Ref. No. : Ex/EE/T/411/2019

B. E. ELECTRICAL ENGINEERING 4TH YEAR 1ST SEMESTER EXAMINATION, 2019

SUBJECT: - PRINCIPLES OF COMMUNICATION ENGINEERING & COMPUTER NETWORKS

Time: Three hours

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

PART I

Answer all the questions.

1. What is the difference between "multiplexing" and "multiple access"? Describe the characteristic features of different multiple access schemes in detail. Draw the relevant diagrams. 12

OR

Draw the transmitter and the receiver structures for bandpass FHSS technique. Explain the operations of those two techniques. 12

2. (a) Derive the conditions to ensure the orthogonality of the two BFSK signals. 06

(b) Derive the condition which will ensure the continuity of the BFSK signals at bit transitions. 04

(c) Justify or rectify the following statement citing suitable reasons: 04

"Noise performance of coherent BFSK is better than non-coherent BFSK, yet non-coherent BFSK is often preferred over coherent BFSK."

OR

2. (a) Prove that the noise performance of BPSK signal is better than the noise performance of BFSK signal. 08

(b) Define the terms "null-to-null bandwidth" and "Percentage bandwidth". 06

[Turn over

3. (a) A message signal $m(t)$ has the amplitude spectrum as shown in fig. 1, where W=2 kHz. This signal is applied to a product modulator, together with a carrier wave $A_c\cos(2\pi f_c t)$, producing DSB-SC modulated signal $u(t)$. The modulated signal is then applied to a coherent detector. Assuming perfect synchronism between the carrier waves in the modulator and the detector, determine the spectrum of the detector output when: (*i*) the carrier frequency f_c=2.5 kHz and (*ii*) the carrier frequency f_c=1.5 kHz. What is the lowest carrier frequency for which each component of the modulated signal $u(t)$ is uniquely determined by $m(t)$? 06

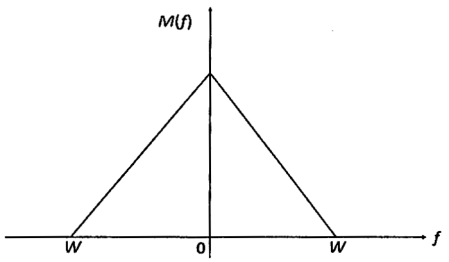

Fig. 1.

3. (b) How can frequency modulated signals be demodulated using FMFB demodulators? In this context, explain the operation of an FMFB modulator using PLL in detail. 08

OR

What is a balanced discriminator circuit? With the help of a suitable diagram, explain the operation of the same. 08

4. Write short notes on ***any two*** of the following: 05+05

i) Baseband communication and carrier communication.

ii) Stationarity of a random process.

iii) White noise.

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B.E. ELECTRICAL ENGINEERING FOURTH YEAR FIRST SEMESTER EXAMINATION 2019

Principles of Communication Engineering and Computer Networks

Time: Three Hours **Full Marks:** 100

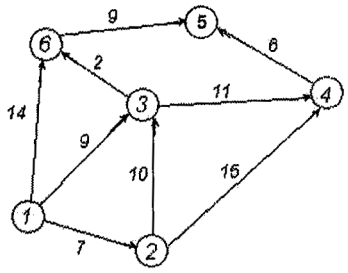
(50 marks for each part)
Use a separate Answer-Script for each Part

PART-II

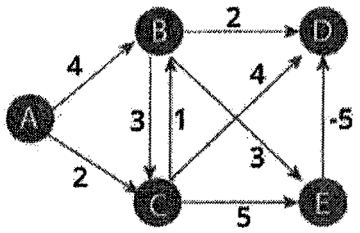
Answer *all* questions from this part.

1.	a) Discuss the reasons for flow integrity error in data bits during transmission across the network.	4
	b) Find the checksum of the following four binary numbers each having 8 bits. The MSBs are on the left hand of each byte. 10110011, 10101011, 01011010 and 11010101. How checksum is used to detect error in data transmission? What are the limitations of the checksum method ?	4
	c) Show the waveform of the digital signal to be transmitted using (i) Manchester and (ii) Bipolar AMI encoding techniques for the digital data 1101111010. Mention the merits of both the techniques.	4
	OR	
1.	a) A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1. Show the actual bit stream transmitted. If the 3rd bit from the left is inverted during transmission, show how this error can be detected at the receiver.	4
	b) Show the waveform of the signal to be transmitted using (i) NRZ-L, (ii) Differential Manchester encoding techniques to transmit the binary data 01100101. Mention the relative merits and demerits of the two methods.	4
	c)List different types of guided and unguided transmission medium and mention their application. Why twisted pair cable is used instead of straight cable?	4
2.	a) Why layered approach is needed in protocol architecture model?	3
	b) Explain the functions of data link layer, network layer and presentation layer of ISOOSI	5

	architectural model.	
	OR	
2.	a) What are the different types of transmission impairments that occurr while transmitting data through a channel?	3
	b)Explain the functions of transport layer and internet layer of TCP/IP architecture. What is protocol data unit (PDU)? Name the PDU of TCP and IP layer.	5
3.	a) Explain the virtual circuit service and datagram service in packet switched wide area network. Compare the two services in terms of quality of service, reliability of service and implementation complexity.	4
	b) Mention the different components of IEEE 802.11 wireless LAN system. What are the functions of different control frames used in IEEE 802.11? Show the RTS frame format and explain different fields therein.	5
	c) Explain TOKEN Ring protocol. How its performance can be improved?	3
	OR	
3.	a) The octets of the MAC frame (IEEE 802.3 frame) in hexadecimal are given below. The preamble (PR) and start frame delimiter (SFD) are not included. Identify the various fields of the frame. 00 00 66 33 B5 49 00 00 A7 12 36 B7 00 60 AA AA 03 00 00 00 08 00 48 45 4C 4C	2
	b) Briefly explain the medium access protocol for wireless LAN.	5
	c) Compare principle of operation of Bus and Dual bus in LAN.	3
	d) Explain circuit switching wide area network. Give one example of it.	2
4.	a) How the congestion in the network can be detected? The TCP congestion window is at 24 Kbytes and triple duplicate ACK occurs, then what will be the window size and threshold (slow start threshold(ssthresh)) size? Explain with diagram the procedure for congestion avoidance.	5
	b) Explain the two types of virtual connection in an ATM network.	3
	c) A and B choose p=47, g=3 and A picks a random number x=8 and B picks a random number y=10. Show the calculations done by them to get the secret key (K) using the Diffie-Hellman key exchange algorithm.	3
	d) Explain briefly with header format of the ICMP messages "Time Exceeded" and "Source Quench".	3
	e)Find the shortest path from Node 1 to all other nodes using **Dijkstra's Algorithm.**	4



OR

4.	a) Why Flow control is necessary during transmission of data from source to destination? Explain "Selective Repeat" flow control protocol.	**5**
	b) Encrypt plaintext "CAB" if C=3, A=1 and B=2 using public key encryption algorithm. Use prime numbers p= 7 and q=11 and encryption key **e=7** to generate decryption key **d** such that **de mod {(p-1) x (q-1) = 1.** Prove that public key decryption method recovers the original plaintext.	**4**
	c)What is meant by negative weight cycle? Find out the shortest distance of each vertex from source node **A** as shown in the Figure below using **Bellman Ford algorithm.**  	**4**
	d) What is committed information rate (CIR) and excess burst size (Be) in Frame Relay?	**2**
	e) Explain the roles of 'URG', 'SYN' and 'FIN' flags in TCP Header format.	**3**