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Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with 'A' Grade (CGPA : 3.18)

Department of AI&DS, AI&ML
Academic Year 2022-2023
Term Test – I

Course Name: Data Structures and Algorithms **Course Code: DJ19AMC302 DJ19ADC302**

Class: S.Y. B. Tech **Sem: III**

Date: 19/10/2022 **Time**: 9:00 am -10:00 am

Maximum Marks: 25

Instructions:

1. Draw figures wherever required.
2. Assume suitable data wherever necessary and clearly state it.

Q. No	Questions	Max. Marks

1	Explain different Asymptotic Notations with neat diagram. Compute time complexity for the following code:
	`int sum(int A[ ], int n)`
	`{`
	`  int sum = 0, i;`
	`  for(i = 0; i < n; i++)`
	`  sum = sum + A[i];`
	`  return sum;`
	`}`
		[05]

	OR	
1	State the conditions for Master's Theorem to analyse the complexity of Recurrence Relations. Using the same, solve for $T(n) = 3T(n/3) + n^2$	[05]
2	Write a C program to implement Queue ADT using Linked List. Perform **any two** operations of the following: (iv) Insert a node in the queue (v) Delete a node from the queue (vi) Display queue elements	[05]
3	Write a C program to implement Singly Linked List. The program should be able to perform **any two** of the following operations: (iv) Insert a node at the end of the linked list (v) Delete a particular node (vi) Insert a node at the beginning of the linked list	[05]
4	List and explain different types of linked lists with suitable example.	[05]
	OR	
4	List and explain different types of queues with suitable example.	[05]
5	Convert the following Infix Expression to Postfix and Prefix. Show all steps properly. **a - b * c – d + e / f / (g + h)**	[05]

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Department of AI & ML / AI & DS
Academic Year 2022-2023
Term Test – I

Course Name: Operating Systems **Course Code: DJ19AMC305 DJ19ADC305**

Class: SE **Sem: III**

Maximum Marks: 25

Instructions:

1. Please solve questions in order with clear and dark ink pens
2. Draw figures wherever required

Q. No	Questions	Bloom's Level	CO mapped	Max. Marks
1.	Explain the term: "The Operating System as a User/Computer Interface" with diagram. List down and explain 6 services provided by Operating system	Understand	CO1	02 03
2.	Consider the following set of processes. Apply Shortest Job First Preemptive and Non preemptive algorithm and calulate average turnaround time and average waiting time for it.	Apply	CO2	05
3.	Explain the terms: • Multiprogramming • Time sharing Differentiate between Batch Multiprogramming and Time Sharing	Understand	CO1	05
4.	Consider the C program statements and answer the following: Scanf ("%d", &i); 1. The process moves from ------ to------to ----- state. 2. An I/O request is made from the ------ state which causes C to enter the ------- state (waiting for stdin input) 3. The user enters some text, C moves from ------ to ------- to ----state. 4.After successful execution, process enters from ----- to ------state. **Draw the state transition diagram for the above scenario**	Analyse	CO2	05
5.	Explain User level and kernel level threads	Understand	CO2	05

Process	Arrival Time	Burst Time
P1	0	10 6 4
P2	4	2
P3	4	8
P4	8	5

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Academic Year 2022-2023

Term Test – I

Course Name: Discrete Structures

Course Code: DJ19ICC304/DJ19ADC304/DJ19AMC304

Class: SY BTech **Sem:** III

Maximum Marks: 25 **Duration:** 1 hour

Instructions:

