

15CS46: DATA COMMUNICATION QUESTION BANK

1.	Define data communications. Explain its four fundamental characteristics	6Marks*
2.	Draw basic block diagram of data communication systems and explain different components of system	6Marks*
3.	Describe Simplex, half-duplex and full duplex methods of data flow	8Marks
4.	Define performance, reliability and security.	5Marks
5.	Explain in detail point to point and multipoint connection	5Marks
6.	Describe different topologies in which a network is laid out Physically.	10Marks
7.	List the differences between LAN, WAN and MAN networks with Examples	8Marks*
8.	What are ISPS? List different types of ISP'S and functions in brief?	6Marks
9.	Define protocol and explain key elements of protocol.	6Marks
10	Name the four basic network topologies and cite an advantage of each type.	4Marks
11.	Explain the three criteria necessary for an effective and efficient Network.	5Marks
12.	List the seven layers and its functionality in OSI model.	7Marks
13.	Explain the duties of Physical layer and Data Link layer in OSI model.	10Marks
14.	List the responsibilities of the Network layer and Transport layer.	10Marks
15.	What is the difference between a port address, a logical address and a physical address?	6Marks
16.	Give some advantages & disadvantages of combining the session, presentation and application layer in the OSI model into one single application layer in the internet model.	10Marks
17.	Explain the functions of session, presentation and application layer in detail.	10Marks
18.	Explain TCP/IP architecture with a layer diagram.	12Marks*
19.	What are the functions of IP, ARP, RARP, ICMP, and IGMP Protocols at network layer?	6Marks
20.	Explain UDP, TCP, and SCTP Protocols at transport layer?	6Marks
21.	Explain four levels of addressing employed in TCP/IP protocol.	8Marks

22.	What is data communications? What are its characteristics? Explain.	6Marks*
23.	Define the following terms : i) Protocol ii) Internet	4Marks*
24.	Describe with neat diagram the functionalities of each layer in the OSI model.	10Marks*
25.	Explain the functionalities of OSI Model and Internet Architecture.	10Marks*
26.	Explain the TCP/IP reference model with examples of protocols to each layer in the form of TCP/IP protocol suite.	8Marks*
27.	Write in detail how all the layers in ISO/OSI model work together for network operations.	8Marks*
28.	Explain the importance of layered study of communication network with definition to layer, service and protocols.	8Marks*
29.	What are the uses of a layered network model? Compare OSI and TCP/IP models.	7Marks*
30.	What are the differences between port address, logical address and a physical address?	7Marks*
31.	Explain the functions a network must provide?	6Marks*
32.	What is the difference between physical address, network address and domain name?	6Marks*
33.	With a neat diagram explain mesh topology and star topology with application of each.	6Marks*
34.	What are standards? Name any four standard organizations.	6Marks*
35.	Explain OSI reference model with functions of following layers i)Physical layer ii)Data link layer iii)Network layer	8Marks*
36.	Differentiate between i) ARP and RARP ii) ICMP & IGMP iii) UDP & TCP	4Marks*
37.	Explain OSI Reference model with neat figure.	8Marks*
38.	What is protocol? What are its key elements ?	2Marks*
39.	What is data communication? What are its four fundamental characteristics?	6Marks*
40.	Distinguish between baseband transmission and broadband transmission with examples.	10Marks
41.	Define analog ,digital, periodic and non-periodic signals and sketch these signals.	6Marks
42.	Draw a sine wave and explain the various parameters it represents and draw a sketch representing each of them.	8Marks
43.	Describe digital signal as a Composite analog signal.	5Marks
44.	What do you mean by transmission impairment? Explain the causes of transmission impairment?	10Marks
45.	We modulate several voice signals and send them through the air. Is this baseband or broadband transmission? Give reasons for your answer.	8Marks
46.	What are the three factors data rate is dependent on? Explain the theoretical formula which was developed to calculate the data rate.	8Marks

