Department of Computer Science. Islamiah College (Autonomous).

Question Bank

Computer Networks

for III B.Sc.,/B.C.A./ B.Sc., (SW) Third Year – Fifth Semester

(193 Questions)

Unit	No of Questions
Ι	37
II	44
III	36
IV	35
V	41
Total Questions	193

UNIT-I BASIC CONCEPTS OF OSI LAYERS

- 1. Define data communications. Explain its four fundamental characteristics.
- 2. Draw basic block diagram of data communication systems and explain different components of system.
- 3. Explain the five components of a data communications system.
- 4. How would you summarize the requirements of building a network? Explain.
- 5. What are the advantages of distributed processing?
- 6. What are the three criteria necessary for an effective and efficient network?
- 7. Name the factors that affect the performance of a network.
- 8. Define performance, reliability and security.
- 9. What is computer network? Explain goals and applications of computer networks.
- 10. What are standards? Name any four standard organizations.
- 11. Define protocol. List the three key elements of a protocol. Why are protocols and standards needed?
- 12. What are the two types of line configuration? Categorize the four basic topologies of line configuration.
- 13. What are the advantages of a multipoint connection over a point-to-point connection?
- 14. What is meant by topology and explain the different topologies of a computer network.
- 15. Name the four basic network topologies, and cite advantages and disadvantages of each type.
- 16. For *n* devices in a network, find number of cable links required for a mesh, ring, bus, and star topology?
- 17. Discuss network topologies in detail with their performance indicator. Also draw and show the hybrid topology with star as back bone and four ring network.
- 18. Draw a hybrid topology with a ring backbone and two bus networks.
- 19. Explain the types of transmission mode and compare it.
- 20. With relevant examples differentiate between simplex, half duplex and full duplex communication.
- 21. List the differences between LAN, WAN and MAN networks with examples.
- 22. What are some of the factors that determine whether a communication system is a LAN, MAN or WAN?
- 23. What is a LAN? Can a LAN have routers? What is the difference between a packet and a frame?
- 24. Explain the OSI architecture with neat diagram.
- 25. How OSI and ISO relate to each other? How the OSI layers are grouped?
- 26. Discuss the organization of OSI model. What are the functions of OSI layers? Discuss.
- 27. Compare and contrast between the ISO OSI model and the TCP/IP reference model.
- 28. Explain in detail the data transmission in OSI reference model.
- 29. How do the layers of the Internet model correlate to the layers of the OSI model?
- 30. Define (i) Internet (ii) Intranet (iii) peer-to-peer process.
- 31. How does information get passed from one layer to the next in the Internet model?
- 32. What are headers and trailers, and how do they get added and removed?
- 33. What are the concerns of the physical layer in the Internet model?
- 34. What are the responsibilities of presentation layer? Name some services provided by application layer.
- 35. Name some services provided by the application layer in the Internet model.
- 36. What are the responsibilities of the data link, network and transport layer in the Internet model?
- 37. What is the difference between a port address, a logical address, and a physical address?

UNIT-II SIGNALS AND TRANSMISSION MEDIA

- 1. Define analog, digital, periodic and non-periodic signals and sketch them.
- 2. Draw a sine wave and explain various parameters it represents. Draw a sketch representing each of them.
- 3. Define the terms (i) period (ii) frequency (iii) amplitude (iv) phase of a signal.
- 4. The period of a signal is 100ms. Express the period in microseconds. What is its frequency in kilohertz?
- 5. Describe digital signal as a Composite analog signal.
- 6. If a periodic signal is decomposed into five sine waves with frequencies of 100,300,500,700, and 900Hz, what is its bandwidth? Draw the spectrum, assuming all components have maximum amplitude of 10 V.
- 7. A periodic signal has a bandwidth of 20 Hz. The highest frequency is 60 Hz. What is the lowest frequency? Draw the spectrum if the signal contains all frequencies of the same amplitude.
- 8. What is the bit rate of HDTV?
- 9. Suppose a signal travels through transmission medium and its power is reduced to one-half. Calculate its attenuation in decibel.
- 10. Define Decibel, SNR . The power of signal is 10 mW and the power of noise is $1\mu W.$ What are the values of SNR and SNR dB.
- 11. A Noiseless channel transmitting a signal with four levels, what is its Nyquist bit rate?
- 12. A Network with bandwidth of 10 Mbps can pass 12000 frame per minutes and each frame carrying average of 10000 bits. What is the throughput of the network?
- 13. Distinguish between based band transmission and broad band transmission.
- 14. A digital has a bit interval of 40μ s. What is the bit rate? Express the bit rate in Kbps.
- 15. An analog signal carries four bits in each signal element. If 1000 signal elements are sent per second, find the baud rate and the bit rate.
- 16. A non-periodic composite signal has a bandwidth of 200 KHz, with a middle frequency of 140 KHz and peak amplitude of 20V. The two extreme frequencies have an amplitude of 0. Draw the frequency domain of the signal.
- 17. Define bandwidth. A signal has a bandwidth of 20 Hz. The highest frequency is 60 Hz. What is the lower frequency? Draw the spectrum if the signal contains all integral frequencies of the same amplitude.
- 18. Assume we need to download text documents at the rate of 100 pages per minute. What is the required bit rate of the channel?
- 19. A file contains 3 million bytes. How long does it take to download this file using a 100 kbps channel?
- 20. Discuss the different transmission impairments.
- 21. Describe about the different guided media and unguided media.
- 22. Explain the Shielded twisted pair (STP) and unshielded twisted pair (UTP)
- 23. Why are the wires twisted in twisted-pair copper wire? Mention some limitations of twisted-pair wire?
- 24. Explain the coaxial cable and its standards in detail.
- 25. Describe the following properties of coaxial cable:
 - a) Gauge b) bandwidth c) error performance d) distance e) security.
- 26. Describe the components of optical fiber cable.
- 27. What is the purpose of cladding in an optical fiber?
- 28. Name the advantages of optical fiber over twisted-pair and coaxial cable.
- 29. Explain the fiber optic cable in detail with its advantages and disadvantages.

