

UNITED INSTITUTE OF TECHNOLOGY

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (CYBER SECURITY)

QUESTION BANK

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HEAD OF THE DEPARTMENT

ACOE

PRINCIPAL CHAIRMAN

CS3551 DISTRIBUTED COMPUTING

UNIT I INTRODUCTION

Introduction: Definition-RelationtoComputerSystemComponents–Motivation–Message-Passing Systems versus Shared Memory Systems – Primitives for Distributed Communication – Synchronous versus Asynchronous Executions – Design Issues and Challenges; A Model of Distributed Computations: A Distributed Program – A Model of Distributed Executions – Models of Communication Networks – Global State of a Distributed System.

Q.No	Question	со	BTL	Marks
	PART A			
1.	What are the main components of a computer system related to distributed systems?	1	1	2
2.	Differentiate between message-passing systems and shared memory systems.	1	2	2
3.	List any two advantages of a distributed system	1	1	2
4.	What are the primitives used for distributed communication?	1	1	2
5.	Differentiate between synchronous and asynchronous execution.	1	2	2
6.	What is the significance of the global state in a distributed system?	1	2	2
7.	State any two challenges in designing a distributed system.	1	1	2
8.	What are the models of communication networks in a distributed system?	1	1	2
	PART B			
1.	Discuss the motivation for using distributed systems. What are the advantages and challenges?	1	5	16
2.	Describe the primitives for distributed communication and their significance in real-world applications.	1	3	16
3.	Differentiate between synchronous and asynchronous execution in distributed systems with examples	1	4	16
4.	Design a simple distributed system architecture for a cloud- based application and discuss its components.	1	6	16

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UNIT II LOGICAL TIME AND GLOBAL STATE

Logical Time: Physical Clock Synchronization: NTP – A Framework for a System of Logical Clocks – Scalar Time – Vector Time; Message Ordering and Group Communication: Message Ordering Paradigms – Asynchronous Execution with Synchronous Communication – Synchronous Program Order on Asynchronous System – Group Communication – Causal Order – Total Order; Global State and Snapshot Recording Algorithms: Introduction–SystemModelandDefinitions– Snapshot Algorithms for FIFO Channels.

Q.No	Question	со	BTL	Marks	
	PART A				
1.	What is clock drift in a distributed system?	1	1	2	
2.	Differentiate between physical clocks and logical clocks.	1	2	2	
3.	What is the happened-before () relation in Lamport timestamps?	1	2	2	
4.	What are the types of message ordering in distributed systems?	1	2	2	
5.	Differentiate between FIFO order and total order in message communication	1	2	2	
6.	Define causal order in message passing	1	1	2	
7.	What is a snapshot algorithm in a distributed system?	1	1	2	
8.	Mention any two properties of FIFO channels in distributed systems.	1	2	2	
	PART B				
1.	Describe Lamport's logical clock algorithm with an example. How does it ensure event ordering?	1	3	16	
2.	Explain asynchronous execution with synchronous communication in distributed systems	1	4	16	
3.	Compare and contrast different message ordering paradigms (FIFO, causal order, total order) in distributed systems	1	5	16	
4.	Explain the Chandy-Lamport snapshot algorithm for recording global states in FIFO channels.	1	4	16	

UNIT III

DISTRIBUTED MUTEX AND DEADLOCK

Distributed Mutual exclusion Algorithms: Introduction–Preliminaries–Lamport's algorithm –Ricart- Agrawala's Algorithm — Token-Based Algorithms – Suzuki-Kasami's Broadcast Algorithm; Deadlock Detection in Distributed Systems: Introduction – System Model – Preliminaries – Models of Deadlocks – Chandy-Misra-Haas Algorithm for the AND model and OR Model.

Q.No	Question	со	BTL	Marks		
	PART A					
1.	Define Lamport's algorithm for mutual exclusion.	1	1	2		
2.	What is the key difference between Lamport's and Ricart-Agrawala's algorithm?	1	2	2		
3.	State two advantages of token-based mutual exclusion algorithms	1	2	2		
4.	How does Suzuki-Kasami's algorithm ensure mutual exclusion?	1	1	2		
5.	Define deadlock in distributed systems.	1	1	2		
6.	What is a wait-for graph (WFG) in deadlock detection?	1	1	2		
7.	Differentiate between AND and OR models in deadlock detection	1	2	2		
8.	What are the methods to handle deadlocks in distributed systems?	1	2	2		
	PART B					
1.	Describe Ricart-Agrawala's algorithm in detail. How does it improve Lamport's algorithm?	1	4	16		
2.	Compare and contrast token-based and timestamp-based mutual exclusion algorithms	1	5	16		
3.	Discuss different approaches to handling deadlocks in distributed systems	1	5	16		
4.	Explain the working of the Chandy-Misra-Haas algorithm for the OR model with an example.4	1	4	16		