47	Write a short note on characteristics influencing performance of the network?	10Marks
48	We send a digital signal from one station on LAN to another station. Is this baseband or broadband transmission? Give reasons for your answer.	6Marks
49	What are the differences between parallel and serial transmission?	4Marks
50	List the three techniques in serial transmission and explain the transmission in detail.	10Marks
51	Compare and contrast PCM and DM	8marks
52	Describe baseline wandering and its effect on digital transmission.	6marks
53	Define block coding. Explain its 2 methods and advantages.	10Marks
54	a)Distinguish between data element and signal element b)Distinguish between data rate and signal rate	6Marks
55	Define a DC component and its effect on digital transmission.	10Marks
56	Define scrambling and give its purpose.	5Marks
57	List any five line coding techniques and represent the sequence 10110011 using the techniques.	10Marks
58	Explain the Delta modulation technique with DM modulator and Dm demodulator diagrams	8Marks
59	Explain the PCM Technique of changing analog signal to digital signal with neat diagrams of PCM encoder & Decoder	12Marks
60	What do you mean by Sampling? Explain three sampling methods with a neat diagrams.	8Marks
61	Explain non uniform quantization and how to recover original signal using PCM decoder .	6Marks
62	Explain multilevel schemes and its advantages. Explain 2B1Q Technique and 8B6T Technique.	12Marks
63	Calculate the Shannon channel capacity in following cases: i) Bandwidth = 20Khz $SNR_{db} = 40$	6Marks*
64	A file contains 3 million bytes. How long does it take to download this file using a 100kbps channel?	4Marks*
65	Define line coding. Describe Unipolar NRZ, POLAR NRZ-L ,Bi-polar AMI & Manchester encoding by applying on the information sequence 101011100	10Marks*
66	What is encoding ?Explain the different encoding schemes with waveforms?	10Marks*
67	Define bandwidth. A signal has a bandwidth of 20hz. The highest frequency is 60hz. What is the lower frequency? Draw the spectrum if the signal	6Marks*
68	Write the definition of the following transmission mode with diagrams i) parallel ii)serial iii) synchronous iv)asynchronous transmissions.	6Marks*
69	Suppose we wish to transmit at a rate of 64kbps over a 3Khz telephone channel, what is the minimum SNR required to accomplish this,	8Marks*

70	A 10Khz baseband channel is used by a digital transmission system. Ideal pulses are sent at the Nyquist rate and pulses take 16levels. What is the data rate	5Marks*
71	What is line coding? Why is it necessary? Line code the stream 101011 using different schemes.	10Marks*
72	Using Shannon's theorem , compute the maximum bit rate for a channel having bandwidth of 3100Hz and SNR of 20db.	6Marks*
73	Calculate the number of levels (signals) required to transmit the maximum bit rate. What is the baud rate?	8Marks*
74	Sketch the signal waveforms when 00110101 is transmitted in the following signal codes.	6marks*
75	Explain three causes of transmission impairments.	6marks*
76	Describe with neat waveform any two polar line coding schemes.	6marks*
77	Give data rate formula suggested by Nyquist and Shannon. Low pass communication has BW of 1 Mhz. What is Shannon's capacity of channel if SNR is	8marks*
78	Define bandwidth. A Periodic signal has bandwidth of 20 Hz. The highest frequency is 60hz. What is the lowest frequency? Draw the spectrum if the signal contains all frequencies of the same amplitude.	4marks*
79	Suppose an application wants to send L-Byte message to its peer process using the existing TCP connection. The TCP consists of message plus header 20bytes of header. The segment is encapsulated into IP Packet that has an additional 20byte header. The Ip packet in turn goes inside the Ethernet frame that has 18bytes of header and trailer. What percentage of the transmitted byte in the physical layer correspond to the message information? L=100byte	6marks*
80	Define digital to analog conversion? List and define different types of digital to analog conversion	6 marks
81	Define carrier signal and modulation or shift keying?	3 marks
82	Explain different aspects of digital-to-analog conversion?	6 marks
83	Define Amplitude shift keying. Explain binary amplitude shift keying and its implementation.	6 marks
84	Describe bandwidth for Binary amplitude shift keying.	4 marks
85	Define Frequency shift keying. Explain binary frequency shift keying and its implementation.	6 marks
86	Describe bandwidth for Binary frequency shift keying.	4 marks
87	Define the non-coherent and coherent technique. Explain the implementation of BFSK using coherent.	6 marks
88	Define Phase shift keying. Explain binary phase shift keying and its implementation.	6 marks
89	Define Quadrature Phase shift keying. Explain QPSK implementation.	8 marks

