		Reg. No.							
MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL A Constituent Institution of Manipal University									
V SEMESTER B. Tech. (BME) DEGREE END SEM EXAMINATIONS NOVEMBER 2017									
SUBJECT: TELEMEDICINE (BME 3105) (REVISED CREDIT SYSTEM)									
Monday, 20 <sup>th</sup> November 2017: 2 PM to 5 PM									
TIM	TIME: 3 HOURS MAX. MARKS: 100								
Ang	wer A	LL questions							
Alls		LL questions							
1.	(a)	(i) List the advantages of using digital transmission over analog transmission.	(2)						
		(ii) How does channel bandwidth affect communication?	(5)						
			(1.3)						
	(b)	(i) Given the bandwidth of the network to be 1Gbps and the distance between sender and receiver to be 12000 km, calculate the propagation-time and the transmission time required to transmit a 2.5 Kbyte message. [Assume the speed of light to be $2.4 \times 10^8$ m/sec].	(2)						
		(ii) List and explain the performance parameters associated with a network.	(5)						
		(iii) How does the bit rate change when the SNR of a channel increases? Justify your answer.	(1.5)						
	(c)	(i) Which of the guided media offers the lowest electromagnetic interference. Give reason	(2)						
		(ii) Write a note on three different transmission media used for wireless communication.	(5)						
2.	(a)	(i) What parameter of the message would be affected with a phase error in the synchronizing carrier used in the demodulation of DSB-SC signal? Prove the answer.	(1+4)						
		(ii) How much of power can be saved with SSB transmission, compared to that required for DSB-SC signal transmission?	(2)						

	(b)	<ul><li>(i) The power transmitted by a Single Sideband (SSB) transmitter is 10KW. It is required to be replaced by standard AM transmission having a modulation-index of 0.8, and having the same power. Determine the power content of the carrier and power in each of the sidebands.</li><li>(ii) Which of the methods of linear modulation is well suited for the transmission of video in commercial television broadcasting applications. Give the reason.</li></ul>	(4) (2)
	(c)	(i) Show that for distortionless recovery of the baseband signal using square law detector, the percentage-modulation should be very small.	(5)
		(ii) A carrier signal with an amplitude of RMS value 2V and a frequency of 1.5MHz is amplitude modulated by a sine wave of frequency 500Hz and RMS amplitude level of 1V. Write the expression for the resulting AM signal, and calculate the modulation index.	(2)
3.	(a)	(i) Given a square wave input, draw the corresponding frequency modulated (FM) and phase modulated (PM) output.	(3)
		(ii) Consider an angle-modulated signal generated by frequency-modulation process as $V_{FM}(t) = 20 \cos [2\pi 10^6 t + 0.1 \sin (10^4 \pi t)]$ . Given $k_f = 10\pi$ , derive the expression for the modulating signal. Assume that the modulating signal is $V_m(t) = V_m \cos(10^4 \pi t)$ .	(4)
	(b)	(i) What are the advantages of using DPSK over coherent methods?	(1)
		(ii) Explain the method of generating a DPSK signal. In this context, assume the binary message data to be 11010010 and the initial bit to be 1.	(6)
		(iii) Sketch the output of the DPSK detector.	(3)
	(c)	How can digital data be transmitted over an analog band pass channel? Explain any modulation technique that can be used for this purpose.	(3)
4.	(a)	(i) Differentiate Frequency Division multiplexing (FDM) from frequency division multiple access (FDMA).	(2)
		(ii) Define CDMA. Illustrate the concept of CDMA with an example.	(5)
		(iii) Twenty-four voice-band signals (each having $f_m = 3.4$ KHz), are sampled uniformly, with each pulse having a duration of 1µs, and then time-division multiplexed. The multiplexing operation includes provision for synchronization by adding an extra pulse of 1 µs duration. Assuming a sampling rate of 8KHz, calculate the spacing between successive pulses of the multiplexed signal.	(4)

	(b)	(i) What are the salient features of ISDN that makes it suitable for telemedicine applications? Explain the two types of ISDN in detail, giving an application for each.	(4)
		(ii) Consider that the maximum frequency in an analog information signal is 3.2KHz. A binary channel of bit rate 36kbps is available for PCM voice transmission. Determine the minimum sampling frequency, number of bits required per sample, and the number of quantized levels.	(3)
	(c)	What are the different layers of the ISO-OSI reference model? Which layer in the network is concerned with the encryption of data.	(2)
5.	(a)	Differentiate symmetric from asymmetric encryption. Explain how public key encryption can be done along with authentication of data.	(1+6)
	(b)	(i) What are the ethical issues involved in telemedicine?	(1.5)
		(ii) Explain the following terms with reference to their importance in telemedicine: Firewall; Phisher; Jurisdiction; confidentiality of data; HL7	(5)

(c) With a neat diagram, explain the components of a videoconferencing system. (5+1.5) Also, mention the standards used in videoconferencing.