UNIT IV CONSENSUS AND RECOVERY

Consensus and Agreement Algorithms: Problem Definition–Overview of Results–Agreement in a Failure-Free System(Synchronous and Asynchronous) –Agreement in Synchronous Systems with Failures; Check pointing and Rollback Recovery: Introduction–Background and Definitions–Issues in Failure Recovery–Checkpoint-based Recovery–Coordinated Check pointing Algorithm-Algorithm for Asynchronous Check pointing and Recovery

Q.No	Question	со	BTL	Marks
	PART A			
1.	What is the difference between synchronous and asynchronous agreement?	1	2	2
2.	Define the role of failure detectors in achieving consensus.	1	2	2
3.	What is Byzantine agreement in distributed systems?	1	1	2
4.	What are the main challenges in reaching consensus in asynchronous systems?	1	1	2
5.	Differentiate between coordinated and uncoordinated checkpointing	1	2	2
6.	What is rollback propagation?	1	1	2
7.	What is a stable storage in the context of rollback recovery?	1	1	2
8.	Define asynchronous checkpointing	1	1	2
PART B				
1.	Explain the consensus problem in distributed systems. Why is it difficult to achieve in asynchronous systems?	1	4	16
2.	Discuss Byzantine agreement and its solutions in a distributed system.	1	4	16
3.	Describe the challenges and techniques used in checkpoint- based rollback recovery	1	3	16
4.	Discuss the issues in failure recovery and how rollback recovery handles them.	1	5	16

UNIT V

CLOUD COMPUTING

Definition of Cloud Computing – Characteristics of Cloud – Cloud Deployment Models – Cloud Service Models – Driving Factors and Challenges of Cloud – Virtualization – Load Balancing – Scalability and Elasticity – Replication – Monitoring – Cloud Services and Platforms: Compute Services – Storage Services – Application Services

Q.No	Question	со	BTL	Marks		
PART A						
1.	List any two characteristics of cloud computing.	5	2	2		
2.	What are the three main cloud service models?	5	1	2		
3.	Differentiate between public and private clouds.	5	2	2		
4.	List any two driving factors of cloud computing.	5	1	2		
5.	Mention two challenges of cloud computing.	5	1	2		
6.	What is virtualization in cloud computing?	5	2	2		
7.	What is the role of load balancing in cloud computing?	5	2	2		
8.	What is replication in cloud computing?	5	1	2		
	PART B					
1.	Explain the cloud service models (IaaS, PaaS, SaaS) with suitable examples.	5	3	16		
2.	Compare and contrast private, public, hybrid, and community cloud models.	5	5	16		
3.	Explain virtualization in cloud computing and its role in resource optimization	5	3	16		
4.	Evaluate different cloud computing platforms and their services (AWS, Azure, Google Cloud).	5	5	16		

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CS3691

EMBEDDED SYSTEMS AND IOT



UNIT I

8-BIT EMBEDDED PROCESSOR

8-Bit Microcontroller – Architecture – Instruction Set and Programming – Programming Parallel Ports – Timers and Serial Port – Interrupt Handling.

Q.No	Question	со	BTL	Marks
	PART A		1	
1.	What are the main components of an Embedded system?	1	1	2
2.	What are the applications of an embedded system?	1	1	2
3.	Compare sensor and transducer.	1	1	2
4.	Define precision.	1	1	2
5.	How Register bank selected in 8051 microcontroller ?	1	1	2
6.	Compare pooling and interrupts. How a microcontroller perform upon activation of interrupts ?	1	1	2
7.	What is difference between compiler and cross compiler ?	1	1	2
8.	How does 8051 differentiate between bit and byte addresses in its internal ram?	1	1	2
	PART B			
1.	Discuss in detail about the Architecture of 8051 in detail	1	2	16
2.	Draw the pin configuration of 8051 and explain the function of each pin in detail.	1	1	16
3.	Explain the different Addressing modes and Instruction sets of 8051 in detail	1	2	16
4.	Draw the Memory organization of 8051 and explain in details	1	2	16

UNIT II

EMBEDDED C PROGRAMMING

Memory And I/O Devices Interfacing – Programming Embedded Systems in C – Need For RTOS –Multiple Tasks and Processes – Context Switching – Priority Based Scheduling Policies.