90	Explain the concept of Constellation Diagram with a diagram.	6 marks
91	Draw & explain the constellation diagram for ASK,BPSK &QPSK.	7 marks
92	Define analog to analog conversion and explain any one of the modulation methods with neat diagrams.	10 marks
93	Explain amplitude modulation and its implementation with diagrams. How is standard bandwidth allocation done for AM radio?	10 marks
94	Explain frequency modulation and its implementation with diagrams. How is standard bandwidth allocation done for FM radio?	10 marks
95	Explain phase modulation and its implementation with diagrams. How is bandwidth allocation done for PM?	6 marks
96	Find the bandwidth for the following situations if we need to modulate a 8-kHz voice. a)AM b)FM(set =5) c) PM (set = 1)	6 marks
97	What is the required bandwidth for the following cases if we need to send 6000bps?Let d=1 a) ASK b) FSK with $2\Delta f = 4$ kHz c) QPSK	6 marks
98	Calculate the bit rate for the given baud rate and type of modulation. a) 2000 baud, FSK b) 2000 baud, ASK c) 2000 baud, QPSK	6 marks
99	Draw the constellation diagram for the following: a) ASK, with peak amplitude values of 2 and 4 b) BPSK, with peak amplitude value of 3 c) QPSK, with peak amplitude value of 4 d) 8-QAM with two different peak amplitude values, 1 and 3, and four different phases.	8 marks
100	Calculate the baud rate for the given bit rate and type of modulation. a) 4000 bps, FSK b) 6000 bps, ASK c) 8000 bps, QPSK d) 72,000 bps,64-QAM	8 marks
101	Draw the constellation diagram for the following cases. Find the peak amplitude value for each case and define the type of modulation. The number in parentheses defines the values of I and Q respectively. a) Two points at (3,0) and (2,0) b) Two points at (4,0) and (-4,0) c) Four points at (3,3) , (-3,3) ,(-3,-3) ,(3,-3) d) Two points at (0,3) and (0,-3)	8 marks
102	The telephone line has 4kHz bandwidth. What is the maximum number of bits we can send using each of the following techniques? Let d=0 a. ASK b. QPSK c.64-QAM d.128-QAM	8 marks
103	Explain the concepts of multiplexing and list the categories of multiplexing?	4 marks

104	Define frequency division multiplexing? Explain the FDM multiplexing and de multiplexing process with neat diagrams.	12marks
105	Explain analog hierarchy. What is the common application of FDM?	10 marks
106	Define and explain the concept of Wavelength division multiplexing.	10 marks
107	Explain in detail synchronous time division multiplexing.	10 marks*
108	What do u mean by interleaving? Explain	6 marks
107	Explain the concept of pulse stuffing, multiple-slot allocation and frame-synchronizing in Multi-level Multiplexing.	10 marks
108	Explain Statistical time-division multiplexing.	10 marks*
109	Distinguish between multi-level TDM, multiple-slot TDM and pulse-stuffed TDM.	6 marks
100	Define link and channel in multiplexing. Describe the goals of multiplexing.	6 marks
101	Define spread spectrum, Frequency Hopping spread spectrum, Direct sequence spread spectrum.	4 marks.
102	Define FHSS and explain how it achieves bandwidth multiplexing.	8 marks
103	Define DSSS and explain how it achieves bandwidth multiplexing.	8 marks
104	Define the digital hierarchy used by the telephone companies and list different levels of the hierarchy.	10 marks
105	Define the analog hierarchy used by the telephone companies and list different levels of the hierarchy.	10 marks
106	We need to use the synchronous TDM and combine 25 digital sources, each of 100 kbps. Each output slot carries 1 bit from each digital source, but extra bit is added for synchronization. Answer the following questions: 1) What is the size of the output frame in bits? 2) What is the output frame rate? 3) What is the duration of an output frame rate? 4) What is the output data rate? 5) What is the efficiency of the system (ratio of useful bits to the total bits).	5marks
107	Two channels, one with a bit rate of 150 kbps and another with bit rate of 140 kbps, are to be multiplexed using pulse stuffing TDM with no synchronization bits. 1) What is the size of a frame in bits? 2) What is the frame rate? 3) What is the duration of the frame? 4) What is the data rate?	5 marks

108	Four channels, two with a bit rate of 300 kbps and two with a bit rate of 250 kbps, are to be multiplexed using multiple slot TDM with no synchronization bits. 1) What is the size of a frame in bits? 2) What is the frame rate? 3) What is the duration of a frame? 4) What is the data rate?	5 marks
109	We have ten sources, each creating 200 characters per second. If the interleaved unit is a character and 1 synchronizing bit is added to each frame. Find (a) the data rate of each source (b) the duration of each character in each source (c) the frame rate (d) the duration of each frame	6 marks
	(e) number of bits in each frame (f) the data rate of the link	
110	Define synchronous TDM.	2marks*
111	Describe ASK, FSK and PSK Mechanisms and apply them over the digital data 101101.	6marks*
112	We have four sources, each creating 250 characters per second. If the interleaved unit is a character and 1 synchronizing bit is added to each frame. Find (a) the data rate of each source (b) the duration of each character in each source (c) the frame rate (d) the duration of each frame (e) number of bits in each frame (f) the data rate of the link	12marks**
113	Explain phase shift keying. Find a relation between baud rate and bandwidth in FSK.	7marks*
114	What is multiplexing? With neat diagram explain FDM.	6marks*
115	With a neat waveform explain three methods of digital to analog conversion. Draw waveform with input data 110100	6marks*
116	An analog signal has a bit rate of 8000bps and baud rate of 1000baud. How many data elements are carried by each signal element? How many signal elements do we need ?	4marks*
117	What is FDM? Explain de multiplexing and multiplexing process.	6marks*
118	Explain briefly the two spread spectrum techniques.	8marks*
119	A voice grade channel of a telephone network has a bandwidth of 3.4Khz. 1) Calculate channel capacity for S/N= 30db. 2) Calculate S/N required to support information transfer at 4800bps.	6marks*
120	Explain and derive delays in Datagram packet switching 10marks	
121	Briefly explain the coaxial cable and optical fiber with their applications.	10*marks

