SRM VALLIAMMAI ENGINEERING OLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

QUESTION BANK

VI SEMESTER

EC3662 COMPUTER NETWORKS AND SECURITY

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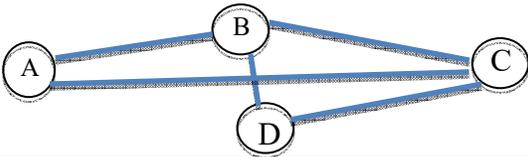### QUESTION BANK

SUBJECT   : EC3662 COMPUTER NETWORKS AND SECURITY

SEM / YEAR: VI/ III-year B.E.

	UNIT I			
	NETWORK MODELS AND DATALINK LAYER			
Overview of Networks and its Attributes – Network Models – OSI, TCP/IP, Addressing –Introduction to Datalink Layer – Error Detection and Correction – Ethernet (802.3)- Wireless LAN – IEEE 802.11, Bluetooth – Flow and Error Control Protocols – HDLC – PPP.			
	PART – A			
Q.No	Questions	CO	BT Level	Competence
1.	Summarize the fundamental characteristics of data communication system.	CO1	BTL 1	Remembering
2.	Name the criteria necessary for an effective and efficient network.	CO1	BTL 1	Remembering
3.	Name the four basic network topologies.	CO1	BTL 2	Understanding
4.	State the function of WAN.	CO1	BTL 1	Remembering
5.	Interpret the responsibilities of data link layer.	CO1	BTL 2	Understanding
6.	Compare the packet-switched and circuit-switched networks.	CO1	BTL 2	Understanding
7.	Compare flow and error control.	CO1	BTL 1	Remembering
8.	Write about Protocol layering.	CO1	BTL 1	Remembering
9.	Identify the purpose of computer networks.	CO1	BTL 2	Understanding
10.	Write the seven layers of OSI model.	CO1	BTL 2	Understanding
11.	Differentiate between half duplex and full duplex.	CO1	BTL 1	Remembering
12.	What is the flow and error control.	CO1	BTL 1	Remembering
13.	Distinguish between baseband transmission and broadband transmission.	CO1	BTL 1	Remembering
14.	Mention the concerns of physical layer.	CO1	BTL 1	Remembering
15.	Define analog and digital signals.	CO1	BTL 1	Remembering
16.	Write the difference between a port address, a logical address and a physical address.	CO1	BTL 1	Remembering
17.	Illustrate error detection and correction.	CO1	BTL 1	Remembering
18.	Consider that the data word to be transmitted is 100100 and key is 1101. Determine parity bits for the given data.	CO1	BTL 2	Understanding

19.	Generalize the term checksum.		CO1	BTL 2	Understanding
20.	Determine the three criteria necessary for an effective and efficient network.		CO1	BTL 2	Understanding
21	Mention the functions of data link layer.		CO1	BTL 1	Remembering
22	Show the Ethernet frame format.		CO1	BTL 2	Understanding
23	What is the need of escape character?		CO1	BTL 2	Understanding
24	State the working principle of stop-and-wait protocol.		CO1	BTL 2	Understanding
	PART- B				
1.	Define data communications. Describe the five components of data communications system with necessary diagrams.	(16)	CO1	BTL 3	Applying
2.	Write brief note on the following: (i) Network criteria (ii) Physical structures (iii) Physical topology	(16)	CO1	BTL 4	Analyzing
3.	What are the types of network? Explain with necessary diagrams.	(16)	CO1	BTL 4	Analyzing
4.	Explain about data and signals and name three types of transmission impairment.	(16)	CO1	BTL 3	Applying
5.	Infer the overview of internet architecture with necessary diagrams.	(16)	CO1	BTL 4	Analyzing
6.	Illustrate the mechanism of simple parity check code with your own example.	(16)	CO1	BTL 4	Analyzing
7.	Interpret the process of two-dimensional parity check with real time example.	(16)	CO1	BTL 3	Applying
8.	Demonstrate what kind of arithmetic is used to add data items in checksum calculation with an example?	(16)	CO1	BTL 3	Applying
9.	Given the data word 1010011110 and the divisor 10111, (i) Generate the codeword at the sender site (using binary division). (ii) Show the checking of the codeword at the receiver site (assume no error). (iii) Show the checking of the codeword at the receiver site (include error)	(16)	CO1	BTL 3	Applying
10.	How can errors be detected by using block coding? Analyze the process of error detection and correction in block coding.	(16)	CO1	BTL 3	Applying
11.	Inspect the responsibilities and concerns of physical layer with neat diagram.	(16)	CO1	BTL 3	Applying
12.	How would you categorize the levels of addresses used in an internet employing the TCP/IP protocols?	(16)	CO1	BTL 4	Analyzing

