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Subject Code: ACSBS0106

Roll No:

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**NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA**

**(An Autonomous Institute Affiliated to AKTU, Lucknow)**

**B.Tech**

**SEM: 1<sup>st</sup>**

**SESSIONAL EXAMINATION –III (2020-2021)**

**Subject Name: Discrete Mathematics**

**Time: 1.15 Hours**

**Max. Marks: 30**

**General Instructions:**

- All questions are compulsory. Answers should be brief and to the point.
- This Question paper consists of 2 pages & 5 questions.
- It comprises of three Sections, A, B, and C. You are to attempt all the sections.
- **Section A** - Question No- 1 is objective type questions carrying 1 mark each, Question No- 2 is very short answer type carrying 2 mark each. You are expected to answer them as directed.
- **Section B** - Question No-3 is Short answer type questions carrying 5 marks each. You need to attempt any two out of three questions given.
- **Section C** - Question No. 4 & 5 are Long answer type (within unit choice) questions carrying 6 marks each. You need to attempt any one part a or b.
- Students are instructed to cross the blank sheets before handing over the answer sheet to the invigilator.
- No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

**SECTION – A**

**[8]**

**1. Question -**

**(4×1=4)**

**CO**

- a.** Find the value of  $a_4$  for the recurrence relation  $a_n = 2a_{n-1} + 3$  with  $a_0 = 6$ .
- a) 320
  - b) 221
  - c) 141
  - d) 65

**(1)**

**CO3**

- b.** How many cells are there for an 8-variable K-Map?
- a) 421
  - b) 1048
  - c) 256
  - d) 375

**(1)**

**CO1**

- c.** What should be the order of this recurrence relation:  $a_n = a_{n-1} + 4a_{n-2}$ .
- a) 1

**(1)**

**CO3**



		b) 2 c) -2 d) -1		
	d.	What is the use of Boolean identities? a) Minimizing the Boolean expression b) Maximizing the Boolean expression c) To evaluate a logical identity d) Searching of an algebraic expression	(1)	CO1
2.	<b>Questions-</b>		(2×2=4)	CO
	a.	Determine the solution for the recurrence relation $b_n = 8b_{n-1} - 12b_{n-2}$ with $b_0=3$ and $b_1=4$ .	(2)	CO3
	b.	Proof by contradiction that there exist no integers a and b for which $18a + 6b = 1$ .	(2)	CO3
<b>SECTION - B</b>				
3.	<b>Answer any two of the following-</b>		[2×5=10]	CO
	a.	Determine the solution of the recurrence relation $F_n = 20F_{n-1} - 25F_{n-2}$ where $F_0=4$ and $F_1=14$ .	(5)	CO3
	b.	Use generating function to solve the recurrence relation $a_n - 9a_{n-1} + 20a_{n-2} = 0$ with $a_0 = -3$ and $a_1 = -10$ .	(5)	CO3
	c.	Minimize the Boolean expression using Boolean identities: $A'B + ABC' + BC' + AB'C$	(5)	CO1
<b>SECTION - C</b>				
4	<b>Answer any one of the following-</b>		[2×6=12]	CO
	a.	Proof by contradiction that for all integers n, if $n^3 + 5$ is odd then n is even.	(6)	CO3
	b.	Use mathematical induction to prove that $1^3 + 2^3 + 3^3 + \dots + n^3 = n^2(n+1)^2 / 4$ for all positive integers n.	(6)	CO3
5.	<b>Answer any one of the following-</b>			
	a.	An engineer hands you a piece of paper with following Boolean expression on it, and tells you to build a gate circuit to perform that function $AB' + C(A+B)$ . Draw a logic circuit for this function.	(6)	CO1
	b.	Simplify the expression using K-maps: $F(A,B,C) = \Sigma(1,3,5,6,7)$ .	(6)	CO1