122	Explain how CRC is used in detecting errors for the following polynomial, $g(x) = x^4 + x + 1$. Consider the following information sequence 1101011011 i) Find the codeword corresponding to this sequence.	10*marks
123	ii) If the codeword has an error in third bit, what does receiver obtain when it does its error checking?	
124	Suppose we want to transmit the message 11001001 and protect it from errors using the CRC polynomial $X^3 + 1$. i) Use polynomial long division to determine the message that should be transmitted. ii) Suppose the leftmost bit of the message is inverted due to noise on the transmission link. What is the result of the receivers CRC calculations? How does the receiver know that an error has occurred?	10*marks
125	Write short notes on polynomial codes.	5*marks
126	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	12*marks
127	Describe optical fiber cable. What is the purpose of cladding in OFC?	7*marks
128	What is CRC? If the generating polynomial for CRC code is $x^4 + x^3 + 1$ the message word is 11110000. Determine the check bits and the encoded word.	10*marks
129	Find the code word for $G(X) = x^3 + x^2 + 1$ and the information bits (1,1,0,1,1,0)	4*marks
130	Give a brief description of the cyclic redundancy check in error detection.	5*marks
131	Explain the following medias with one application a) coaxial cable b) Infra red light.	6*marks
132	Explain internet checksum algorithm along with an example.	8*marks
133	Let $G(p) = x^4 + x + 1$. Consider the information sequence 1001. i) Find the code word corresponding to the preceding information sequence. ii) Suppose that the codeword has a transmission error in the first bit. What does that receiver obtain when it does its error checking?	10*marks
134	Explain the use of twisted pair in Ethernet LANs.	6*marks
135	Generate CRC code for the data word 110101010 using the divisor 10101.	5*marks
136	Explain three major classes of guided media with their applications?	10 marks
137	Define transmission medium. How do guided media differ from unguided media?	5marks
138	Explain the performance of twisted pair cable, coaxial cable and fiber optic cable.	6 marks

139	List the advantages and disadvantages of Optical fiber.	8 marks		
140	Explain omni directional antenna and unidirectional antenna.	6 marks		
141	Define single-bit error and burst error and explain its effect on a data unit.	6 marks		
142.	Define redundancy. Explain how it is achieved using any one coding scheme.	8 marks		
143	Define block coding and clearly explain how error is detected and corrected using block coding technique.	10 marks		
144	Define hamming distance .Find the hamming distance of the coding scheme.	5 marks		
			Datawords	Codewords
			00	000
			01	011
			10	101
	11	110		
145		Datawords	Codewords	
		00	00000	
		01	01011	
		10	10101	
		11	11110	
	Find the hamming distance of the above coding scheme.			
146	Write short notes on Linear blocking code.	8 marks		
147	Describe the physical and transmission characteristic of following i) Twisted pair cable ii)Fiber optic cable	6marks*		
148	What is hamming distance? Explain simple parity check code C(5,4) with DMIN=2. How many bits can be corrected?	6marks*		
149	What is CRC? If the generating polynomial for CRC code is X^4+X^3+1 and message word is 11110000, determine check bits and coded word.	8marks*		
150	Give the performance, applications and limitations of coaxial cable and fiber optics cable.	6marks*		
151	Explain internet checksum algorithm along with example.	5marks*		
152	For P=110011 and M=1110011 find the CRC code where notation have their usual significance.	5marks*		
153	A (15,5) linear cyclic code has a generator polynomial $g(x) = 1+x+x^2+x^4+x^5+x^8+x^{10}$ $D(x) = 1+x^2+x^4$ in systematic form Is $V(x) = 1+x^4+x^6+x^8+x^{14}$ a code polynomial?	4 marks*		
154	Briefly explain twisted pair cable and optical fibre cable, with their applications.	10marks*		
155	Explain checksum with an example	6marks*		
156	Explain the types of error.	4marks*		
157	Explain briefly fiber optic cable with neat figure.	8marks*		