1. Please solve questions in order with clear and dark ink pens

Q. N	Questions	Bloom's Level	COs	Marks
1a.	Let A = {a, b, c, d} and R be a relation on A whose matrix is $M_R = \begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ Prove that R is a partial order. Draw the Hasse diagram of R. Is the poset (A, R) a lattice? Justify your answer.	Apply	CO2	7
1b.	Determine whether the relation R on the set A = {1, 2, 3, 4, 5} is reflexive, irreflexive, symmetric, asymmetric, antisymmetric or transitive. 1. R = {(1, 2), (1, 3), (1, 4), (5, 2), (5, 4), (5, 3)} 2. A = Z; aRb if and only if $\|a-b\| = 2$	Analyze	CO2	5
	OR			
1b.	Let A = {1, 4, 7, 13}, R = {(1, 4), (4, 7), (7, 4), (1, 13)} Find the transitive closure by Warshall's Algorithm.	Apply	CO2	5
2a	Establish the validity of the argument: $u \rightarrow r$ $(r \wedge s) \rightarrow (p \vee t)$ $q \rightarrow (u \wedge s)$ $\sim t$ q $\therefore p$	Understand	CO1	3

2b	Prove using Mathematical Induction $2 + 5 + 8 + \ldots + (3n - 1) = n(3n + 1)/2$	Analyze	CO1	4
3a	In a class of 25 students, 12 have taken mathematics, 8 have mathematics but not biology. Find the number of students who have taken mathematics and biology and those who have taken biology but not mathematics.	Apply	CO1	3
3b	Prove by Laws of set theory $(A \cap B) \cup (A^C \cap B) \cup (A \cap B^C) \cup (A^C \cap B^C) = U$ Note: A^c is complement of A	Apply	CO1	3

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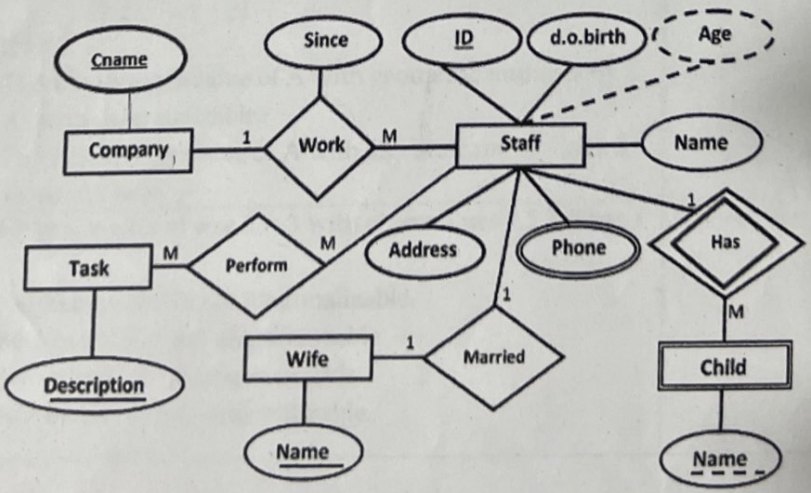
Department of AI & ML / AI & DS / IOT & CS
Academic Year 2022-2023
Term Test – I

Course Name: Database Management Systems **Course Code:** DJ19AMC303, DJ19ADC303, DJ19ICC303

Class: S.Y B.Tech. **Sem:** III
Date: 18/10/2022 **Time:** 09:00 am – 10:00 am
Maximum Marks: 25

Instructions:
1. Please solve questions in order with clear and dark ink pens
2. Draw figures wherever required

Q. No	Questions	Marks
1.	Identify the significant differences between file-processing system and a DBMS.	04
2a	Write a detailed problem statement for hospital management system and construct an E-R diagram for the same.	08
	OR	
2b	Define weak entity set and attribute. Describe different types of attributes with examples.	08
3a	Convert following ER diagram into Relational model. 	05
	OR	

3b	Explain generalization and specialization with an example.	05
4a	Write the SQL queries for the following 'Cricket' schema. Match (MatchID, Team1, Team2, Ground, Date, Winner) Player (PlayerID, LName, FName, Country, YBorn, BPlace) Batting (MatchID, PlayerID, Order, NRun, Fours, Sixes) Bowling (MatchID, PlayerID, NOvers, Maidens, NRun, NWickets) a. Add new player to the database (1 mark) b. Retrieve name of Indian players born after 1980. (1 mark) c. Retrieve MatchID of the player whose name is 'Tendulkar' (2 marks) d. Retrieve PlayerID who was bowler as well as batsman for the matchID 3033 (2 marks) e. Retrieve name of the Indian players and average runs scored by them. Display the result in descending order of names. (2 marks)	08