13.	Discuss in detail about the Forward Error Correction techniques	(16)	CO1	BTL 3	Applying
14.	Elaborate the layered architecture of OSI model and assess the functions of each layer.	(16)	CO1	BTL 4	Analyzing
15.	In order to transmit the message M = 1.11011 with divisor hit as c = 1.101 whose polynomial is given by $C(x)=x^3+x^2+1$, Formulate message that should be transmitted using polynomial long division and predict the occurrence of errors in the receiver.	(16)	CO1	BTL 4	Analyzing
16.	Draw an architecture diagram for 6LowPAN technology and explain layer.	(16)	CO1	BTL 3	Applying
17.	Illustrate an architecture and MAC layers of IEEE 802.11 with necessary diagrams.	16)	CO1	BTL 4	Analyzing

UNIT II
NETWORK LAYER PROTOCOLS
Network Layer – IPv4 Addressing – Network Layer Protocols (IP, ICMP and Mobile IP) Unicast and Multicast Routing – Intra-domain and Inter-domain Routing Protocols – IPv6 Addresses –IPv6 –Datagram Format - Transition from IPv4 to IPv6.
PART – A

Q. No	Questions	CO	BT Level	Competence
1.	Differentiate between basic service set and extended service set.	CO2	BTL 1	Remembering
2.	Examine the open-loop Congestion control and closed loop Congestion control.	CO2	BTL 1	Remembering
3.	Draw the frame format of IPv4.	CO2	BTL 2	Understanding
4.	Compare the Security issues in IP protocol.	CO2	BTL 2	Understanding
5.	Develop the protocol to overcome the deficiencies in IP.	CO2	BTL 1	Remembering
6.	Discuss about Routing.	CO2	BTL 1	Remembering
7.	What do you mean by Unicast routing?	CO2	BTL 2	Understanding
8.	Illustrate Least-Cost routing.	CO2	BTL 2	Understanding
9.	Explain distance-vector routing.	CO2	BTL 1	Remembering
10.	Evaluate Bellman-Ford equation.	CO2	BTL 1	Remembering
11.	Define Autonomous system.	CO2	BTL 2	Understanding
12.	Examine Global routing protocol.	CO2	BTL 2	Understanding
13.	Interpret the concept of RIP.	CO2	BTL 2	Understanding
14.	Analyze the performance of OSPF.	CO2	BTL 2	Understanding
15.	Outline the benefits of Open Shortest Path First (OSPF) Protocol.	CO2	BTL 1	Remembering
16.	Compare Interdomain and Intradomain routing.	CO2	BTL 2	Understanding
17.	State Multicast routing.	CO2	BTL 1	Remembering
18.	Why IPv6 is preferred than IPv4.	CO2	BTL 1	Remembering

