NP - 313

I Semester B.C.A. Degree Examination, March/April 2023 (NEP) (2021 – 22 and Onwards) (F+R) COMPUTER SCIENCE Discrete Structures

Time : 21/2 Hours

Max. Marks : 60

LIBRAR

Instruction : Answer any 4 questions from each Section.

SECTION - A

I. Answer any 4 questions. Each question carries 2 marks.

(4×2=8)

5

5

P.T.O.

- 1) Find x and y if (x + 3, 7) = (4, 2x y).
- 2) Define reflexive and symmetric relation.
- 3) How many 3 digit numbers can be formed by using digits 1 to 9 if no digit is repeated ?
- 4) Find Adjoint of A = $\begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$.
- Define scalar matrix with an example.
- 6) Define Binary tree.

SECTION - B

- II. Answer any four questions. Each question carries 5 marks. (4×5=20)
 - 7) Out of 20 members in a family, 12 like to take tea, 15 like coffee. Assume that each one like at least one of the two drinks how many like
 - i) Both coffee and tea.
 - ii) Only tea and not coffee. 8) Prove that $\sim (p \leftrightarrow q) \equiv \sim [(p \rightarrow q) \land (q \rightarrow p)].$

NP - 313

5

5

- 9) Find the value of n if ${}^{n}p_{2} = 12$.
- 10) If $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 4A + 3I = 0.$ 5
- 11) Traverse the following tree in preorder, postorder and inorder.



12) Solve using Cramer's rule.

3x + 4y = 7 and 7x - y = 6.

SECTION - C

- III. Answer any 4 questions. Each carries 8 marks.
 - 13) a) Consider f : $R \rightarrow R$ given by f(x) = 4x + 3 show that f is invertible. Find inverse of f.
 - b) Prove that $(p \land q) \land \sim (p \lor q)$ is contradiction.
 - 14) a) How many words with or without meaning can be made from the letter of the word "MONDAY" assuming that no letter is repeated if
 - i) 4 letters are used at a time
 - ii) All letters are used at a time.
 - b) Find the co-efficient of x^6y^3 in the expansion of $(x + 2y)^9$. (4+4)
 - 15) a) Explain tower of Hanoi problem with 3 discs.
 - b) Show that $1 + 3 + 5 + \ldots + (2n 1) = n^2$ by mathematical induction. (4+4)

5

 $(4 \times 8 = 32)$

(4+4)

16) a) Find the inverse of the matrix $A = \begin{bmatrix} 2 & -1 \\ 3 & -2 \end{bmatrix}$.

b) If
$$A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$$
 and $B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$ verify $(AB)' = B'A'$. (4+4)

17) a) Find the minimum weighted spanning tree by Prim's algorithm.



b) Define minimum spanning tree.

(6+2)

- 18) a) Construct binary search tree 56, 38, 10, 65, 72, 44, 50.
 - b) Define Hand shaking lemma theorem with an example.

(5+3)