define a bipartite graph with an example.

PART- B

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

7. Show that the proposition $(p \rightarrow q) \wedge (q \rightarrow r) \rightarrow (p \rightarrow r)$ is a tautology.
8. Prove by mathematical Induction that $1^2 + 2^2 + 3^2 + \ldots\ldots + n^2 = \frac{n(n+1)(2n+1)}{6}$
9. Explain principles of counting

[P.T.O.

10. Find the inverse of the matrix

$$\begin{pmatrix} 1 & 2 & -1 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{pmatrix}$$

11. Find the rank of the matrix

$$\begin{pmatrix} 1 & 1 & 1 & 6 \\ 1 & 2 & 3 & 14 \\ 1 & 4 & 9 & 30 \end{pmatrix}$$

12. Define the following terms.

i) Loop

ii) Walk

iii) Trial

iv) Path

v) Circuit

PART - C

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

13. a) If A = {1,2,3} B = {1,-1} C = {0,4} then verify that $A-(B\cup C)=(A-B)\cap(A-C)$

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?

14. a) State and Prove binomial theorem for any positive integer,m.

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

15. a) Write converse, inverse and contrapositive of the conditional statement " If S is an equilateral triangle then S is an Isosceles triangle".

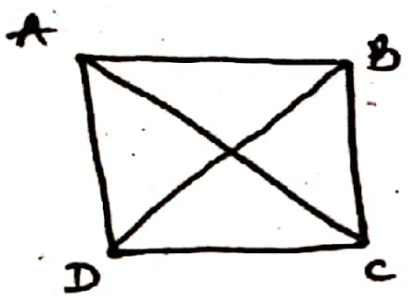
b) In how many ways the letters of the word MISSISSIPPI be arranged so that 4's are not together.

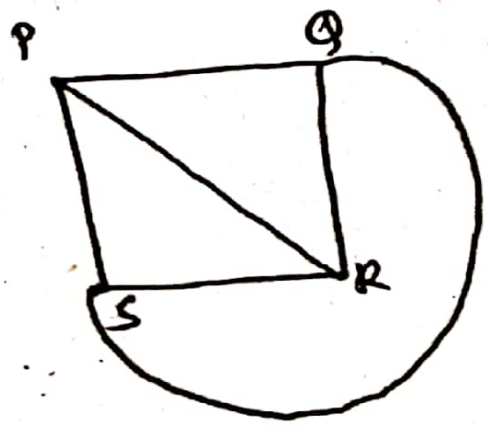
16. a) If $A=\begin{bmatrix}5\\2\\-3\end{bmatrix}$ $B=[-1 \quad 4 \quad 6]$ show that $(AB)'=B'A'$

b) Solve the system of equations

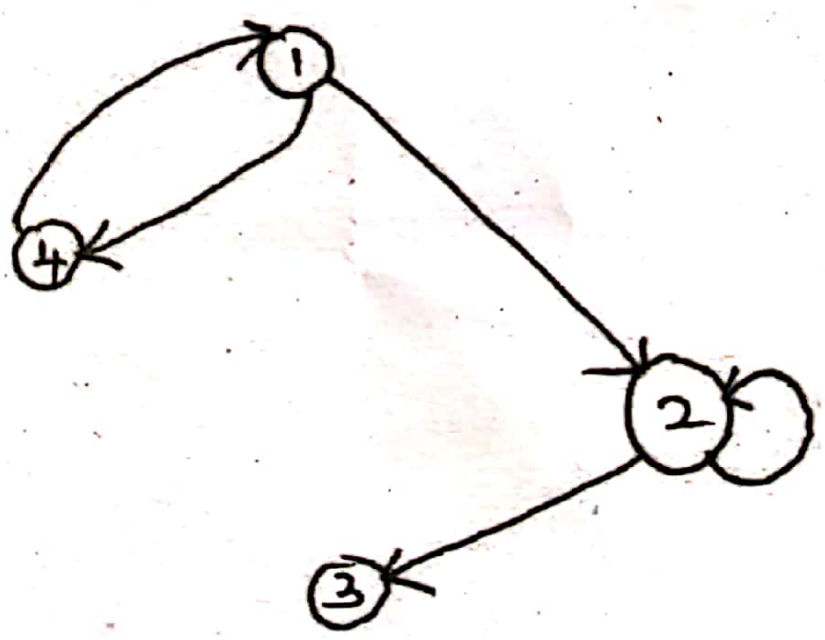
$$x+y+z=7$$
$$2x+3y+2z=17$$
$$4x+9y+z=37.$$

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





b) Find the relation represented by the digraph given below. Write down its matrix.



[P.T.O.

18. Find the minimum weight spanning tree by prim's algorithm