Ref. No. : Ex/EE/T/411/2018

B. ELECTRICAL ENGINEERING 4TH YEAR 1ST SEMESTER EXAMINATION, 2018

SUBJECT: - PRINCIPLES OF COMMUNICATION ENGINEERING & COMPUTER NETWORKS

Full Marks 100

Time: Three hours **Part-I** **(50 marks for each part)**

Use a separate Answer-Script for each part

Answer any THREE questions. Two marks reserved for neat and well organized answers.

Q. 1a). "A DSB-SC AM signal is so named because the carrier signal does not have a contribution at carrier frequency f_c in the frequency spectrum of the modulated signal." – Justify or modify the statement, citing suitable reasons. 04

Q. 1b). "Single sideband AM is not a suitable modulation scheme for those message signals which have significant contributions of dc component and/or very low frequency components." – Justify or modify the statement, citing suitable reasons. 04

Q. 1c). Explain the operating principle of a rectifier type conventional DSB AM demodulator and prove that its output is a scaled version of the original message signal transmitted. 08

Q. 2a). "The bit error probability of a digital modulation scheme is directly related to the ratio of average bit energy to noise power spectral density." - Justify or modify the statement, citing suitable reasons. 04

Q. 2b). Under what circumstances nonuniform quantization is employed in digital communication? What are the popular companding characteristics employed to achieve nonuniform quantization? 07

[Turn over

Q. 2c). "For the purpose of coherent BPSK demodulation, it is mandatory that f_c should be an integer multiple of R_b, where each symbol has its usual meaning." - Justify or modify the statement, citing suitable reasons. 05

Q. 3a). A signal $x(t) = m(t) + \cos 2\pi f_c t$ is applied to a nonlinear system whose output is $y(t) = x(t) + \frac{1}{2}x^2(t)$. Fig. 1 shows the spectrum $M(f)$ where $W << f_c$. Determine the spectrum of $y(t)$ and sketch it. 06

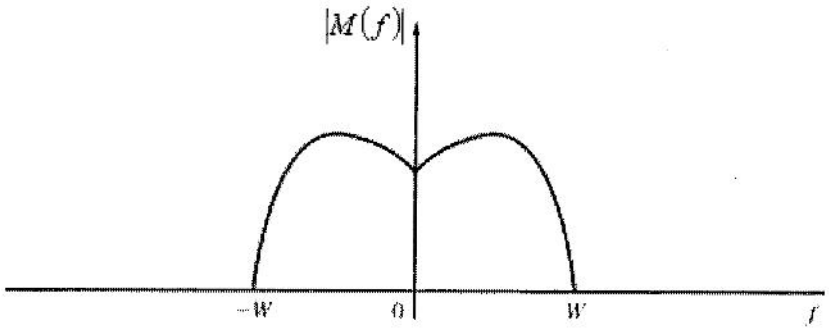

Fig. 1.

Q. 3b). Develop an expression for the narrowband frequency modulated wave of a single frequency message signal. Draw the corresponding block diagram and show how the same circuit can be utilized as a narrowband phase modulator. 07

Q. 3c). Why the matched filter used for detection of binary signals in Gaussian noise is so named? 03

Q. 4a). Describe in detail how spreading and despreading are achieved in the transmitter and receiver stages, respectively, in spread-spectrum modulation for baseband transmission. 07

Q. 4b). Why are guard bands and guard times utilized in designing FDMA and TDMA schemes, respectively? 04

Q. 4c). Why the concept of frequency reuse is important in wireless communication? How are co channel cells located for frequency reuse? 05

Q.5. Write short notes on any **two**: 08+08

(a) Communication channels for analog signal transmission.

(b) Coherent FSK demodulators.

(c) Pulse code modulation.

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B.E. ELECTRICAL ENGINEERING FOURTH YEAR FIRST SEMESTER EXAMINATION 2018

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 *any three* questions from this part.
Two marks are reserved for neat and well organised answer

1.	a)	What is committed information rate (CIR) in Frame Relay network? What will the Frame Relay switch do if this rate is exceeded?	3
	b)	What are the different call set up and call disconnection packets in X.25 packet switched network? Explain how they are used during a call-establishment and call-disconnection process.	4
	c)	Explain medium access protocol for FDDI LAN.	4
	d)	Discuss the functions of data link layer and session layer of ISOOSI and internet layer of TCP/IP architectural model.	5
2.	a)	Draw the diagram and explain in brief the protocol stacks that need to run on end systems (hosts) and bridge when ETHERNET LAN is connected to a TOKEN RING LAN. Discuss how the information is being transferred in this context.	5
	b)	The frame size is 2400 bits on a satellite channel operating at 4800 bps(bit/sec). What is the link utilization efficiency for stop-and-wait flow control mechanism? The distance between the sender and receiver is 2000km and speed of propagation over the medium is 200,000km/sec.	4
	c)	Why are RTS and CTS signals used in wireless communication system?	2+2
	d)	Explain how congestion can be controlled in Frame Relay network.	3
3.	a)	Describe the procedure to re-assemble IP fragments at the destination.	4

	b) Mention the different types of ICMP messages. Explain briefly the ICMP messages "Destination unreachable" and "Redirect".	5
	c) Calculate the frame check sequence (FCS) for the message M = 11100011 by CRC method using generator polynomial P = 110011. Show the actual bit stream transmitted.	4
	d) List the different types of guided transmission medium. Mention the advantages of optical fiber as transmission medium.	1+2
4.	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	3
	b) Explain the "Selective Repeat/ Retransmission" flow control protocol and show how it controls the error in data transmission.	5
	c) Briefly discuss the different transmission medium technology for IEEE 802.11 wireless local area network.	5
	d) Mention the necessity of "TTL" (Time-to-live) and "TOS" (Type of Service) field in the IP datagram header (IPv4) format.	3
5.	a) Show the waveform of the digital signal to be transmitted using (i) Differential Manchester and (ii) Bipolar AMI encoding techniques for the binary data 1101111010.	3
	b) Explain the two types of virtual connection in an ATM network.	4
	c) The TCP congestion window is at 18KB, then **timeout** occurs. What will be the congestion window size (cwnd) and threshold (ssthresh) size thereafter. Explain with diagram the procedure to overcome this situation of congestion.	5
	d) Explain the flooding technique of routing.	4