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1RV21A1045

Academic year 2022-2023 (Odd Semester)

DEPARTMENT OF

COMPUTER SCIENCE AND ENGINEERING

Date		Maximum Marks	60
Course Code	21CS36(CSE/ISE/AIML)	Duration	110 Mins
Sem	III	CIE - I	

DISCRETE MATHEMATICLA STRUCTURES

Part - A

Sl. No.	Questions	M	BT	CO
1	In how many ways can the letters in **WONDERING** be arranged with exactly two consecutive vowels	1	L3	CO1
2	Find the coefficient of x^2yz^2 in the expansion of $[(x/2) + y - 3z]^5$	1	L3	CO1
3	Twelve points are placed on the circumference of a circleand all the chords connecting these points are drawn. What is the largest number of points of intersection for these chords?	1	L2	CO1
4	The truth value of negation of " If $-1 < 3$ and $3 + 7 = 10$, then $\sin(3\prod/2) = -1$" is ___	1	L2	CO2
5	Dual of $p \leftrightarrow q$ is	1	L1	CO2
6	A proof that $p \rightarrow q$ is true based on the fact that q is true, such proofs are known as _____	1	L3	CO2
7	Consider the recurrence relation $a1=4$, $a_n=5n+a_{n-1}$. The value of a_{64} is _____	1	L2	CO1
8	Columbia has two dozen each of n different colored beads. If she can select 20 beads (with repetitions of colors allowed) in 230230 ways, what is the value of n?	1	L2	CO1
9	Let Q(x) be the statement "$x < 5$." What is the truth value of the quantification $\forall x Q(x)$, having domains as real numbers.	1	L4	CO1
10	The recurrence relation for $S(n) = 6(-5)^n$, $n > 0$ is _____	1	L3	CO1

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Academic year 2022-2023 (Odd Semester)

PART B				
QNo.	**Questions**	**M**	**BT**	**CO**
1. a	How many distinct four-digit integers can one make from the digits 1,3,3,7,7, and 8 ?	07	L1	CO2
1. b	Matthew works as a computer operator at a small university. One evening he finds that 12 computer programs have been submitted earlier that day for batch processing. In how many ways can Mathew order the processing of these programs if (i) there are no restrictions? (ii) he considers four of the programs higher in priority than the other eight and wants to process those first ? (iii) he first separates the programs into four of top priority, five of lesser priority, and three of least priority, and he wishes to process the 12 programs in such a way that the top-priority programs are processed first and the three programs of least priority are processed last ?	03	L2	CO1
2. a	Determine the solution of the recurrence relation $a_n = 8a_{n-2} - 16a_{n-4}$, for $n \geq 4$,	06	L2	CO1
2. b	Determine the number of integer solutions of $x_1 + x_2 + x_3 + x_4 = 32$ where **a)** $x_i > 0,\ 1 \leq i \leq 4$, **b)** $x_1,\ x_2 \geq 5,\ x_3,\ x_4 \geq 7$, **c)** $x_i > -2, 1 \leq i \leq 4$	04	L3	CO2
3. a	Let p,q,r be primitive statements, Use truth table to verify the logical equivalence $[p \rightarrow (q \vee r)] \Leftrightarrow [\neg r \rightarrow (p \rightarrow q)]$	04	L2	CO2
3. b	Use substitution rules to verify $\neg[\neg[(p \vee q) \wedge r] \vee \neg q] \Leftrightarrow q \wedge r$	06	L1	CO1
4. a	Establish the Validity of the following argument. $p \rightarrow (q \rightarrow r)$, $p \vee s$, $t \rightarrow q$, $\neg s$ / $\therefore \neg r \rightarrow \neg t$	06	L3	CO2
4. b	Briefly explain the applications of discrete mathematics in computer science	04	L2	CO1
5. a	Let $p(x, y), q(x, y)$ denote the following open statements. $p(x, y)$: $x^2 \geq y$ $q(x, y)$: $x + 2 < y$ If the universe for each of x, y consists of all real numbers, determine the truth value for each of the following statements. **a)** $p(2, 4)$ **b)** $q(1, \pi)$ **c)** $p(-3, 8) \wedge q(1, 3)$ **d)** $p\left(\frac{1}{2}, \frac{1}{3}\right) \vee \neg q(-2, -3)$ **e)** $p(2, 2) \rightarrow q(1, 1)$ **f)** $p(1, 2) \leftrightarrow \neg q(1, 2)$	06	L2	CO2
5. b	Give a direct proof of the theorem "If n is an odd integer then n^2 is odd"	04	L4	CO2

