NP – 404

I Semester B.C.A. Examination, January/February 2026
(NEP) (Repeaters)
COMPUTER APPLICATION
Discrete Structures

Time : 2½ Hours　　　　　　　　　　　　　　　　Max. Marks : 60

Instructions : *1) Answer **all** the Sections.*
*2) Answer **any 4** questions from **each** Section.*

SECTION – A

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

1) Mention the different methods of representation of sets.

2) Define Domain and Range of a Relation.

3) Define identity matrix with an example.

4) Evaluate 7! – 5!.

5) If $A = \begin{bmatrix} 5 & 2 \\ 0 & 1 \end{bmatrix}, B = \begin{bmatrix} 3 & 3 \\ 4 & 1 \end{bmatrix}$ find 2A + 3B.

6) Define Graph isomorphism.

SECTION – B

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

7) According to the survey made among 200 students, 140 students like cold drinks, 120 students like milkshakes and 80 like both. How many students like atleast one of the drinks ?

8) Prove that $(p \to q) \vee (\sim p \to q)$ is a tautology.

9) Find r, if ${}^{15}P_{n-1} : {}^{16}P_{r-2} = 3 : 4$.

P.T.O.

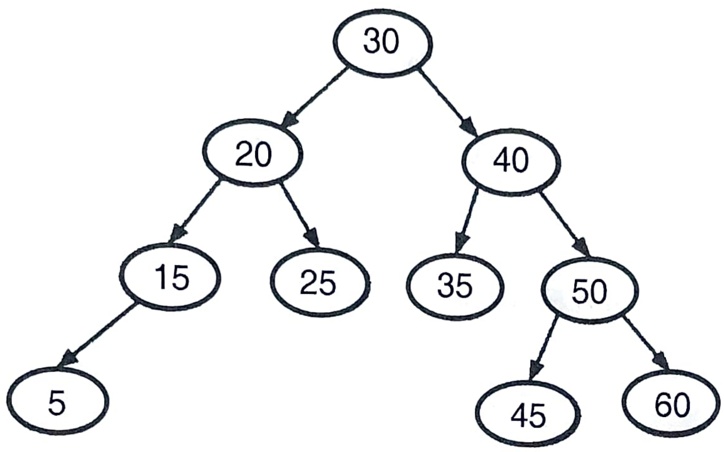
10) Solve using Cramer's rule.

$3x + 4y = 7$

$7x - y = 6$

11) Find the value of x, if $\begin{vmatrix} 1 & 4 & 5 \\ 2 & x & 0 \\ 3 & 5 & 8 \end{vmatrix} = 0$.

12) Traverse the following tree in preorder, postorder and inorder.



SECTION – C

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

13) a) Let R, be the relation on the set {1, 2, 3, 4, 5} defined by the rule $(x, y) \in R$ if $x + y \leq 6$. Find the following :

i) List the elements of R and R^{-1}

ii) Domain of R and R^{-1}

iii) Range of R and R^{-1}. 4

b) Show that $(p \wedge q) \wedge \sim (p \vee q)$ is a contradiction. 4

14) a) Find the number of ways in which 8 boys and 5 girls can be arranged in a row so that no two girls are together. **4**

b) Find the coefficient of x^7y^5 in the expansion of $(x + y)^{12}$. **4**

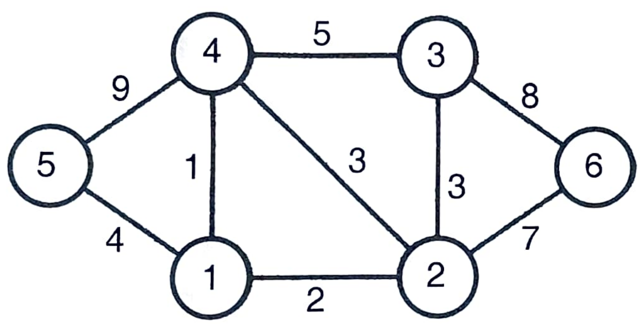
15) Using Mathematical induction, prove that $1 + 3 + 5 + ... + (2n - 1) = n^2$. **8**

16) a) Solve by matrix method.

$2x - 3y = 1, 3x - y = 3$ **4**

b) Find the adjoint of $A = \begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$. **4**

17) Obtain the minimum cost spanning tree for the following graph using Kruskal's algorithm. **8**



18) a) Construct binary search tree, the order of the elements given are 56, 38, 10, 65, 72, 44, 50. Show the tree after each insertion. **5**

b) Define a walk, trial and path with example. **3**