19.	Distinguish between RIP and OSPF.		CO2	BTL 1	Remembering
20.	Classify the destination address in IPv6.		CO2	BTL 1	Remembering
21	Develop a Global unicast address block.		CO2	BTL 2	Understanding
22	Integrate the compatible address and mapped address.		CO2	BTL 2	Understanding
23	Generalize the applications of Multicasting.		CO2	BTL 1	Remembering
24	Justify the strategies in transition from IPv4 to IPv6.		CO2	BTL 1	Remembering
	PART- B				
1.	(i) Interpret the format of IPv4 datagram header. (ii) Find the netid and the hostid of the following IP addresses. a 114.34.2.8 b. 132.56.8.6 c. 208.34.54.12	(8) (8)	CO2	BTL 4	Analyzing
2.	Identify the need for network layer and show the functionality of the Network layer at the source, router, and destination.	(16)	CO2	BTL 3	Applying
3.	How DHCP sever dynamically assigns IP address to a host.	(16)	CO2	BTL 4	Analyzing
4.	Describe about IP fragmentation and reassembly.	(16)	CO2	BTL 4	Analyzing
5.	(i) Evaluate the addressing in Mobile IP. (ii) Assess the Inefficiency in Mobile IP.	(7) (9)	CO2	BTL 3	Applying
6.	Analyze the various Phases in Mobile IP.	(16)	CO2	BTL 3	Applying
7.	(i) Illustrate the classes in classful addressing and define the application of each class with an example. (ii) Find the class of the following IP addresses. (a). 208.34.54.12 (b). 238.34.2.1 (c). 114.34.28 (d). 129.14.6.8	(8) (8)	CO2	BTL 4	Analyzing
8.	Elaborate about Internet Control Message Protocol messages and formulate the important points of error reporting messages.	(16)	CO2	BTL 3	Applying
9.	Compare and contrast byte-stuffing and bit-stuffing. Which technique is used in byte-oriented protocols and bit-oriented protocols? Justify your answer.	(16)	CO2	BTL 4	Analyzing
10.	(i) Assess the two types of networks in Bluetooth architecture. (ii) Evaluate the functions of Bluetooth layers.	(8) (8)	CO2	BTL 3	Applying
11.	Apply link state routing algorithm for the given network and tabulate the steps for building routing table for node D. 	(16)	CO2	BTL 3	Applying

12.	What is reliable flooding and explain how routing takes place in link state routing.	(16)	CO2	BTL 4	Analyzing
13.	Define Unicast routing and its Internet structure with neat diagram.	(16)	CO2	BTL 4	Analyzing
14.	Describe in detail about RIP with packet format and example network.	(16)	CO2	BTL 4	Analyzing
15.	Summarize the basic principles of network protocol.	(16)	CO2	BTL 4	Analyzing
16.	Discuss in detail about the transition from IPv4 to IPv6	(16)	CO2	BTL 3	Applying
17.	(i) Compare and contrast between IPv4 addresses and IPv6 addresses. (ii) Illustrate IPv6 datagram packet format with neat diagram.	(8) (8)	CO2	BTL 3	Applying

UNIT III
TRANSPORT AND APPLICATION LAYERS
Transport Layer Protocols – UDP and TCP Connection and State Transition Diagram –Congestion Control and Avoidance (DEC bit, RED) - QoS - Application Layer Paradigms –Client – Server Programming – Domain Name System – World Wide Web, HTTP, Electronic Mail.

PART - A				
Q. No	Questions	CO	BT Level	Competence
1.	What is Transport layer?	CO3	BTL 1	Remembering
2.	Differentiate Flow control and Congestion control.	CO3	BTL 1	Remembering
3.	Examine the buffers used in transport layer services.	CO3	BTL 1	Remembering
4.	Show the responsibilities of error control in transport layer.	CO3	BTL 1	Remembering
5.	Explain Socket Address.	CO3	BTL 2	Understanding
6.	Distinguish between UDP and TCP.	CO3	BTL 2	Understanding
7.	Summarize Stop-and-wait protocol and Go-Back-N protocol.	CO3	BTL 1	Remembering
8.	Draw the TCP header format.	CO3	BTL 1	Remembering
9.	Compare and contrast UDP, TCP, and SCTP.	CO3	BTL 2	Understanding
10.	State the features of TCP.	CO3	BTL 2	Understanding
11.	Construct the three-way handshaking with an example.	CO3	BTL 1	Remembering
12.	Give the approaches to improve the QoS.	CO3	BTL 1	Remembering
13.	Write about SYN Flooding attack.	CO3	BTL 2	Understanding
14.	Name the general policies for handling congestion.	CO3	BTL 1	Remembering
15.	Assess the ways to deal with congestion.	CO3	BTL 2	Understanding
16.	Distinguish between network applications and application-layer protocol.	CO3	BTL 1	Remembering
17.	Illustrate the services provided by UDP.	CO3	BTL 1	Remembering
18.	Define Application layer protocol.	CO3	BTL 2	Understanding
19.	Mention the limitations of SMTP.	CO3	BTL 1	Remembering
20.	Write the name of components used in e-mail system.	CO3	BTL 1	Remembering