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	26	34	-	-	14	27	14	05	-	-

	R V College of Engineering Department of Computer Science and Engineering CIE - I: Question Paper		
Subject : (Code)	**OPERATING SYSTEM(21CS35)**		**Semester : III B.E**
Date : .01.2023	**Duration :** 90 minutes	**Staff : Prof. JS/ Dr.AN/Prof.DD/Prof. Shewta S/Prof. Somesh Nandi**	
Name :	**USN :** 1RV21AI045	**Section :**	**A/B/C/ISE/AIML**

Sl.no	Part-A - Quiz	Marks	* L1-L6	*CO
1.	How many processes are created if a process executes the code? fork (); fork (); fork ();	2	L2	CO1
2.	Compare user mode and kernel mode of operations.	2	L2	CO2
3.	If the parent has called wait call and has completed execution, then it will be in _____ state	1	L1	CO3
4.	Consider three CPU-intensive processes, which require 10, 20 and 30 time units and arrive at times 0, 2 and 6, respectively. How many context switches are needed if the operating system implements a shortest remaining time first scheduling algorithm? Do not count the context switches at time zero and at the end.	2	L3	CO4
5.	Identify the benefits of multithreaded programming	2	L2	CO1
6.	An OS program module that selects the next job to be admitted for execution is called_____	1	L1	CO1

Sl.no	Part-B	Marks	* L1-L6	*CO
1.	Identify the various operating system services with a supporting diagram	10	L2	CO1
2.	Analyze the various ways in which components of operating system can be structured/interconnected into a kernel	10	L3	CO2
3a.	How are processes represented in operating system? Consider there are 2 processes P0 and P1, indicate the steps showing CPU switch from one process to another with a supporting diagram.	06	L3	CO3

3b.	Identify the roles of various types of schedulers and dispatcher.	04	L1	CO2
4.	Write a program to create threads to perform following functions on a matrix simultaneously i) sum of each row ii) sum of each column iii) maximum element in matrix	10	L3	CO4
5.	Compare preemptive and non-preemptive scheduling. Consider the following scenario with processes and length of the CPU burst time given in milliseconds Process | Burst Time P1 | 3 P2 | 6 P3 | 4 P4 | 2 Draw Gantt charts illustrating the execution of these processes using FCFS and SJF. Compute the average waiting time, average turnaround time and number of context switches in each approach.	10	L3	CO1

	L1	L2	L3	L4	L5	L6	CO1	CO2	CO3	CO4	CO5
Total Marks	06	16	38	-	-	-	25	16	07	12	-

COURSE OUTCOMES:

Course Outcomes: After completing the course, the students will be able to	
CO1:	Apply the operating systems concepts to solve problems in computing domain
CO2:	Analyze data structures and algorithms used to implement OS concepts
CO3:	Design solutions using modern tools to solve applicable problems in operating systems domain
CO4:	Implement process, memory, scheduling, synchronization and other operating system techniques
CO5:	Demonstrate skills like investigation, effective communication, working in team/Individual and following ethical practices by implementing operating system concepts and applications

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Academic Year 2022-2023 (ODD Semester)

USN: 1RV21AI045

Department of Artificial Intelligence and Machine Learning

Course Code: 21AI34
Sem: III Semester
Duration: 20 Minutes

Date:
Maximum Marks: 10

QUIZ-I
Foundation of Cyber Physical System

SL. No	Question	M	BT	CO
1	Register is a _____	1	1	1
2	In Von-Neumann Architecture, data and instructions have no difference. Justify your answer.	1	3	2
3	Write the Symbolic representation of Arithmetic Logic Unit (ALU)	1	1	2
4	Working Memory is a _____	1	1	1
5	Give an example for the Software interrupt.	1	3	2
6	How data is organized in word-organized and bit-organized schemes.	1	3	2
7	DRAM use _____ to store Information	1	1	1
8	What is the role of Boot-Loader in Firmware.	1	1	1
9	In what way Micro-processors are different from Microcontrollers.	1	1	1
10	How Program Counter (PC) are useful in Processors?	1	1	1

