U19IK21S0102

DCCA – 203

II Semester B.C.A. Examination, October/November 2022
(NEP Scheme)
COMPUTER APPLICATION (Paper – II)
Discrete Mathematical Structures

Time : 2½ Hours Max. Marks : 60

Instruction : *Answer **all** Sections.*

SECTION – A

I. Answer **any six** questions : **(6×2=12)**

1) What is a proposition ? Give an example.
2) In how many ways four boys can be seated on a bench ?
3) State principle of Mathematical Induction.
4) Give the truth table for implication.
5) Find the symmetric difference of {1,3,5} and {1,2,3}.
6) What is a Null matrix ? Give an example.
7) Define a diagonal matrix. Give an example.
8) Define Graph Isomorphism.
9) Find the adjoint of $A = \begin{bmatrix} 2 & 1 \\ 5 & 3 \end{bmatrix}$

SECTION – B

II. Answer **any four** questions : **(4×6=24)**

10) i) Write the converse, inverse and contra positive of the conditional statement
" The home team wins whenever it is raining".

ii) Construct the truth table for the compound propositions and show that they are logically equal

a) $p \vee (q \wedge r)$

b) $(p \vee q) \wedge (p \vee r)$

P.T.O.

11) i) Is the function f(x)=x+1 from the set of integers to the set of integers is one-one ?

ii) Find how many arrangements can be made with the letters of word "MATHEMATICS". In how many of them the vowels occur together ?

12) In how many ways can a football team of 11 players selected from 15 players ? How many of these will

i) Include one particular player ?

ii) Exclude one particular player ?

13) Show that for all $n \geq 1$, $1^2+2^2+3^2+.....+n^2 = \frac{n(n+1)(2n+1)}{6}$ using mathematical induction.

14) Solve using Cramer's Rule

$3x + y + z = 3$

$2x + 2y + 5z = -1$

$x - 3y - 4z = 2.$

15) Draw the digraph corresponding to the matrix

$$\begin{bmatrix} 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 \\ 0 & 2 & 0 & 0 \end{bmatrix}$$

SECTION – C

III. Answer **any three** questions : **(3×8=24)**

16) Derive the recurrence relation for Tower of Hanoi Problem.

17) Solve the recurrence relation

$a_n - 4a_{n-1} + 4a_{n-2} = 0$ where $a_0=1, a_1=3$.

18) Find the coefficient of x^6y^3 in the expansion of $(x+2y)$.

19) A certain computer center employs 100 Programmers out of these 47 can program in FORTRAN, 35 in PASCAL, 20 in COBOL, 23 in FORTRAN and PASCAL, 12 in COBOL and FORTRAN, 11 in PASCAL and COBOL. How many can do all of these languages ?

20) i) Find the rank of the matrix

$$A = \begin{bmatrix} 1 & 2 & -1 & 3 \\ 2 & 4 & 1 & -2 \\ 3 & 6 & 3 & -7 \end{bmatrix}$$

ii) Determine whether the relation with the directed graph is an equivalence relation.