****All the Best****

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Department of AI & ML / AI & DS / IOT

Academic Year 2022-23

Term Test - 1

Course Name: Engineering Mathematics -III | **Time: 09:00 – 10:00 AM**

Course Code: DJ19AMC301 / DJ19ADC301 / DJ19ICC301 | **Date: 17th Oct 2022**

Class: SY B Tech | **Sem : III** | **Max Marks: 25**

Q. No.	Question	Bloom's Level	CO Mapped	Max. Marks
Q. 1. (i)	Consider the set of orthogonal functions $\sin\frac{\pi x}{2L}, \sin\frac{3\pi x}{2L}, \sin\frac{5\pi x}{2L}, \ldots\ldots$, in (0,2L). Then the corresponding orthonormal set of functions is a) $\sqrt{\frac{2}{L}}\sin\frac{\pi x}{L}$ b) $\sqrt{\frac{1}{L}}\sin\frac{\pi x}{L}$ c) $\frac{1}{L}\sin\frac{\pi x}{L}$ d) $L\sin\frac{\pi x}{L}$	Knowledge	301.6	[2]
(ii)	Consider the Fourier Series $f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty}\left(a_n cos\frac{n\pi x}{l} + b_n sin\frac{n\pi x}{l}\right)$ If you expand $f(x) = x\cos x$ in $(-\pi, \pi)$ with period 2π into a Fourier Series, then the value of a_0 is a) $\frac{1}{2}$ b) $-\frac{1}{2}$ c) 0 d) $\frac{2}{9}$	Apply	301.6	[1]
(iii)	Consider $\begin{bmatrix} -1 & 2 & 2 \\ 0 & 2 & 0 \\ 2 & -1 & 2 \end{bmatrix}$. Then, which of the following is TRUE? a) There is an eigenvalue of A with geometric multiplicity 2. b) A is not diagonalizable. c) There is an eigenvalue of A with algebraic multiplicity 2 d) None of These.	Apply	301.3	[3]
(iv)	Let P be a matrix of size 3 × 3 with eigenvalues 1,2,3. Then P is a) Neither invertible nor diagonalizable. b) Both invertible and diagonalizable c) Invertible but not diagonalizable d) Not invertible but diagonalizable.	Knowledge	301.3	[2]

(v)	If $A=\begin{bmatrix}1 & 0\\ 1 & 7\end{bmatrix}$ then the value of k for which $A^2 = 8A + kI$ is a) 5 b) -5 c) 7 d) -7	Knowledge Apply	301.3	[2]
Q. 2(a)	Find the Fourier series of $f(x) = \begin{cases} 0, & -\pi < x < 0 \\ e^x - 1, & 0 \le x < \pi \end{cases}$	Knowledge Apply	301.6	[7]
	OR			
Q.2(b)	Obtain half range cosine series for $f(x) = x(\pi - x)$ in the interval $(0, \pi)$ and hence deduce that $\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \ldots\ldots$	Knowledge Apply	301.6	[7]
Q. 3(a)	If $A = \begin{bmatrix}3 & -1 & 1\\ -1 & 5 & -1\\ 1 & -1 & 3\end{bmatrix}$, find the eigenvalues and eigenvectors of $B = A^3 - 2A + 3I$. Is the matrix B diagonalizable. If yes then find the transforming matrix and the diagonal matrix.	Knowledge Apply	301.3	[8]
	OR			
Q. 3(b)	For a symmetric matrix A, the eigenvectors are $=(1,1,1)^T$ and $(1, -2, 1)^T$ corresponding to eigenvalues $\lambda_1=6$ and $\lambda_2=12$. If $\lambda_3=6$. Find the transforming matrix M and the diagonal matrix D. Hence find the matrix A.	Knowledge Apply	301.3	[8]