- 30. Give brief details about applications, limitations and some physical parameters of following types of transmission media. i) Twisted pair ii) Coaxial cable iii) Optical fiber
- 31. What is refraction, reflection and critical angle?
- 32. Discuss the types of propagation of radio waves.
- 33. What are some major advantages and disadvantages of microwave transmission?
- 34. How does sky propagation differ from line-of-sight propagation?
- 35. Indicate some significant differences between broadcast radio and microwave.
- 36. What is an isotropic antenna? What two functions are performed by an antenna?
- 37. What is the advantage of a parabolic reflective antenna?
- 38. What factors determine antenna gain?
- 39. What is direct broadcast satellite (DBS)?
- 40. Why must a satellite have distinct uplink and downlink frequencies?
- 41. What is satellite-based networks? Explain various advantages and applications of GEO, MEO and LEO based communication networks.
- 42. What is the difference between omnidirectional waves and unidirectional waves?
- 43. Explain Omni directional antenna and unidirectional antenna.
- 44. Define the terms (i) Attenuation (ii) Noise (iii) Throughput (iv) Propagation time

UNIT-III ERROR DETECTION, CORRECTION AND DATA LINK CONTROL

- 1. What is an error? Why do you need error detection? Explain different types of Errors?
- 2. Define single-bit error and burst error and explain its effect on a data unit.
- 3. Define redundancy. Explain how it is achieved using any one coding scheme.
- 4. What are the methods used to detect errors in data transmission?
- 5. What are the limitations of VRC and LRC?
- 6. Explain the use of parity check for error detection? What are the different types of errors detected by parity check?
- 7. Assuming even parity, find the parity bit for each of the following data units.
 - a. a. 1001011 b. 0001100 c. 1000000 d. 1110111
- 8. What is the relationship between the size of the CRC remainder and the divisor?
- 9. Generate CRC code for the data word 110101010 using the divisor 10101.
- 10. Calculate a 3-bit CRC for the 16-bit data block 11010011101100 using the 4-bit divisor 1011
- 11. Obtain the 4-bit CRC codeword for the databit sequence 10011011100 using polynomial $x^4 + x^2 + 1$
- 12. What is CRC? If the generating polynomial for CRC code is $x^4 + x^3 + 1$ and the message word is 11110000. Determine the check bits and the encoded word.
- 13. A series of 8-bit message blocks is to be transmitted across data link using a CRC for error detection. A
generator polynomial of 11001 is to be used. Explain CRC coding mechanism considering following
message and generator polynomial:M: 1100101010101010G=1010
- 14. Briefly explain the cyclic redundancy check error detection scheme. Given the dataword 1010011110 and the divisor 10111.
- 15. Explain about the cyclic redundancy check with an example.
- 16. What is a checksum? What are its limitations? List the steps to create a checksum.
- 17. Explain checksum with an example
- 18. What is checksum? With an example list the steps undertaken by the sender and receiver for error detection.
- 19. Suppose a IP header consists of four 16-bit words: (11111111 11111111, 11111111 00000000, 11110000 11110000, 11000000 11000000). Please find the Internet checksum for the code.
- 20. Given the 8-bit data word 10110100, generate the 13-bit composite word for the Hamming code that corrects single errors and detects double errors.
- 21. Given the 11-bit data word 00100101010, generate the corresponding 15-bit Hamming code word.
- 22. A 12-bit Hamming code word containing 8 bits of data and 4 parity bits is read from memory. What was the original 8-bit data word that was written into memory if the 12-bit word read out is
 - (a) 010011111000 (b) 0111010010 (c) 01000000101
- 23. It is necessary to formulate the Hamming code for four data bits D3, D5, D6 and D7, together with three parity bits P1, P2, and P4.
 - a. Evaluate the 7-bit composite code word for the data word 0110.
 - b. Evaluate the three check bits C1, C2, and C4, assuming no error.
 - c. Assume an error in bit D5 during storage into memory. Show how the error in the bit is detected and corrected.
- 24. Briefly explain how error detection and correction achieved by a network.