158	What is internet checksum? With an example list the steps undertaken by the sender and receiver for error detection.	6marks*
159	Find the code word $C(x)$ for the information $d(x)=X^3+1$ with the generator polynomial $1+x+x^2=g(x)$	6marks*
160	Define flow control .Describe stop- and – wait flow control.	7 marks*
161	Name the types of HDLC frames give a brief description of each.	7 marks*
162	Explain the conditions for stop-and-wait, Go-back-N and selective repeat protocols.	6 marks*
163	Explain in detail HDLC frame format.	10 marks*
164	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?	8 marks*
165	Explain any two framing methods?	6 marks*
166	Define framing and two types of framing with examples.	4 marks
167	Explain character oriented protocol. What is the problem encountered and explain how it is solved?	6 marks
168	Explain the concept of byte stuffing and un stuffing with example.	6 marks*
169	Explain bit oriented protocol. Explain bit stuffing and un stuffing with example.	7 marks
170	Define flow control and explain its mechanism.	7 marks
171	In what kind of channels Go-Back-N ARQ Protocol is inefficient? What are the features of selective repeat? Explain the working of selective repeat ARQ showing the details of send and receive windows and buffer states.	6 marks*
172	Discuss the performance of selective repeat and the effect of error rate.	4 marks*
173	With a neat diagram explain the working of sliding window protocol.	5 marks*
174	With a neat diagram explain the working of stop-and-wait protocol. What is the need for sequence numbers? What is the reason for its inefficiency and how is it addressed in Go-Back-N ARQ protocol.	7 marks*
175	Discuss the effect of error rate on the efficiency of Stop-and-Wait, Go-Back-N and Selective-Repeat protocols. Graphically compare the 3 methods along with their equations of efficiency.	7 marks*
176	What is framing? How the beginning and end of the frame are marked? What is byte stuffing? Illustrate with an example.	5 marks*
177	What is point-to-point protocol? With a neat schematic explain the frame structure of PPP protocol.	6 marks*
178	Write a short notes HDLC Data link control.	10 marks**
179	With a neat diagram explain the design of the simplest protocol with no flow control or error control.	7 marks

180	Write algorithm for sender site and receiver site for the simplest protocol and analyze the algorithm.	6 marks.
181	Define Stop-and-Wait protocol and write algorithm for sender site and receiver site and analyze the algorithm.	10 marks
182	What is Stop-and-Wait ARQ? Explain the need for sequence numbers and acknowledgement numbers?	5 marks
183	What is the purpose of ARQ? What are the three types of ARQ protocols? List the basic elements of ARQ?	6 marks
184	Why do we have to break large block of data (packets) into smaller frames?	3 marks
185	Draw the flow diagrams when there is a) normal operation b) lost frame c) lost ACK frame d) delayed ACK frame.	8 marks
186	List the features of Stop-And-Wait ARQ?	5 marks
187	What do you mean by G0-Back-N ARQ? Explain the concept of sliding window with sender and receiver window diagrams.	10 marks
189	Write sender site and receiver site algorithm for Stop-and-Wait ARQ Protocol.	10 marks
190	Write sender site algorithm for Stop-and-Wait ARQ Protocol and analyze the algorithm.	8 marks
191	Write sender site and receiver site algorithm for Stop-and-Wait ARQ Protocol and analyze the algorithm.	8 marks
192	Draw and explain the design of Stop-and- wait ARQ Protocol.	6 marks
193	Draw and explain the design of Stop-and- wait Protocol	6 marks
194	Draw and explain the design of G0-Back-N ARQ Protocol	6 marks
195	Draw and explain the design of Selective repeat ARQ Protocol	6marks
196	Write sender site algorithm for Selective repeat ARQ Protocol and analyze the algorithm.	10 marks
197	Explain send window and receive window for Selective repeat ARQ.	8 marks
198	Explain the concept of Piggybacking and design of Piggybacking in Go-Back-N ARQ.	10 marks
199	Explain the control field for HDLC protocol.	10 marks
200	Explain framing and transition phases in Point-to-Point Protocol.	10 marks
	Compare and contrast Byte-Oriented and Bit-Oriented protocols.	6 marks
	Compare and contrast HDLC with PPP. Which one is byte-oriented; which one is bit- oriented?	6 marks
	Define Piggybacking and its usefulness.	5 marks
	Compare and contrast flow control and error control.	5 marks
	Define framing and need for framing.	4 marks
	Compare and contrast the Go-back-N ARQ protocol with selective-repeat ARQ?	5 marks

