Shri Vaishnav Institute of Information Technology

Department of Computer Science and Engineering

MST-I (Sep 2024)

Section H

Time: 1 Hour **Total Marks: 20**

Subject Code: BTCS301N **Subject Name: Discrete Structure**

Note: All questions are compulsory. Assume suitable missing data.

Q.1 (a)	If $A = \{1,2\}$, $B = \{2,3\}$, $C = \{3,5\}$ then find $(A \times B) \cap (A \times C)$	3	CO2
(b)	If relation, $R = \{(x, y): x, y \in N \text{ and } x + y = 8\}$ then find the domain and range of R	3	CO3
(c)	Prove that $A \times (B \cap C) = (A \times B) \cap (A \times C)$	4	CO2
	OR		
	Prove that the function $f: R \to R$ defined by $f(x) = 2x - 3$ is one one and onto	4	CO3
Q.2 (a)	Prove commutative law by truth table	3	CO4
(b)	If p and q are two statements then write the converse, inverse and contrapositive of $p \to q$	3	CO4
(c)	Prove that $(p \to q) \vee (r \to p)$ is tautology	4	CO4
	OR		
	Obtain the disjunctive normal form of $(p \to q) \wedge (\sim p \wedge q)$	4	CO4

CO2	Define sets and perform operations and algebra on sets
CO3	Demonstrate an understanding of relations and functions and be able to determine their properties.
CO4	Analyze logical propositions via truth tables

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Shri Vaishnav Institute of Information Technology

Department of Computer Science and Engineering

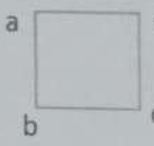
MST-II (Nov 2024)

Section H

Time: 1 Hour **Total Marks: 20**

Subject Code: BTCS301N **Subject Name: Discrete Structure**

Note: All questions are compulsory. Assume suitable missing data.

Q.1 (a)	Draw a graph of following adjacency matrix $\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \end{bmatrix}$ and $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$	3	CO7
(b)	Define complete and regular graph with example	3	CO7
(c)	Define isomorphic graph	4	CO7
	OR		
	Find all minimal spanning tree of the Graph 	4	CO7
Q.2 (a)	Define Group	3	CO8
(b)	Form Caylay's table for cube root of unity under multiplication	3	CO8
(c)	Show that the set of all positive rational number forms a group under following binary operation $a * b = \frac{ab}{2}$	4	CO8
	OR		
	Prove that the set of all fourth root of unity forms an abelian group under multiplication	4	CO8

CO7	Model problems in Computer Science using graphs and tree
CO8	Be able to use effectively algebraic techniques to analyze basic discrete structure and algorithms.

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Shri Vaishnav Institute of Information Technology

Department of Computer Science and Engineering

MST I

Subject Code: BTCS306M **Subject Name: Fundamental of Data Structure** **Semester: III**

Time: 1 Hour **Total Marks:** 20

Note: All questions are compulsory. Assume suitable missing data

Question No.		Marks	Related CO
1	a) Define data structure. Write the difference between linear and non-linear data structure	3	CO1
	b) Discuss about Asymptotic notation with suitable example	3	CO1
	c) A 2-D array A[4---7, -1--3] requires two bytes of storage space for each element. If the array is stored in row major order from having base address 100 then find the address of A[6][2].	4	CO2
	OR		
	d) What is array? Write an algorithm for Insertion of element at the specific position of array.	4	CO2
2	a) Briefly explain types of linked list.	3	CO1
	b) Write an algorithm for insertion of a new node after a given node.	3	CO1
	c) Write an algorithm for the delete operation in a circular linked list.	4	CO2
	OR		
	d) Explain dynamic memory allocation in detail.	4	CO2

CO1	Characterize a given engineering system in terms of its essential elements, that is, purpose, parameters, constraints, performance requirements, subsystems, interconnections and environmental context.
CO2	Develop a modeling strategy for a real world engineering system, which considers prediction and evaluation against design criteria, and integrates any required sub-system models.