Q.No	Question	со	BTL	Marks		
	PART A					
1.	Define I/O device interfacing.	2	1	2		
2.	Define Multitasking.	2	1	2		
3.	Define RTOS.	2	1	2		
4.	List the bitwise operators in Embedded C language.	2	1	2		
5.	What is embedded C programing?	2	1	2		
6.	Define Watch dog ?	2	1	2		
7.	How does priority scheduling improve multitask execution ?	2	1	2		
8.	What are the basic types of memory components that are commonly used in embedded systems ?	2	1	2		
	PART B					
1.	Discuss in detail about RTOS.	2	2	16		
2.	List the algorithms used for process scheduling.Explain any two algorithm with process scheduling.	2	2	16		
3.	Discuss about Multiple Task and Multiple Processes	2	2	16		
4.	Explain context switching in operating system	2	2	16		

UNIT III

IOT AND ARDUINO PROGRAMMING

Introduction to the Concept of IoT Devices – IoT Devices Versus

Computers – IoT Configurations – Basic Components – Introduction to Arduino – Types of Arduino – Arduino Toolchain – Arduino Programming Structure – Sketches – Pins – Input/Output From Pins Using Sketches – Introduction to Arduino Shields – Integration of Sensors and Actuators with Arduino.

Q.No	Question	со	BTL	Marks		
	PART A					
1.	Define IoT	3	1	2		
2.	Name the types of shield.	3	1	2		
3.	Define I2C.	3	1	2		
4.	What is PWM?	3	1	2		
5.	What is sensors and Actuators?	3	1	2		
б.	List the characteristics of IOT.	3	1	2		
7.	How debugging works in Arduino?	3	1	2		
8.	List various Libraries in Arduino	3	1	2		
PART B						
1.	Discuss about IoT architecture and its components.	3	2	16		
2.	Discuss about Arduino and its types.	3	2	16		
3.	Explain FIFO and Round Robin Scheduling	3	2	16		
4.	Explain in detail about Arduino programming structure with examples	3	2	16		

UNIT IV

IOT COMMUNICATION AND OPEN PLATFORMS

IoT Communication Models and APIs – IoT Communication Protocols – Bluetooth – WiFi – ZigBee – GPS – GSM modules – Open Platform (like Raspberry Pi) – Architecture – Programming – Interfacing – Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins – Connecting to the Cloud.

Q.No	Question	со	BTL	Marks		
	PART A					
1.	List the states of Bluetooth device.	4	1	2		
2.	Interpret the usage of Raspberry Pi interface in IOT	4	1	2		
3.	What is the requirement of IOT protocol standardization?	4	1	2		
4.	State where Zigbee makes it mark with regard to IOT applications when compared to Bluetooth and Wifi Standars	4	1	2		
5.	What is Exclusive pair model?	4	1	2		
6.	Define REST.	4	1	2		
7.	What is LORA WAN?	4	1	2		
8.	List the states of Bluetooth device.	4	1	2		
	PART B					
1.	Explain in detail about IoT Communication Protocols	4	5	16		
2.	Explain in detail about GSM module with its architecture	4	5	16		
3.	Discuss about Raspberry Pi with its architecture in detail.	4	5	16		
4.	Discuss about Raspberry Pi with its architecture in detail.	4	5	16		

UNIT V

APPLICATIONS DEVELOPMENT

Complete Design of Embedded Systems – Development of IoT Applications – Home Automation – Smart Agriculture – Smart Cities – Smart Healthcare.

Q.No	Question	со	BTL	Marks			
	PART A						
1.	What is Embedded system design?	5	1	2			
2.	What are the challenges in embedded system design?	5	1	2			
3.	Show the block diagram of smart parking system.	5	1	2			
4.	List the components of wearable devices	5	1	2			
5.	What are the components used as the core of an embedded systems?	5	1	2			
6.	Recall the Scope of Developing IOT applications in public services and Smart cities.	5	1	2			
7.	What is Embedded system design?	5	1	2			
8.	What are the challenges in embedded system design?	5	1	2			
	PART B						
1.	Explain in detail about IoT based Smart Healthcare.	5	5	16			
2.	Explain about Embedded system design process and software development activities.	5	5	16			
3.	Explain in detail about IoT based Smart City.	5	5	16			
4.	Illustrate how IOT technology is used to enable the agricultural industry to increase operational efficiency, lower costs, reduce waste and improve the quality of their yield.	5	5	16			

CS3591 COMPUTER NETWORKS

UNIT I

INTRODUCTION AND APPLICATION LAYER

Data Communication - Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Introduction to Sockets - Application Layer protocols: HTTP – FTP – Email protocols (SMTP - POP3 - IMAP - MIME) – DNS – SNMP

Q.No	Question	со	BTL	Marks		
	PART A					
1.	What are the different transmission modes in data communication?	1	1	2		
2.	Define Flow Control.	1	1	2		
3.	What is DNS?	1	1	2		
4.	Define Computer Network.	1	1	2		
5.	Differentiate between LAN, MAN and WAN.	1	2	2		
6.	What is protocol layering?	1	1	2		
7.	List the four layers of the TCP/IP model.	1	1	2		
8.	List the seven layers of the OSI model.	1	1	2		
	PART B					
1.	Explain in detail about the OSI architecture.	1	5	16		
2.	(i)Explain HTTP with an Example.(ii)Explain SMTP in detail.	1	5	16		
3.	Demonstrate the working of an E-Mail in detail.	1	5	16		
4.	Demonstrate the working of Domain Name System with example.	1	5	16		

