

First Year B.C.A (Semester - II) Examination
Paper - 15BCA110

Discrete Mathematical Structures

Time : Three hours]

[Full Marks - 60

- N.B. :**
- i) All questions carry equal marks
 - ii) Question No. 1 is compulsory.
 - iii) Due credit will be given to neatness & adequate dimensions.
 - iv) Illustrate your answer necessary with the help of neat sketches.
 - v) Use Blue/Black ink/refill only for writing the answer book.

Q.1 Choose correct alternative. 5

- a) A _____ is an ordered collection of objects.
 - i) Relation ii) Function
 - iii) Set iv) Proposition
- b) In function $y = f(x)$, y is known as
 - i) argument of x
 - ii) image of x
 - iii) range of x
 - iv) None
- c) Exponential Generating function is given by _____
 - i) $\sum_{n=0}^{\infty} a_n$ ii) $\sum_{n=0}^{\infty} a_n x^n$
 - iii) $\sum_{n=0}^{\infty} a_n \frac{x^n}{n!}$ iv) None
- d) _____ solution is the sum of Homogenous solution.
 - i) Ordinary solution ii) Total solution
 - iii) Exponential solution iv) Aggregate solution

- Q.10 a) Define Graph & explain types of graphs with example. 8
- b) Define tree with example. Also state properties of tree. 3

OR

- Q.11 a) Define Graph. Explain how to represent graph in the form of matrix with example. 7
- b) Explain with example. 4
- i) Degree of vertex
 - ii) Binary Tree

- e) _____ tree has only one vertex of degree 2 and remaining vertices are of degree 1 or 3
- i) Rooted Tree ii) Binary Tree
iii) Complete Tree iv) Regular Tree

- Q.2 a) If \cup = even nos. less than or equal to 4U 7
A = even numbers from 14 to 24
B = even numbers from 20 to 30
Find $A \cup B$, $A \cap B$, $A - B$, $B - A$, $A \oplus B$, A' , B'
- b) Find the number of integers between 1 to 250 which are neither divisible by 2 nor 5 4

OR

- Q.3 a) State principle of Inclusion - Exclusion for two finite sets and three finite sets. Also explain principles of Inclusion - Exclusion for two finite sets. 6
- b) Define set and explain types of sets with example. 5
- Q.4 a) Define function. Explain types of function with example. 5
- b) Define with example. 6
- i) Reflexive
ii) Transitive
iii) Symmetric

OR

- Q.5 a) Define with example. 4
- i) Composition of function
ii) Inverse of function
- b) Define Relation. Explain types of relation with example. 7

- Q.6 a) Find ordinary Generating function and exponenting generating function of following sequence. 8
- i) $\langle 0, 1, 2, 3, \dots \rangle$
ii) $\langle 1, -1, 1, -1, \dots \rangle$
- b) Find sequence for exponential generating function $(1-x)^{-1}$ 3

OR

- Q.7 a) Let $A(x)$, $B(x)$ and $C(x)$ are ordinary generating functions then prove. 6
- i) If $A(x) = B(x)$ then $a_n = b_n$
ii) If $C_n = \alpha \cdot a_n + \beta \cdot b_n$ then
 $C(x) = \alpha \cdot A(x) + \beta \cdot B(x)$
- b) Explain Ferrer's Diagram and conjugate of Ferrer's diagram. Also find Ferrer's diagram and its following. 5
- i) $8 + 6 + 7 + 3 + 2 + 4$
ii) $3 + 5 + 1 + 2$

- Q.8 a) Find particular solution of following recurrence relation. 6
- $a_r + 3a_{r-1} + 4a_{r-2} = 2r^2$
- b) Define Recurrence Relation with example. Explain in detail total solution of recurrence relation. 5

OR

- Q.9 a) Define Homogeneous solution. Find homogeneous solution of following. 7
- $a_r - 13a_{r-1} + 10a_{r-2} = 2r$
Where $a_0 = 5$, $a_1 = 10$
- b) State following properties of Lattice. 4
- i) Associative ii) Commutative
iii) Absorption iv) Idempotent