- 25. Define flow control.Describe stop-and-wait flow control.
- 26. Define flow control and explain its mechanism.
- 27. With a neat diagram explain the working of 3-bit sliding window protocol.
- 28. Assume a Go-Back N protocol is used with a window size of 4 and that the ACK for packet 2 gets lost. Show the events until packet 2 isacknowledged at the sender side?
- 29. With a neat diagram explain the working of stop-and-wait protocol. What is the need for sequence numbers?
- 30. What is Stop-and-Wait ARQ? Explain the need for sequence numbers and acknowledgement numbers?
- 31. What is the purpose of ARQ? What are the three types of ARQ protocols? List the basic elements of ARQ?
- 32. What is the reason for its inefficiency and how is it addressed in Go-Back-N ARQ protocol.
- 33. Draw the flow diagrams when there is a) normal operation b) lost frame c) lost ACK frame d) delayed ACK frame.
- 34. List the features of Stop-And-Wait ARQ?
- 35. What is the disadvantage of Go-Back-N ARQ protocol? Show how it is overcome in Selective Repeat protocol. What is the maximum window size of protocol?
- 36. Explain the conditions for stop-and-wait, Go-back-N and selective repeat protocols.

UNIT-IV SWITCHING & NETWORK DEVICES

- 1. Explain the significance of Switching? Discuss different switching techniques used in networks?
- 2. List four major components of a packet switch and their functions.
- 3. Explain the difference between datagram packet switching and virtual packet switching.
- 4. List three traditional switching methods. What are the most common methods today?
- 5. What is switching? Explain datagram networks in detail.
- 6. Compare and contrast different types switching methodologies.
- 7. Differentiate between Packet Switching and Circuit Switching. What kind of networks you will advocate for the PSTN and Internet respectively.
- 8. Explain (i) Crossbar switch (ii) Multistage switches (iii) blocking in a switched network.
- 9. Compare space-division and time-division switches.
- 10. Distinguish between multilevel TDM, multiple slot TDM, and pulse-stuffed TDM.
- 11. Explain the basic principle of FDM and TDM. What are various applications of FDM and TDM systems?
- 12. Write a short note on PSTN.
- 13. What is the role of the address field in a packet traveling through a (i) Datagram (ii) Virtual-circuit network.
- 14. Differentiate virtual circuit and datagram connection.
- 15. Explain TDM System with its advantages & disadvantages.
- 16. What is TSI and its role in a time-division switching?
- 17. We need a three-stage space division switch with N=360. We use 40 crossbars at the first and third stages and 8 crossbars at the middle stage. (N is number of input lines)
 - a. Draw the configuration diagram.
 - b. Calculate the total number of cross points.
 - c. Find the possible numbers of simultaneous connections.
 - d. Find the possible number of simultaneous connections if we use one single crossbar.
 - e. Find the blocking factor, the ratio of the number of connections in c and in d.
- 18. What is a network connecting device? List and explain different types of connecting devices in detail.
- 19. Write short notes on internetworking issues.
- 20. Describe Hub, Switch and Router in detail.
- 21. Differentiate between the following. (i) Hub and Repeater. (ii) Router and Gateways.
- 22. With the neat sketches, explain the working principle of simple bridges. Discuss its types.
- 23. What do you mean by routing protocol? Explain in detail.
- 24. Explain in detail about the steps involved in the routing process of a packet network.
- 25. Enumerate in detail about the Internet routing protocols.
- 26. Discuss adaptive and non-adaptive routing.
- 27. What are different goals of routing algorithms in a packet switched network? How will you classify the routing algorithms? Mention the advantages of distance vector routing over flow-based routing.
- 28. What is the major difference between Distance Vector and Link State routingalgorithms?
- 29. Discuss the Distance Vector routing algorithm in detail with an example.
- 30. Discuss the Link state routing algorithm in detail with an example.
- 31. Explain Dijkstra's shortest path routing algorithms with example.

32. A router using distance vector routing has the following routing table:

Net	Hops	Router
Net 2	6	А
Net 3	7	В
Net 4	3	А
Net 6	2	С
Net 7	3	В

The router receives the following route update from router C. Show the updated routing table for the router.

