Printed page: 2   Subject Code: ACSE0306/AMICSE0306/ACSEH0306

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY ,GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech(CSE/IT/ CS/AI/AIML/DS/IOT/ M.TECH.(INT)/CS(R))

(SEM: III, SESSIONAL EXAMINATION –I)(2022-2023)

Subject Name: Discrete Structure

Time: 1.15Hours   Max. Marks:30

General Instructions:

> All questions are compulsory. Answers should be brief and to the point.
> This Question paper consists of ………… 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 &5are Long answer type (within unit choice) questions carrying 6marks 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.		Attempt all parts	(4×1=4)	CO1
	a.	Represent the set {1,3,5,7,9} in Set Builder Form.	(1)	
	b.	Define: (i) Singleton set (ii) Void Set	(1)	
	c.	Give an example of difference on Multiset.	(1)	
	d.	Given the Set A = {1,2,3,4,5} with Relation R={(1,2),(3,4),(2,2)} and S={(4,2),(2,5),(3,1),(1,3)}. Find the Composition R∘S.	(1)	
2.		Attempt all parts	(2×2=4)	CO
	a.	If A= {-3,0,1,2,4}, B= {1,2,3,4} calculate symmetric difference of A,B.	(2)	
	b.	Let f: R ->R be such that f(x) = x^2 . Is f invertible?	(2)	
		SECTION – B		
3.		Answer any two of the following-	[2×5=10]	CO
	a.	Prove: (i) A ∩ B = B ∩ A, (ii) A ∪ B = B ∪ A	(5)	
	b.	The number of 2 letter words which can be formed by using the letters in a word 'GREAT' are?	(5)	
	c.	Find the generating function of numeric function (2,3,5,9,17,33…)	(5)	

SECTION – C

4	Answer any **one** of the following-(Any one can be applicative if applicable)		[2×6=12]	CO
	a.	Question- Solve the Recurrence Relation $a_r - 7a_{r-1} + 10a_{r-2} = 0$. Given that $a_0 = 0$, $a_1 = 3$. Find the value of a5.	(6)	
	b.	By using mathematical induction prove that the given equation is true for all positive integers. $1 \times 2 + 3 \times 4 + 5 \times 6 + \ldots + (2n-1) \times 2n = [n(n+1)(4n-1)/3]$	(6)	
5.	Answer any **one** of the following-			
	a.	Let $f: R \to R$ be defined by $f(x) = x^3 - 4$, $g(x) = 1/(1+x^2)$, $h(x) = x^4$ then find the following composition function $(f \circ g \circ h)(x)$ $(g \circ g)(x)$ $(g \circ h)(x)$	(6)	
	b.	(i) Let A = {1,2,3} and R = {(1,2), (2,3), (3,3)} is a relation on set A. Determine transitive closure of R. (ii) (a) Let A= {1,2,3,4,5} And B = {2,3,4,5,6,7}.Find the power set of (A∪B). (b) State pigeonhole principle with suitable Example. (c) What do you mean by Law Of Duality?	(6)	

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute)
Affiliated to Dr. A.P. J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow

Course: B.Tech Branch: CSE/IT/CS/AI/AIML/DS/IOT/M.TECH (INT)/CS(R)
Semester: III   Sessional Examination: Second
Subject Name: Discrete Structure   Year- (2022- 2023)
Time: 1.15 Hours   Max. Marks: 30

General Instructions:

➤ This Question paper consists of 2 pages & 5 questions. It comprises three Sections -A, B, &C. You are expected to answer them as directed.
➤ Section A –Q.No- 1 is of one 1 mark each & Q. No- 2 carries 2 mark each.
➤ Section B- Q. No- 3 carries 5 marks each.
➤ Section C - Q.No-4 & 5 carries 6 marks each. Attempt any one part a or b

SECTION – A   [08Marks]

1. All questions are compulsory-   (4×1=4)

   a. A Poset in which every pair of elements has both a least   (1)   CO3
       upper bound and a greatest lower bound is termed as
       _____

       a) sublattice   b) lattice
       c) trail   d) walk

   b. Define algebraic structure   (1)   CO2

   c. Condition for monoid is _____.   (1)   CO2
       a) (a+e)=a
       b) (a*e)=(a+e)
       c) a=(a*(a+e)a)
       d) (a*e)=(e*a)=a

   d. Find out the identity element In the group G = {2, 4, 6, 8}   (1)   CO2
       under multiplication modulo 10?

       A. 5   B. 9   C. 6   D.12

2. Attempt all parts   (2×2=4)

a. Define Poset? (2) CO3

b. Define Group and write its properties. (2) CO2

SECTION – B [10Marks]

3. Answer any two of the following- (2×5=10)
   a. Let set A={1,2,3,12 ,24,36,} consider the partial order of (5) CO3
   divisibility on A. Draw the corresponding Hasse Diagram.
   Find out the following into the Hasse diagram:-
   (i) Maximum
   (ii) Minimum
   (iii) Maximal
   (iv) minimal

   b. Explain homomorphism and isomorphism with example (5) CO2

   c. Define rings and write its properties. (5) CO2

SECTION – C [12Marks]

4 Answer any one of the following- (1×6=6)
   a. The set $G = \{0,1,2,3,4,5,6,7,8\}$ is a abelian group with (6) CO2
   respect to addition modulo 9.

   b. (i) Define cosets. (6) CO3
   (ii) Find all the cosets of H ={0,4} in the group $G =(Z_8, +_8)$.

5. Answer any one of the following- (1×6=6)
   a. (i) Define fields. (6) CO2
   (ii) Show that the set 'N' is a monoid with respect to
   addition.
   (iii) Draw the Hasse diagram for $(D_{60}, /)$.

   b. (i) Define the following:- (6) CO3
   (a) Monoid
   (b) Sub group
   (c) Integral domain

   CO2

   (ii) Show that $G = \{1, w, w^2\}$ is an abelian group under
   multiplication. Where $1, w, w^2$ are cube roots of unity.