Course Outcome	
CO1	Understand and apply the knowledge of engineering specialization to address the complex engineering problems
CO2	Analyse the various Cyber-Physical components used in solving the real-world problem
CO3	Design solution for complex engineering problem using Cyber Physical Systems
CO4	Communicate effectively and collaborate in group to carryout Cyber Physical System activities
CO5	Demonstrate design skills to solve inter-disciplinary problems using modern tools effectively by exhibiting team work through oral presentation and written reports.

M-Marks, BT-Blooms Taxonomy Levels, CO-Course Outcomes

	Particulars	CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
Marks Distribution	Max Marks	6	4			07		03			

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Academic Year 2022-2023 (ODD Semester)

USN:

Department of Artificial Intelligence and Machine Learning

Course Code: 21AI34
Sem: III Semester
Duration: 90 Minutes

Date:
Maximum Marks: 50

CIE-I
Foundation of Cyber-Physical Systems

SL. No		Questions	M	BT	CO
1	a)	Discuss the properties of a Cyber-Physical Systems.	5	2	1
	b)	Summarize the Advanced CPS architecture.	5	2	1
2	a)	Consider Autonomous Vehicles (AV's) as a complex CPS system, Identify the Sensors, Actuators and Communication Protocols used in AVs	5	4	2
	b)	What is Decision Support System? How Decision Supports Systems are useful in the Agriculture CPS	1+4	1	1
3	a)	Describe the requirements for the Vehicular and Health CPS	5	2	3
	b)	Discuss the Software Layers of Desktop Computers, Complex Embedded Computer and Embedded Computer.	5	2	2
4	a)	Differentiate Von-Neumann Machine Architecture and Harvard Architecture	5	2	1
	b)	Illustrate the Hardware and Software Architecture for Home Automation System	5	4	3
5	a)	List the difference between CISC and RISC	5	1	1
	b)	With a neat sketch explain the Embedded Computer Architecture.	5	2	1

Course Outcome	
CO1	Understand and apply the knowledge of engineering specialization to address the complex engineering problems
CO2	Analyse the various Cyber-Physical components used in solving the real-world problem
CO3	Design solution for complex engineering problem using Cyber Physical Systems
CO4	Communicate effectively and collaborate in group to carryout Cyber Physical System activities
CO5	Demonstrate design skills to solve inter-disciplinary problems using modern tools effectively by exhibiting team work through oral presentation and written reports.

M-Marks, BT-Blooms Taxonomy Levels, CO-Course Outcomes.

Marks Distribution	Particulars	CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Max Marks	30	10	10		10	30		10		

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Academic year 2022-2023 (Odd Sem)

DEPARTMENT OF
BIO TECHNOLOGY

Date	17th Jan 2023	Maximum Marks	10+25
Course Code	21BT32A	Duration	20 Min (Q) + 60Min (T)
Sem	VII	CIE 1 & Quiz 1	
ENVIRONMENTAL TECHNOLOGY			

Instructions: Part A should be answered in first two pages of answer scripts.
All questions are compulsory.

PART A

Q. No	Question	Marks	CO	BTL
1	COP as per United Nations refers to _____.	1	1	1
2	Define EMS as ISO 14000 standard.	1	1	1
3	The ISO 14004 gives the guidelines on _____.	1	1	1
4	List any one advantage of environmental audit.	1	1	2
5	Enumerate any two air pollution control equipment's.	1	1	2

PART B

Q. No	Question	Marks	CO	BTL
1	State the SDG's promulgated by United Nations.	5	1	2
2	Elucidate significance of environmental auditing.	5	1	2
3	State the significance of environmental education and NGO's in conserving the environment.	5	1	2
4	Discuss in brief the different components which constitute the environment.	5	1	2
5	Illustrate the effects of air pollution on human and vegetation.	5	1	2