21	Why DNS Resolver bootstrap the domain name lookup process?		CO3	BTL 2	Understanding
22	Compare HTTP with persistent and Non-persistent Connection.		CO3	BTL 2	Understanding
23	Summarize the applications of RSA.		CO3	BTL 2	Understanding
24	Expand POP3 and IMAP4.		CO3	BTL 2	Understanding
	PART- B				
1.	Write short notes on: (i) Process-to-process communication (ii) Addressing (iii) Encapsulation and Decapsulation	(5) (5) (6)	CO3	BTL 3	Applying
2.	Summarize the following: (i) Stop-and-Wait Protocol (ii) Go-Back-N Protocol	(8) (8)	CO3	BTL 3	Applying
3.	Show the services provided by transport layer protocol.	(16)	CO3	BTL 4	Analyzing
4.	Describe the working principle of TCP congestion control.	(16)	CO3	BTL 3	Applying
5.	Explain the services offered by TCP to the process at the application layer.	(16)	CO3	BTL 3	Applying
6.	Analyze the TCP connection with its Three-Way Handshaking.	(16)	CO3	BTL 3	Applying
7.	Examine the State Transition Diagram for TCP.	(16)	CO3	BTL 3	Applying
8.	Manipulate the flow control mechanism of TCP	(16)	CO3	BTL 3	Applying
9.	With neat sketches, evaluate the retransmission techniques in detail.	(16)	CO3	BTL 3	Applying
10.	Criticize the events and transitions about the TCP state transition diagrams.	(16)	CO3	BTL 4	Analyzing
11.	Elaborate on TCP connection Management using neat diagrams.	(16)	CO3	BTL 3	Applying
12.	Examine the concept of congestion avoidance in TCP.	(16)	CO3	BTL 4	Analyzing
13.	Illustrate the principle of flow control mechanism with an example.	(16)	CO3	BTL 3	Applying
14.	(i) Differentiate between UDP and TCP. (ii) Explain the various Queuing Disciplines.	(16)	CO3	BTL 4	Analyzing
15.	(i) How would you transfer the message using Simple Mail Transfer Protocol? (ii) Explain the final delivery of email to the end user using POP3.	(8) (8)	CO3	BTL 4	Analyzing
16.	Write short notes on (i). Web services (ii) SNMP	(8) (8)	CO3	BTL 4	Analyzing
17.	Illustrate the principle of flow control mechanism with an example.	(16)	CO3	BTL 4	Analyzing