With reference to HDLC protocol, state TRUE or FALSE and <i>justify</i> a) The address field of a frame in HDLC protocol refers always the destination stations b) U-Frames do not carry user information c) FCS field defines the start and beginning of a frame d) HDLC is used only for point-to-point communication e) HDLC follows only GO-BACK-N protocol	10 marks
(b) STOP-AND-WAIT protocol is used between two stations A & B. Channel. Is operating at 4800 bps and the propagation delay from A to B is 20 millisecond. What should be the minimum frame size to get 50% line utilization efficiency?	4 marks
Illustrate with schematic how lost ACK frame is handled in STOP-and- Wait protocol.	8 marks
A sender sends a series of packets to the same destination using the 5- bit sequence numbers. If the sequence number starts with 0 ,what sequence number after sending packets?	3 marks
A system uses the Stop-and-wait ARQ Protocol. If each packet Carries 1000 bits of data , how long does it take to send 1 million Bits of data if the distance between the sender and receiver is 5000k the propagation speed is 2×10^8 m? Ignore transmission , waiting , and processing delays. We assume no data or control frame is lost or damaged.	4 marks
Explain selective repeat ARQ. Justify how selective repeat ARQ outperforms Go-Back-N and Stop-and-wait ARQ.	10*marks
Explain point-to-point protocol frame format. Also briefly describe Different transition phases of PPP in establishing a connection from Home PC to ISP. Or Explain frame format and transitional phases of point to point Protocol.	10* marks Or 08*mark
Explain the working of stop & wait , sliding window ARQ protocol And give the expression for efficiency.	08*marks
Explain the point-to-point protocol with the phase diagram, write How communication goes between the two points.	08*marks
What is bit stuffing and unstuffing? Apply bit stuffing to the sequence 011011111111100 Apply unstuffing:011111000011101111101111101100111110	08*marks
Differentiate between character oriented and bit oriented format for Framing.	06*marks
Explain the salient features of i) Stop and wait protocol. ii) Stop and wait ARQ protocol.	08*marks

Explain briefly about point to point protocol.	06*marks
Discuss sliding window flow control.	06*marks
In a selective repeat ARQ explain the meanings Of S_{last} S_{recent} , R_{next} , W_s AND W_R	10*marks
Explain the selective repeat and stop and wait ARQ.	10*marks
Explain with neat diagrams stop and wait ARQ & Go back N ARQ	10 *marks
Define random access, controlled access& channelization methods of multiple access protocols?	6 marks
Explain why collision is an issue in a random access protocol but not in controlled access or channelizing process.	4 marks
Compare and contrast a random access protocol with a channelizing protocol.	5 marks
Compare and contrast a random access protocol with a controlled access protocols.	5 marks
Compare and contrast a controlled access protocol with a channelizing protocol.	5 marks
Explain frames in a pure aloha network and how collision is avoided or it prevents congesting the channel?	7 marks
Explain the procedure for pure ALOHA protocol with a flow chart.	7 marks
Explain vulnerable time, throughput for pure ALOHA and compare the same with Slotted ALOHA.	6 marks
Compare and explain vulnerable time with respect to ALOHA & CSMA.	5 marks
Explain the three persistence methods with flow diagrams.	10 marks
Explain the energy level in a channel.	3 marks
Explain the procedure for the CSMA/CD protocol with a flow chart.	7 marks
Explain the concept of inter frame space (IFS) ,Contention window and Acknowledgement in CSMA/CA protocol.	10 marks
Explain the polling concept with select and poll functions with diagrams.	8 marks
Explain how token management can be done efficiently.	4 marks
Describe physical, dual, bus, star, ring topologies of token passing.	10 marks
Explain the concept of FDMA , TDMA and compare it with FDM & TDM.	8 marks
Compare FDMA, TDMA & CDMA in terms of their ability to handle groups of stations that produce information flows that are produced at constant but different bit rates	8 marks
Explain the concept or idea of CDMA.	4 marks
What is orthogonal sequence? Explain properties of orthogonal sequence.	7 marks

How is data represented in CDMA .Explain encoding & decoding, signal level and sequence generation?	10 marks
Explain the IEEE standard for LANS.	8 marks
Explain the frame format of 802.3 MAC frame.	7 marks
Explain addressing, unicast, multicast and broadcast in Ethernet networks.	6 marks
Define slot time and maximum network length. Explain the 2 cases to describe why 512 bit slot time is chosen.	10 marks
Explain the 4 physical layer implementation of standard Ethernets.	12 marks
Distinguish between switched Ethernet and full-duplex Ethernet.	6 marks
Write short notes on FAST ETHERNET	8 marks
Explain how bridged Ethernet raise the bandwidth and separate collision domains.	8 marks
Explain 3 fast Ethernet implementations	10 marks
Short notes on gigabit Ethernet.	8 marks
Explain full-duplex and half duplex approach of gigabit Ethernet.	8 marks
Explain encoding in gigabit Ethernet implementations with diagrams.	7 marks
Write short notes on Ten-gigabit Ethernet.	10 marks
Define Random access control. Explain slotted aloha and CSMA-CD.	10 marks*
What technique is used to improve the efficiency of ALOHA protocol ? If a 56Kbps channel is shared to transmit 1000 bit frames , what is the maximum throughput possible in ALOHA & Slotted ALOHA?	7 marks*
Briefly explain CDMA.	6 marks*
Define random access control. Explain slotted ALOHA and compare with Pure ALOHA.	7 marks*
What is the difference between random access and scheduling approach MAC.? Explain the polling technique.	8 marks*
Explain the following random access protocols : i)CSMA ii)CSMA/CD	10 marks*
Discuss 802.3 MAC frame format. Mention the restrictions imposed on minimum and maximum lengths of a 802.3 frame.	10 marks*
What is Random access? Explain following random access protocols. i) Slotted ALOHA ii) CSMA/CD	6 marks**
What is channelization? Explain CDMA.	6 marks*
Describe frame format for IEEE 802.3 MAC frame. What are the salient features of fast Ethernet?	8 marks*
In HDLC Protocol ,Discuss the functions executed by the control frame.	10 marks*
What do you mean channelization? Explain the protocols used for channelization.	10marks*
Explain 1) CSMA 2)CSMA/CD	10marks*