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	35	-	-	-	5	20	10	-	-	-

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DEPARTMENT OF MATHEMATICS

Date	**16th January, 2023**	**Maximum Marks**	**50**
Course Code	**21MA31D**	**Time**	**11:45 AM to 01:45 PM**
Semester	**III**	**Test-1**	

MATHEMATICAL FUNDAMENTALS FOR AI and ML (AIML)

Sl.No.	QUIZ	M	BT	CO
1	If $F(s) = \frac{1}{s^2-2s+7}$, then $L^{-1}[F(s)] =$ _____.	2	L2	1
2	$L^{-1}\left[\frac{1}{(s+2)^{\frac{3}{2}}}\right] =$ _____.	2	L2	1
3	$L[\sinh(at)\cos(at)] =$ _____.	2	L3	2
4	Let V be a vector space in $\mathbb{R}^3$. Is $S = \{(a,b,c) \mid a = 2b+1\}$ subspace of V?	2	L3	2
5	If $v_1 = (1,1,1), v_2 = (1,2,3), v_3 = (1,5,8)$ then verify that the set $\{v_1, v, v_3\}$ spans $\mathbb{R}^3$ or not?			
	TEST			
1	Find the Laplace transform of the following functions $(i)\int_0^t e^t\left(\frac{\sin t}{t}\right)dt \quad (ii)\, t^2e^{-2t}\cos t \quad (iii)\left(t^{\frac{1}{4}}+\frac{1}{t^{\frac{1}{4}}}\right)^2$	10	L3	2
2 (a)	Obtain the Laplace transform function $f(t) = \begin{cases} \frac{t}{a}, & for\ 0 \le t \le a \\ 1, & for\ t > a. \end{cases}$	4	L2	2
2 (b)	Evaluate the inverse Laplace transform of $\frac{s}{(s^2+a^2)^2}$ using convolution theorem.	6	L2	3
3	Apply Laplace transform method to solve $y'' + 2y' + 5y = e^{-t}\sin(t)$ with $y(0) = 0$ and $y'(0) = 1$.	10	L3	4
4 (a)	A function in the frequency domain is given by $F(s) = s\log\left(\frac{s-3}{s+4}\right)$ find the corresponding function in the time domain.	5	L2	2
4 (b)	If $v_1 = (1,2,-1), v_2 = (2,-3,2), v_3 = (4,1,3), v_4 = (-3,1,2)$ be the vectors in $\mathbb{R}^3$. Show that $Span\{v_1, v_2\} \neq Span\{v_3, v_4\}$.	5	L3	2
5	Show that the set $V = \{a - b\sqrt{3}, where\ a, b \in \mathbb{R}\}$ under usual addition and scalar multiplication is a vector space.	10	L3	3

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USN: 1RV21AI045

Department of Artificial Intelligence and Machine Learning

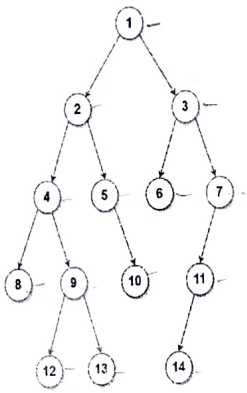
QUIZ-I

Course Code: 21AI33
Sem: III

Date: 18-Jan-2023
Duration: 20 Minutes

Data Structures and Data Analysis (DSDA)

Answer all the Questions

SL. No	Questions	M	BT	CO
1	Imagine you are developing a Text Editor, Undo and Redo commands. Which data structure is suitable for this purpose and why?	02	02	01
2	Demonstrate the advantage of using Static Circular Queues against Static linear Queues (Program writing not required).	02	01	03
3	Consider int *ptr; What does each of the following two statements do? 1. ptr = (int*) malloc(n * sizeof(int)); 2. ptr = (int*) calloc(n, sizeof(int));	02	02	01
4	Write the list representation and the postorder traversal of the following Binary Tree  	02	02	03

5	Trace the application of Stack in the following recursive function to find the factorial, assuming an initial value of n=4.
	int fact(int n)
	{
	if (n == 0 or n == 1) return 1;
	return(n*fact(n-1));
	}
		02	02	01