	UNIT IV			
	HIGH FREQUENCY DESIGN COMPLEXITY AND PCB DESIGNING			
	OSI Security Architecture – Types of Attacks – Security Services and Mechanisms – Encryption – Advanced Encryption Standard – Public Key Cryptosystems – RSA Algorithm – Hash Functions – Secure Hash Algorithm – Digital Signature Algorithm.			
	PART – A			
Q. No	Questions	CO	BT Level	Competence
1.	What is a security mechanism?	CO4	BTL 1	Remembering
2.	Define an attack.	CO4	BTL 1	Remembering
3.	What is a passive attack?	CO4	BTL 2	Understanding
4.	What is an active attack?	CO4	BTL 2	Understanding
5.	What are the essential components of a symmetric cipher?	CO4	BTL 1	Remembering
6.	Define symmetric encryption.	CO4	BTL 1	Remembering
7.	What is DES?	CO4	BTL 2	Understanding
8.	List out the ingredients of public key encryption scheme.	CO4	BTL 2	Understanding
9.	Write down the purpose of the S-boxes in DES?	CO4	BTL 1	Remembering
10.	What are the modes of DES?	CO4	BTL 1	Remembering
11.	Illustrate the principle of flow control mechanism with an example.	CO4	BTL 2	Understanding
12.	What is AES cipher?	CO4	BTL 2	Understanding
13.	What is a Hash in cryptography?	CO4	BTL 1	Remembering
14.	What is the use of digital signature?	CO4	BTL 1	Remembering
15.	What is digital signature?	CO4	BTL 2	Understanding
16.	What are the types of attacks on an encrypted message	CO4	BTL 2	Understanding
17.	Define weak collision property of a hash function.	CO4	BTL 1	Remembering
18.	List the security services in network.	CO4	BTL 1	Remembering
19.	Why is the Caesar cipher substitution technique vulnerable to a brute-force cryptanalysis.	CO4	BTL 2	Understanding
20.	What is security service and its categories.	CO4	BTL 2	Understanding
21	Which type of algorithm is the digital signature is composed with.	CO4	BTL 1	Remembering
22	List any four types of security attacks as per X.800 model.	CO4	BTL 1	Remembering
23	State the five security services provided in OSI security architecture.	CO4	BTL 2	Understanding
24	What is the key size used in Advanced Encryption Standard (AES)?	CO4	BTL 2	Understanding
	PART- B			
1.	Evaluate the model for network security with neat diagram. (16)	CO4	BTL 3	Applying
2.	Inspect the encryption and decryption method used in DES. (16)	CO4	BTL 3	Applying
3.	Explain in detail about the AES with neat diagram. (16)	CO4	BTL 3	Applying
4.	Summarize the Diffie-Helman Cryptosystem. (16)	CO4	BTL 4	Analyzing
5.	Design the Data Encryption Standard with neat diagram. (16)	CO4	BTL 4	Analyzing
6.	Compose the firewall and its types with neat diagram. (16)	CO4	BTL 4	Analyzing
7.	Explain in detail about RSA algorithm with an example. (16)	CO4	BTL 4	Analyzing
8.	(i) Describe the working nature of Secure Hash Algorithm (SHA). (8)	CO4	BTL 3	Applying

	(ii) Illustrate about hash functions in cryptography.	(8)			
9.	Draw an OSI security architecture and explain in detail.	(16)	CO4	BTL 3	Applying
10.	Compare AES to DES. For each of the following elements of DES, indicate the comparable element in AES or explain why it is not needed in AES. • XOR of subkey material with the input to the f function • XOR of the f function output with the left half of the • Block Swapping of halves of the block.	(16)	CO4	BTL 4	Analyzing
11.	Explain X.800 security services with OSI layer examples and diagram.	(16)	CO4	BTL 3	Applying
12.	Describe DES key schedule and cryptanalysis attacks leading to AES.	(16)	CO4	BTL 4	Analyzing
13.	Explain SHA-3 (Keccak); compare SHA-1, SHA-256, SHA-3 structures.	(16)	CO4	BTL 4	Analyzing
14.	Explain ECC principles; compare with DH and RSA key sizes/security.	(16)	CO4	BTL 4	Analyzing
15.	Describe PKI system with CA, X.509 certificates, and validation process.	(16)	CO4	BTL 3	Applying
16.	Explain Kerberos authentication system with ticket granting and session keys.	(16)	CO4	BTL 3	Applying
17.	Explain IPsec architecture and modes (AH, ESP) with security association diagrams.	(16)	CO4	BTL 3	Applying

UNIT V
HARDWARE SECURITY

Introduction to Hardware security, Hardware Trojans, Side Channel Attacks – Physical Attacks and Countermeasures – Design for Security. Introduction to Blockchain Technology.