	Define channelization and list its three protocols.	10marks*
	How does p-persistent method improve efficiency.	2marks*
	A network transmits 200bitframe on a shared channel of 200kbps.For aloha and slotted aloha what is the i)requirement to make the frame collision free? ii) throughput if the system produces 1000frames/sec?	8marks*
	Compare a piconet and a scatternet.	6 marks
	Draw and explain the frame format of 802.11.	8 marks
	Explain the Bluetooth Architecture.	8 marks
	Write short notes on a) Bluetooth b) VLan	10 marks
	Write short notes on a) Backbone network b) 802.11	10 marks
	List the benefit of VLAN	6 marks
	How does a VLAN reduce network traffic?	5 marks
	What is the difference between a bus backbone and a star backbone?	5 marks
	Write short notes on a) hub b)switch c)repeater	12 marks
	Write the advantages of bridge.	6 marks
	What are the different types of bridges? Explain	8 marks
	List the characteristics of repeater.	8 marks
	Compare the hub and a switch.	6 marks
	Compare the bridge and router.	10 marks
	Explain the difference between bridge and repeater.	6 marks
	Explain the Layer 2 and Layer 3 switch.	8 marks
	List the three types of hubs and explain each of them.	8 marks
	List the functions of hub.	5 marks
	Compare 802.11 and blue tooth standard.	6 marks
	What is VLAN? List the benefits of VLAN.	4 marks
	State the performance characteristics of a typical Bluetooth device. List typical Bluetooth applications.	10 marks
	What are virtual LAN'S? What are the advantages? Explain.	6 marks*
	Why is error control included in the MAC layer in IEEE 802.11and not in 802.3?	5 marks*
	Why CSMA-CD cannot be used in wireless networks?	5 marks*
	Bring out the difference between repeaters, bridges, routers?	6 marks*
	How are hubs different from switch? Explain	6 marks*
	Explain the bridge learning process with an example.	5 marks*
	Explain Basic Service set and Extended service set.	6 marks.
	Define adhoc, infrastructure networks and access point?	4 marks
	Define no-transition, BSS- transition and ESS-transition mobility.	3 marks
	Draw process flowchart for CSMA-CA and explain RTS CTS, DIFS & SIFS.	8 marks
	Explain the concept of network allocation vector NAV.	5 marks
	Explain the concept of repetition interval and why is it needed?	6 marks

Explain the addressing mechanism of IEEE 802.11 with diagrams.	10 marks*
Explain hidden and exposed station problem and how is it solved.	10marks**
List and explain 6 physical layer specifications.	8 marks
Explain the different layers of Bluetooth.	8 marks
Explain single-secondary and multiple-secondary communication concept.	6 marks
Explain the frame format of Bluetooth.	10 marks
Define connecting devices and list 5 categories which contain these devices.	5 marks
Write short notes on transparent bridges.	6 marks*
Explain looping problem in bridges and how is it solved.	10 marks
What is the difference between a forwarding port and a blocking port?	4 marks
What is the basis for membership in a VLAN? What are the advantages of using VLANS?	8 marks
How are stations grouped into different VLAN's?	6 marks
Discuss Bluetooth technology.	10* marks
Explain the working mechanism of following devices used to connect LANs i)Bridge ii)Router	10*marks
Describe the MAC layers in IEEE 802.11 standard.	6*marks
In brief explain blue tooth layers.	6*marks
Bring out the difference between repeaters, bridges, routers and Gateways.	8*marks
How does a virtual LAN helpful in providing (security and reduce network traffic)?	8marks*
Explain the bridges.	4marks*
Explain with neat figure ,802.3 MAC frame format	8marks*
What is the number of bits in IPV4 address? What is the number of bits in an IPV6 address?	6 marks*
Explain why most of the addresses in Class A are wasted . Explain why a medium size or large –size corporation does not want a block of class C addresses.	8 marks*
What is the network address in block of addresses? How can we find the network address if one of the addresses in block is given?	8 marks*
What is dotted decimal notation in IPV4 addressing ? What is the number of bytes in an IPV4 address represented in dotted decimal notation ? What is hexadecimal notation in IPV6 addressing ? What is the number of digits in an IPV6 address represented in hexadecimal notation?	10 Marks
List the classes in classful addressing and define the application of each class .	10 Marks