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Shri Vaishnav Institute of Information Technology

Department of Computer Science and Engineering

MST II

Subject Code: BTCS303AT **Subject Name: Fundamental of Data Structure** **Semester: III**

Time: 1 Hour **Total Marks: 20**

Note: All questions are compulsory. Assume suitable missing data

Question No.		Marks	Related CO
1	a) What is Stack? Explain the operations of stack in detail	3	CO1
	b)Explain linked list representation of stack. Also write algorithm to insert and delete the element from stack using linked list.	3	CO2
	c) Write an algorithm for conversion of infix expression into postfix expression.	4	CO3
	OR		
	d) What is Queue? Write an algorithm to insert and delete the element from the queue using array.	4	CO3
2	a) What is Recursion? Explain its types with example.	3	CO2
	b) What are the drawback of linear queue and how it can be overcome? Write the algorithm to insert and delete the element from circular queue.	3	CO3
	c) Covert the following arithmetic expression into postfix form: (((P+Q) * (R+S))/T) +(A* (B+C))	4	CO3
	OR		
	d) What is Tree? Explain various types of Binary tree with example.	4	CO4

CO1	To understand efficient storage mechanisms of data for an easy access.
CO2	To design and implementation of various basic and advanced data structures.
CO3	To introduce various techniques for representation of the data in the real world.
CO4	To develop application using data structures

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Department of Computer Science and Engineering

MST I

Subject Code: BTCS402N **Subject Name:** SEPM **Semester:** IV

Time: 1 Hour **Total Marks:** 20

Note: All questions are compulsory. Assume suitable missing data

uestion		Marks	Related CO
No. 1			
	a) Define Software Engineering as layered technology.	3	CO1
	b) Explain CMMI along with the level and activities with each level.	3	CO1
	c) What do you mean by Agile process in Software Development? Explain Extreme programming in detail.	4	CO1
	OR		
	d) Explain the difference between Waterfall Model and Incremental process Model.	4	CO1
2			
	a) Explain difference between Functional and Non-functional requirement.	3	CO2
	b) What are the elicitation techniques used in the software requirements.	3	CO2
	c) What is Software requirement Specification (SRS)? Enlist desirable characteristics of a good Software requirement Specification (SRS).	4	CO2
	OR		
	d) What is System Modelling? Explain different system models.	4	CO2

CO1	Compare various software process models and identify where these models are applicable.
CO2	Define and analyze software project management, the framework, and the dimensions of software project management.

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Shri Vaishnav Institute of Information Technology

Department of Computer Science and Engineering

MST II

Subject Code: BTCS402N **Subject Name: SEPM** **Semester: IV**

Time: 1 Hour **Total Marks:** 20

Note: All questions are compulsory. Assume suitable missing data. Answer should be precise.

Question No		Marks	Related CO
1			
	a) What is software architecture? Explain different software architecture style.	3	CO3
	b) Explain the Activity diagram with a suitable example. Also define its components and use.	3	CO3
	c) Draw a use case diagram for a library management system.	4	CO3
	OR		
	d) Explain about various design concepts considered during design.	4	CO3
2			
	a) Explain Coding Standard and Guidelines	3	CO4
	b) Explain Cyclomatic complexity with the help of example	3	CO4
	c) Differentiate Black Box and White Box testing techniques?	4	CO4
	OR		
	d) Explain Control Structure in structural programming	4	CO4

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Shri Vaishnav Institute of Information Technology

Department of Computer Science and Engineering

MST 1

Subject Code: BTCS307M
Subject Name: Principles of Operating Systems **Semester:III**

Time: 1 Hour **Total Marks**: 20

Note: All questions are compulsory. Assume suitable missing data.

Question No.		Marks	Related CO
1 a)	Discuss the goals of an operating system.	3	CO1
b)	Illustrate the advantages of threads over processes in an operating system.	3	CO1
c)	List and briefly explain the different types of operating systems.	4	CO1
	OR		
d)	What are System calls? Explain briefly about various types of system calls provided by an Operating System.	4	CO1
2 a)	What is PCB? What are its various components?	3	CO1
b)	Write short note on (any two)	3	CO2
	a. Types of schedulers b. Convoy effect c. Multilevel Queue scheduling		
c)	Consider the set of processes whose arrival time and burst time are given below. If the CPU scheduling policy is preemptive SJF, develop the Gantt chart and calculate the average waiting time and average turnaround time.	4	CO2

Process	Arrival Time	Burst Time
A	0	3
B	1	6
C	4	4
D	6	2

OR

d)	For the same set of processes given in part 'c'. If the CPU scheduling policy is Round Robin with time quantum = 2 unit, develop the Gantt chart and calculate the average waiting time and average turnaround.	4	CO2

CO1	To describe the detail structure of Operating System.
CO2	To design and Implement Process management Techniques in Operating System.