PART - A				
Q. No	Questions	CO	BT Level	Competence
1.	Define hardware security and list any two key components used for protection.	CO5	BTL 1	Remembering
2.	Define hardware security?	CO5	BTL 2	Understanding
3.	What is a Hardware Trojan? Mention one detection method.	CO5	BTL 1	Remembering
4.	What are vulnerabilities?	CO5	BTL 2	Understanding
5.	How potential vulnerabilities can be introduced by design flaw?	CO5	BTL 2	Understanding
6.	What is a trusted platform module?	CO5	BTL 1	Remembering
7.	Differentiate between power analysis and timing side-channel attacks.	CO5	BTL 1	Remembering
8.	What are hardware Trojans ?	CO5	BTL 1	Remembering
9.	What are the types of hardware Trojans ?	CO5	BTL 2	Understanding
10.	Why is Trojan detection is difficult?	CO5	BTL 2	Understanding
11.	Who are the potential adversaries to implant a hardware Trojans.	CO5	BTL 1	Remembering

12.	Differentiate between a virus and a Trojan.		CO5	BTL 2	Understanding
13.	Why is Trojan detection is difficult?		CO5	BTL 1	Remembering
14.	Name two types of physical attacks on hardware and one basic countermeasure.		CO5	BTL 1	Remembering
15.	What are side channel attacks?		CO5	BTL 2	Understanding
16.	What is probe attack in network security.		CO5	BTL 2	Understanding
17.	List side channel attacks.		CO5	BTL 1	Remembering
18.	What is Differential Power Analysis (DPA)? Name one mitigation technique.		CO5	BTL 2	Understanding
19.	Define blockchain.		CO5	BTL 1	Remembering
20.	Define private blockchain		CO5	BTL 2	Understanding
21	Define public blockchain.		CO5	BTL 1	Remembering
22	Explain the significant properties of blockchain		CO5	BTL 2	Understanding
23	What is KYC in blockchain		CO5	BTL 1	Remembering
24	State two principles of Design for Security in hardware. Briefly explain blockchain's role in security.		CO5	BTL 2	Understanding

<div align="center">PART- B</div>

1.	Explain about Digital Signature Algorithm	(16)	CO5	BTL 3	Applying
2.	Discuss about power analysis attacks.	(16)	CO5	BTL 3	Applying
3.	Write note on design of security.	(16)	CO5	BTL 3	Applying
4.	Discuss about reverse engineering with neat sketches	(16)	CO5	BTL 4	Analyzing
5.	Discuss in detail about the blockchain technology.	(16)	CO5	BTL 4	Analyzing
6.	Discuss Blockchain apps in security: ledgers, smart contracts, integration merits/challenges	(16)	CO5	BTL 4	Analyzing
7.	Discuss OSI security architecture relevance to hardware threats vs TCP/IP models.	(16)	CO5	BTL 3	Applying
8.	Describe Hardware Trojans: types, insertion phases, impacts, and detection with diagrams.	(16)	CO5	BTL 3	Applying
9.	Explain hardware security introduction and its key components with examples.	(16)	CO5	BTL 4	Analyzing
10.	Elaborate Hardware Trojan detection/mitigation: runtime monitoring and logic tagging.	(16)	CO5	BTL 4	Analyzing
11.	Explain side-channel attacks: power, timing, EM, acoustic; diagram DPA.	(16)	CO5	BTL 3	Applying
12.	Discuss side-channel countermeasures: masking, noise, constant-time with case studies.	(16)	CO5	BTL 3	Applying
13.	Detail physical attacks (probing, fault injection, tampering) with examples.	(16)	CO5	BTL 4	Analyzing
14.	Describe physical countermeasures: secure boot, tamper packaging, defense-in-depth diagram.	(16)	CO5	BTL 3	Applying
15.	Explain Design for Security principles: simplicity, least privilege in IC design.	(16)	CO5	BTL 3	Applying
16.	Compare technical/physical/admin layers; guidelines for bus	(16)	CO5	BTL 3	Applying

	encryption/key management.				
17.	Introduce Blockchain: structure, consensus (PoW/PoS), hashing role in hardware security.	(16)	CO5	BTL 4	Analyzing