UNIT II

TRANSPORT LAYER

Introduction - Transport-Layer Protocols: UDP – TCP: Connection Management – Flow control - Congestion Control - Congestion avoidance (DECbit, RED) – SCTP – Quality of Service

Q.No	Question	со	BTL	Marks		
	PART A					
1.	Explain about the socket address?	2	2	2		
2.	What is SCTP? List the services of SCTP.	2	1	2		
3.	Define QOS.	2	1	2		
4.	What are the services provided by the transport layer protocol?	2	1	2		
5.	What is the purpose of the transport layer?	2	1	2		
б.	What is the characteristics of UDP?	2	1	2		
7.	How does TCP provide reliability?	2	1	2		
8.	Difference between TCP and UDP.	2	2	2		
1.	With a neat sketch, Explain about the segment format of TCP and UDP.	2	5	16		
2.	With a neat Sketch, Explain in detail the events and transitions about the TCP State-Transition diagrams (STD).	2	5	16		
3.	Explain in detail about congestion control techniques in transport layer.	2	5	16		
4.	Explain in detail i)SCTP flow control ii)SCTP error control.	2	5	16		

UNIT III

NETWORK LAYER

Switching : Packet Switching - Internet protocol - IPV4 – IP Addressing – Subnetting - IPV6, ARP, RARP, ICMP, DHCP

Q.No	Question	со	BTL	Marks	
PART A					
1.	Explain the three Phases involved in the circuit switching.	3	2	2	
2.	Explain about the Packet Switching.	3	2	2	
3.	Difference between CSMA Collision detection and Collision Avoidance .	3	2	2	
4.	Define tunnelling.	3	1	2	
5.	Differentiate between circuit switching and packet switching.	3	2	2	
6.	What is switching in networking?	3	1	2	
7.	List two key functions of IP.	3	1	2	
8.	How many bits are there in an IPv4 address?	3	1	2	
1.	Explain about packet switching with neat sketches	3	5	16	
2.	Explain the IPv4 packet format with a neat sketch	3	5	16	
3.	Describe about IPV4 frame format along with packet switching in details	3	5	16	
4.	Explain about ARP and RARP in detail	3	5	16	

UNIT IV

ROUTING

Routing and protocols: Unicast routing - Distance Vector Routing - RIP - Link State Routing - OSPF - Path-vector routing - BGP - Multicast Routing: DVMRP - PIM

Q.No	Question	СО	BTL	Marks
PART A				
1.	Define Circuit Switching.	4	1	2
2.	What are the important attributes for a good routing algorithm.	4	1	2
3.	Difference between Connection oriented and Connection less service.	4	2	2
4.	List the services provided by Data link layer.	4	1	2
5.	What is unicast routing?	4	1	2
6.	What is the count-to-infinity problem in Distance Vector Routing?	4	1	2
7.	How does Link-State Routing differ from Distance Vector Routing?	4	1	2
8.	What is the role of Dijkstra's algorithm in Link-State Routing.	4	1	2
1.	Explain in detail, about the ICMP with the neat diagram.	4	5	16
2.	Explain in detail, about the DHCP with the neat diagram.	4	5	16
3.	Explain the working of link state routing in details.	4	5	16
4.	Define BGP protocol. Describe its routing functionality in details.	4	5	16

UNIT V

DATA LINK AND PHYSICAL LAYERS

Data Link Layer – Framing – Flow control – Error control – Data-Link Layer Protocols – HDLC – PPP - Media Access Control – Ethernet Basics – CSMA/CD – Virtual LAN – Wireless LAN (802.11) - Physical Layer: Data and Signals - Performance – Transmission media- Switching – Circuit Switching

Q.No	Question	со	BTL	Marks
PART A				
1.	Define Bandwidth.	5	1	2
2.	What is Piggybacking?	5	1	2
3.	What is an Virtual LAN ?	5	1	2
4.	What are the parameters used to measure the network performance.	5	1	2
5.	What is the function of the Data Link Layer?	5	1	2
6.	Define flow control.	5	1	2
7.	List any two framing techniques.	5	1	2
8.	Why is flow control necessary in a network?	5	1	2
1.	Explain in details the design issues associating with framing in data link layer	5	5	16
2.	Explain in detail about the access method and frame format used in Ethernet	5	5	16
3.	List the responsibilities of data link layer in the Internet Models	5	5	16
4.	Explain about the error detection and error correction technique	5	5	16