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Shri Vaishnav Institute of Information Technology

Department of Computer Science and Engineering

MST II

Subject Code: BTCS307M

Subject Name: Principles of Operating Systems

Semester:III

Time: 1 Hour

Total Marks: 20

Note: All questions are compulsory. Assume suitable missing data.

Question			Marks	Related CO
1	a)	Explain the critical section problem and list the necessary conditions for it to occur.	3	CO3
	b)	What is a semaphore? Explain how semaphore can be used to solve critical section problem.	3	CO3
	c)	List the different techniques for deadlock handling. Compare deadlock prevention and deadlock avoidance techniques.	4	CO3
		OR		
	d)	Consider a system that contains five processes P1, P2, P3, P4 and the three resource types A, B and C. Using Banker's algorithm find Is the system in safe state? If it is, find the safe sequence.	4	CO3

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P1	1	0	1	6	3	1	3	3	0
P2	1	1	2	2	1	4			
P3	1	0	3	1	3	3			
P4	2	0	0	5	4	1			
P5	0	0	2	4	3	5			

2	a)	What is address binding? Explain the different types of address bindings.	3	CO4
	b)	Describe briefly the concept of swapping in memory management.	3	CO4
	c)	Explain the concept of loading a program into memory. Discuss the steps involved in static and dynamic linking.	4	CO4
		OR		
	d)	Consider six memory partitions of size 200 KB, 400 KB, 600 KB, 500 KB, 300 KB and 250 KB in same order. These partitions need to be allocated to four processes of sizes 357 KB, 210 KB, 468 KB and 491 KB in that order. Perform the allocation of processes using-First fit, best fit and worst fit.	4	CO4

CO3	To calculate CPU Scheduling criteria.
CO4	To understand The Memory Management of Operating System.

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Shri Vaishnav Institute of Information Technology
Department of Computer Science and Engineering

MST I

bject Code:BTDSE322M **Subject Name:Principles of Programming nguages**

mester: V **Time: I Hour** **Total Marks: 20**

te: All questions are compulsory. Assume suitable missing data

estion		Marks	Related CO
a)	Differentiate Functional programming and Logic Programming.	3	CO1
b)	What do you understand about programming domains? Describe.	3	CO1
c)	How can we evaluate a language? Write its criteria in detail.	4	CO2
	OR		
d)	Differentiate Imperative and Object Oriented Programming.	4	CO2
a)	Define pointers. Describe its different types.	3	CO1
b)	Given the following union: **union Data { int i ; float f ; char c ; };** What is the correct way to initialize the union to hold the integer value 10, float value 15.01 and character value 'r'?	3	CO1
rite a program to store the data of 10 patients (p_id, p_name, p_height, p_weight) using cture.		4	CO2
	OR		
d)	Write a design issue for a variable and character?	4	CO2

CO1	Students will gain insight and develop understanding to the underlying principles and concepts of programming languages. Also Gain an overview of the programming language translation process.
CO2	Students will be able to competent with analyzing programming language design issues related to data types, expressions and control structures.

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Shri Vaishnav Institute of Information Technology

Department of Computer Science and Engineering

MST II

Subject Name: Principles of Programming Languages

Semester: III **Time: 1 Hour** **Total Marks: 20**

Note: All questions are compulsory. Assume suitable missing data

Question No.		Marks	Related CO
1	a) Discuss Relational and Arithmetic expressions.	3	CO1
	b) What do you understand about short circuit evaluation? Describe.	3	CO1
	c) How can we use mixed mode assignment? Write in detail.	4	CO2
	OR		
	d) Explain control structures.	4	CO2
2	a) Define subprograms. Describe a suitable example.	3	CO1
	b) What are static and dynamic scope.	3	CO1
	c) Explain scope and lifetime of a variable.	4	CO2
	OR		
	d) Write a design issue of a subprogram?	4	CO2

CO1	Students will gain insight and develop understanding to the underlying principle concepts of programming languages. Also Gain an overview of the programmin language translation process.
CO2	Students will be able to competent with analyzing programming language desig issues related to data types, expressions and control structures.