Marks Distribution	Particulars	CO1	CO2	CO3	CO4	CO5	L1	L2	L3	L4	L5
	Max Marks	06	---	04	--	--	02	08	--	--	--

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USN:_____

Department of Artificial Intelligence and Machine Learning

Course Code: 21AI33
Sem:III

Date: 18-Jan-2023
Duration: 90 Minutes

CIE-I

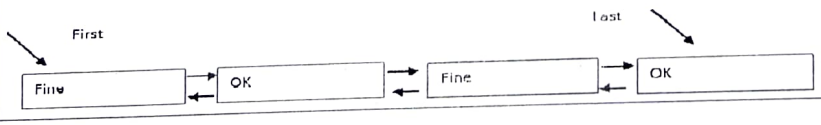
Data Structures and Data Analysis (DSDA)

Answer all the Questions

SL. No		Questions	M	BT	CO

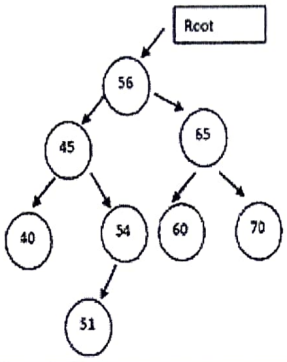
1		Write a complete C program to create and merge **THREE** linked lists to produce one final list in ascending order of data items. Assume the following node structure for the list;
		struct node
		{
		int data;
		struct node *link;
		};
			10	03	01

2	a)	You are asked to convert the given infix expression to postfix using Stacks. Give the tracing by highlighting the value of TOP and Stack Contents **(Do not write C program).** (A + B) / (C - D) - (E * F)	04	02	01
	b)	Write a C program to reverse the String content using Stacks. Your program should have PUSH and POP functions. Example: Input: PEELS Output: SLEEP	06	03	01
3		Consider the following scenario; A theatre has 100 seats, and you are getting a series of N requests for booking them. Write a C program to process these requests using a FIFO manner using a static linear queue of size 1000. Your program should take care of the following: 1. Queue Overflow and Queue Underflow conditions 2. Allot the seats, if available, based on the requested number 3. Display whether the allotment is successful or not for every request	10	03	03
4	a)	Complete the following C function, which is used to delete **all the nodes** in a Linked List, where the current_node initial value is the address of the starting node of a Linked List passed from the main() function. Assume the node structure has int data, struct node *link pointer fields. **(Do not write complete C program).** **struct node *deleteall(struct node *current_node)** { ---------- }	04	02	01

	b)	Assume you have a double-linked list created with the following node structure;
		struct node
		{
		char word[80];
		struct node *llink, *rlink;
		};
		Complete the following C function, which deletes all the occurrences of a keyword from the list; Consider the starting node address as **First** and the ending node address as **Last** **(Do not write complete C program).**
		void delete(char keyword[80]) {----------}
		Example:
		 
			06	03	03

USN:_____

Department of Artificial Intelligence and Machine Learning

5	a)	Prove that the height of a binary tree with 'n' internal nodes is at least $\log_2(n+1)$ and at most $n-1$.	04	03	01
	b)	Write a complete C Program to do the following; 1. Creating a Binary Tree like below 2. To display Binary Tree using various traversals 	06	02	03

Course Outcome	
CO1	Apply the knowledge of data structures in providing solutions to some software development requirements.
CO2	Perform data analysis of some real-world scientific/business use cases and present the analysis results.
CO3	Investigate appropriate data structures and understand requirements in solving some problems of industry and society.
CO4	Use data analysis tools to illustrate the principles of data interpretation, statistical analysis, and graphical visualizations of the datasets.
CO5	Appraise data structures and analysis knowledge to build a successful career as an AIML engineer, work in teams, and communicate their ideas effectively.

M-Marks, BT-Blooms Taxonomy Levels, CO-Course Outcomes

Marks Distribution	Particulars	CO1	CO2	CO3	CO4	CO5	L1	L2	L3	L4	L5
	Max Marks	28	--	22	--	--	--	14	36	--	--