



Sambath

Avinashilingam Institute for Home Science and Higher Education for Women
(Deemed to be University Estd. u/s 3 of UGC Act 1956, Category 'A' by MHRD)
Re-accredited with 'A++' Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore - 641 043, Tamil Nadu, India

Continuous Internal Assessment Test I – February 2025

II SEMESTER

Class : I UG
Major : Computer Science

Time: 2 hours
Maximum Marks: 60

23BCSC04 Discrete Structures

Course Outcomes:

1. CO1: Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
2. CO2: Understand the basics of combinatorics, and be able to apply the methods from these subjects in problem solving.
3. CO3: Be able to use effectively algebraic techniques to analyse basic discrete structures and algorithms.
4. CO4: Understand asymptotic notation, its significance, and be able to use it to analyse asymptotic performance for some basic algorithmic examples.
5. CO5: Understand some basic properties of graphs and trees and related discrete structures, and be able to relate these to practical examples.

Part-A
Choose the correct answer

6x1=6

1. A binary relation R in a set A is said to be reflexive if
A) aRa B) aRb C) bRc D) aRc CO1K1
2. Given s and t, relation on z $s = \{(1, n), n \in \mathbb{Z}\}$ and $t = \{(n, 1), n \in \mathbb{Z}\}$ what is ts ?
A) $\{(1, 1)\}$ B) $\{(n, 1)\}$ C) $\{(1, n)\}$ D) $z \times z$ CO1K3
3. $F(x) = 2x + 3$, range = $\{1, 2, 3\}$ then co domain values are
A) $\{1, 2, 3\}$ B) $\{4, 5, 6\}$ C) $\{5, 7, 9\}$ D) $\{5, 5, 5\}$ CO1K5
4. Which asymptotic notation represents an upper bound on an algorithm's running time?
A) Θ (Theta) notation B) O (Big O) notation C) Ω (Omega) notation D) o (Little O) notation CO2K1
5. What is the sum of the first n natural numbers using the summation notation?
A) $n(n+1)/2$ B) n^2 C) $n/2$ D) $2n$ CO2K2
6. What is the solution to the recurrence relation $T(n) = T(n-1) + 3$ with the base case $T(1) = 2$?
A) $T(n) = 3n-1$ B) $T(n) = 3n-2$ C) $T(n) = 3n+1$ D) $T(n) = 3n$ CO3K2

Part- B
Answer ALL Questions
Each answer should not exceed 400 words or two pages

3x6=18

- 7.a. Define relation and its types . CO1K1
(or)
- 7.b. Explain union and intersection of sets using Venn diagram CO1K2
- 8.a. In a class of 50 students, 20 students play football and 16 students play hockey. It is found that 10 students play both the games. Find the number of students who play neither. CO1K5
(or)
- 8.b. Explain the concept of Asymptotic notations with suitable examples. CO2K2
- 9.a. Write notes on Bounding summations. CO2K3
(or)
9. b. Find the generating functions for the below sequences. (i) 1, 1, 1, ... (ii) 1, 1, 1, 1, 1, 1, 0, 0
(iii) 1, 3, 3, 1, 0, 0 (iv) 1, a, a², a³, ... (v) 1, 3, 9, 27, ... (vi) 1, 2, 3, 4, ... (vii) 0, 1, 2, 3, ... (viii) 0, 0, 0, 1, 2, 3, ...
(ix) 0, 0, 0, 1, 1, 1, ... (x) 1, 1, 0, 1, 1, 1, ... (xi) 1, 0, -1, 0, 1, 0, -1, ... (xii) 2, -2, 2, -2, ... CO3K2

Part-C

3x12=36

Answer ALL questions

Each answer should not exceed 800 words or four pages

- 10.a. Explain one to one and many to one function with an example CO1K1
(or)
- 10.b. A box contains 6 white balls and 5 red balls. Find the number of ways 4 balls can be drawn from the box if (I) they can be any color (II) 2 must be white and 2 red (III) they must all be the same color CO1K5
- 11.a. Find the number of integers between 1 to 100 that are divisible by i) 2, 3, 5 or 7 ii) 2, 3, 5 but not by 7 CO1K4
(or)
- 11.b. Write notes on Approximation by Integrals CO2K4
- 12.a. (i) List the summation formulas and properties.
(ii) Find the sum of 10 first natural numbers greater than 5, using the summation formula.
(iii) Find the sum of all even numbers from 1 to 100
(iv) Simplify and evaluate $\sum_{x=1}^n (4+x)$.
(v) Find the value of $\sum_{i=1}^n (3 - 2i)$ using the summation formulas. CO2K3
(or)
12. b. Solve the following recurrence relations. (i) $a_n = 4a_{n-1} + 5a_{n-2} + 7^n$ where $a_1 = 2$ and $a_2 = 6$,
(ii) $a_n = 6a_{n-1} - 11a_{n-2} + 6a_{n-3}$ where $a_0 = 2$, $a_1 = 5$, $a_2 = 15$ CO3K4

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