Explain the IP address classification. Identify the following IP addresses and their address class: (i) 200.58.20.165 128.127.23.20 16.196.128.50 150.156.10.10	10 marks*
Give the format of IPV6 basic header. Explain the importance.	10 marks*
What is the need to change from Ipv4 to Ipv6? Write the Ipv6 basic header and describe its fields.	10marks*
What are the changes from Ipv4 to Ipv6?	12marks*
What is the role of extension headers in Ipv6	4 marks*
Explain the migration issues from Ipv4 to Ipv6?	6 marks
What are the differences between classful addressing and classless addressing in IPV4?	8 marks
What is mask in IPV4 addressing? What is a default mask in IPV4 Addressing?	10 marks

Additional Questions

1. Name -out of memory -three different Line Coding techniques, explain how they work and state their advantages and disadvantages.
2. What is modulation?
3. Which modulation techniques do you know and what are their differences?
4. Can modulation techniques be combined? If yes, give an example. If no, state why.
5. Explain the difference between modulation and multiplexing.
6. Give two kinds of multiplexing and explain them.
7. Which of the following statements is correct?
 - Using frequency multiplexing, the channels may not overlap.
 - Asynchronous time multiplexing always exploits the transmission medium better than synchronous time multiplexing does.
 - Using frequency multiplexing, the width of the wave bands is always the same.
 - Using time multiplexing, the channels may not overlap.
 - Inevitably, a constant bit rate is guaranteed through asynchronous time multiplexing.
8. Calculate the probability $P(y_0)$, that a '0' is received and the probability $P(y_1)$ for a '1' to be received.
9. Which of the following statements about CRC are true and which are not true? Briefly explain your answer.
 - The CRC is an error-correcting code with a checksum based on

- polynomial division.
- Attaching a CRC-16 Frame Check Sequence to a code increases the Hamming distance of the code at least by one.
 - Two different messages always have different CRC checksums.
 - If the frame payload is transmitted correctly but the Frame Check Sequence contains one or more bit errors, the CRC marks the packet as faulty.
 - Multiple bit errors in payload and Frame Check Sequence can create a frame that is accepted by CRC.
10. Why is bit-stuffing used? Briefly explain the steps that are performed when bit-stuffing is used.
 11. Using error control by “go-back-n” with buffering results in a lower delay than using error control by “go-back-n” without buffering.
 12. Using error control by “selective repeat” less acknowledgments need to be sent compared to error control by “go-back-n” with buffering.
 13. In case of “go-back-n” with buffering only erroneous packets are retransmitted.
 14. Which techniques for error detection/correction and frame boundary indication are used in HDLC?

15. How well will the available capacity be exploited (in percent) when a window size of 10 packets is used?
16. How large does the window have to be in order to utilize the whole capacity?
17. Why does Ethernet require a minimum packet length?
18. Briefly explain the differences between a hub and a (frame) switch.
19. What are the routing tables once they are stable, i.e. after a sufficient amount of time has passed so that further exchanges of distance vectors do not cause any changes?
20. Name and describe the two main tasks of IPv4. Name the respective fields used in the IPv4 header.
21. In heterogeneous networks, fragmentation of packets may occur. Why does this approach make sense?
22. How many bits are required for the network ID, subnet ID and host ID? Use as few bits as possible for the host ID.
23. What might be alternative solutions to route IP packets in an Ethernet?
24. What are the advantages of CIDR over its predecessor? Use the example above to explain.
25. Which of the following protocols is used by TCP?

1. Stop-and-Wait
2. Go-Back N without buffering
3. Go-Back N with buffering
4. Selective Repeat

26. Sequence numbers in TCP have a width of 32 bit. How long does it take until sequence numbers recur when hosts continuously send with the speed stated below? In which case can this be a problem?

- ISDN(64Kbit/s)
- Ethernet(100Mbit/s)
- ATM(155Mbit/s)
- Gigabit-Ethernet(1Gbit/s)

27. Find out what the principle of “Conservation of Packets” means.
28. What additional information would be required to be able to additionally use backward learning and how could backward learning be integrated into your program?
29. Correlate the terms “TCP slow start” and “congestion avoidance” and explain them!
30. What is the major difference between Distance Vector and Link State routing algorithms?