Reg. No.



## MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

## V SEMESTER B. Tech. (BME) DEGREE MAKE-UP EXAMINATIONS, DECEMBER 2017

## SUBJECT: TELEMEDICINE (BME 3105) (REVISED CREDIT SYSTEM) Saturday, 23<sup>rd</sup> December 2017: 2 PM to 5 PM

TIME: 3 HOURS MAX. M			ARKS: 100		
1. 2.	Instructions to Candidates: 1. Answer ALL questions. 2. Draw labeled diagram wherever necessary				
1.	(a)	(i) Differentiate analog and digital transmission.	(4)		
		(ii) Mention the method that can be used to transmit analog data via digital transmission system.	(1)		
	(b)	(i) Explain the nyquist bit rate for noiseless channel and Shannon capacity for a noisy channel.	(4)		
		(ii) Consider a noiseless channel with a bandwidth of 3000Hz, transmitting a signal with two signal levels. What is the maximum bit rate?	(1)		
	(c)	(i) Give a comparison of the different guided media.	(5)		
		(ii) Write a note on three types of propagation methods used in communication.	(5)		
2.	(a)	(i) A carrier signal having 10V peak amplitude is amplitude modulated by three different modulating frequencies with peak amplitude levels of 2V, 3V and 4V respectively. Compute the modulation index of the resultant complex AM signal.	(2)		
		(ii) Explain the detection of standard AM using diode detector.	(6)		
	(b)	(i) An AM signal is given by the expression			
		$V_{AM}(t) = 10[1+0.5 \sin(2\pi 10^3 t) + 0.2 \sin(4\pi 10^3 t)] \sin(2\pi 10^6 t)$ , Find (a) the net modulation index (b) unmodulated carrier power (c) sideband power (d) total power of the AM signal.	(4)		
		(ii) Explain the phasing method for the generation of AM-SSB.	(4)		
	(c)	Let $Vm(t) = sin (2\pi 2000t)$ be the information signal and $Vc(t) = 5 sin(2\pi 10^6 t)$ be the	(4)		

carrier signal. Write the expression for the AM wave in terms of the modulation index.

3.	(a)	(i) Differentiate narrow band FM from Wide band FM.	(2)
		(ii) For a modulating signal $m(t)= 2 \cos(100\pi t) + 18 \cos(2000\pi t)$ , determine the allowable sampling rates and sampling intervals.	(3)
	(b)	(i) Explain the generation and demodulation of PWM signals. How PWM signals are converted to PPM signals.	(8)
		(ii)An FM modulator operates at carrier frequency of 500KHz with frequency deviation sensitivity of 1.5KHz/V. A PM modulator also operating at the same carrier frequency has a phase deviation sensitivity of 0.75rad/V. If both FM modulator and PM modulator are modulated by the same modulating signal having peak amplitude of 2V and modulating frequency of 2KHz, then show that frequency modulation index and phase modulation index have same values.	(4)
	(c)	Explain the coherent detection for BFSK signals.	(3)
4.	(a)	(i) Explain the process of time division multiplexing in detail.	(6)
		(ii) Consider time- division multiplexing of 5 PAM signals with sampling time of 1msec. If the width of each sample pulse is 150µsec, find the guard time. If it is required to maintain the same guard time to avoid interference between samples, find the new pulse width to transmit 10 PAM signals in 1msec duration.	(4)
		(iii) Differentiate FDMA from CDMA.	(2)
	(b)	Mention the layers in the ISO-OSI network architecture and the functions of the physical layer in the network.	(4)
	(c)	What is Wi-Fi? Mention the frequency and range of operation of the Wi-Fi network, long with a telemedicine application.	(4)
5.	(a)	Define cryptography. What are the different parameters that can be used for biometric security and identification? Explain any two in detail.	(1+6)
	(b)	Define symmetric encryption and the same with an example.	(4)
	(c)	(i) Explain in detail the basic components of a tele-radiology system.	(5)
		(ii) Write a note on DICOM.	(4)