Net	Hops
Net 2	4
Net 3	4
Net 4	3
Net 6	2
Net 7	3

33. A router using distance vector routing has the following routing table:

Net	Hops	Router
Net 2	6	Α
Net 3	4	E
Net 4	3	Α
Net 6	2	D
Net 7	1	В

The router receives the following packet from router C:

Net	Hops
Net 2	4
Net 3	5
Net 4	2
Net 6	3
Net 7	2

Show the updated routing table for the router.

34. A router using distance vector routing has the following routing table:

Hops	Router
6	Α
4	E
3	Α
2	С
8	В
	Hops 6 4 3 2 8

The router receives the following packet from router C:

Net	Hops
Net 2	4
Net 4	3
Net 7	3

Show the updated routing table for the router.

35. Given the following network.



Find the shortest path tree and routing table for router A, B, C, D, E and F.

UNIT-V TCP/IP PROTOCOL SUITE: PART I, PROTOCOLS & NETWORK SECURITY

- 1. What is meant by data encapsulation? Explain data encapsulation in TCP/IP.
- 2. What is IP datagram? Differentiate between IP datagram format and TCP segment format.
- 3. State the importance of TTL field in IP header. Which entity has the responsibility of updating TTL?
- 4. What is the difference between a physical address and a logical address?
- 5. Write a note on network classes. What is the use of subnetting in assigning IP address?
- 6. What is dotted decimal notation? Where is it used? Explain the purpose of subnetting. How is masking related to subnetting?
- 7. A large number of consecutive IP addresses are available starting at 198.16.0.0. Suppose that four organisations A , B, C and D request 4000, 2000, 4000 and 8000 addresses, respectively in that order. For each of these, give the (i) first IP address assigned, (ii) last IP address assigned, and (iii) mask in the W.X.Y.Z/S notation.
- 8. Explain the IP address classification. Identify the following IP addresses and their address class: 200.58.20.165 128.127.23.20 16.196.128.50 150.156.10.10
- 9. Suppose that instead of using 16 bits for the network part of a class B address originally 20 bits had been
- 10. used. How many class B networks would have been there?
- 11. Discuss the use of subnetting to break a class C network in to 4 logical networks. If the original class C address is 194.17.68, what are the range of addresses in each of the logical networks?
- 12. What is the maximum number of subnets in each case?
 - Class A, Mask :255.255.192.0
 - Class B, Mask :255.255.192.0
 - Class C, Mask : 255.255.255.192
 - Class C, Mask :255.255.255.240
- 13. If a class B network on the Internet has a subnet mask of 255.255.248.0, what is the maximum number of hosts per subnet?
- 14. What is meant by ARP and RARP? What it does and how it works?
- 15. Explain ICMP and IGMP briefly. What is its purpose?
- 16. Explain the functioning of UDP. Mention at least one application that is based on UDP protocol.
- 17. Draw the format of the UDP header and explain in brief the various fields.
- 18. Differentiate between ports and sockets in context of TCP and IP protocols.
- 19. Explain how TCP is used to add connection-oriented reliable feature to the service of IP.
- 20. Explain architecture of a TCP /IP protocol suite. Draw packet format and explain its various components.
- 21. Compare the TCP header and UDP header. List the field in the TCP header that is missing from UDP header. Give the reason for their absence. List the advantages of one over the other.
- 22. Write a short note on the connection establishment and termination using TCP.
- 23. Explain the significance of the following controls bits in TCP: SYN ACK RST FIN
- 24. Compare OSI and TCP/IP model.
- 25. Compare and contrast between DHCP and ARP in detail with their applications.
- 26. Explain the following protocols: (i) POP3 (ii) IMAP (iii) BOOTP
- 27. Discuss in detail about the role of DNS. Explain principal DNS resource record types and there meanings.

- 28. What do you mean by URL and Internet address? How is URL mapped to Internet address during a web access?
- 29. What application programs allows remote connection. Discuss briefly.
- 30. Explain the concept of FTP and TPTP.
- 31. Elaborate in detail about SMTP and SNMP protocols with an illustration.
- 32. What is Electronic mail? Explain the two scenarios of the architecture of Email.
- 33. What is MIME? What is the role of User Agent and Mail Transfer Agent.
- 34. What do you understand by HTTP protocol? Explain its working.
- 35. Explain the concept of WWW.
- 36. Answer the following in one line.
 - a. Mention any one Network Layer protocol.
 - b. What is ARPANET?
 - c. How many bits are present in class E address format?
 - d. At which layer does a hub operate?
 - e. How many bits is an IPV4 and IPV6 addresses?
 - f. What layer does a router operate at?
- 37. What is Network Security? Explain the four factors needed for a secure network.
- 38. What is major disadvantage of public key encryption and secret key encryption.
- 39. Discuss briefly "Digital Signature". How is a digest created?
- 40. Explain how PGP create a secure network.
- 41. Define the terms authorization and authentication. Explain user autherization with secret key/public key encryption.