VIT

Vellore Institute of Technology

Slot : G2+TG2

School of Computer Science Engineering and Information Systems

Fall Semester 2023-2024

Continuous Assessment Test – II

Programme Name & Branch B.Tech (IT)

Course Name & code: BITE203L – Principles of Communication Systems

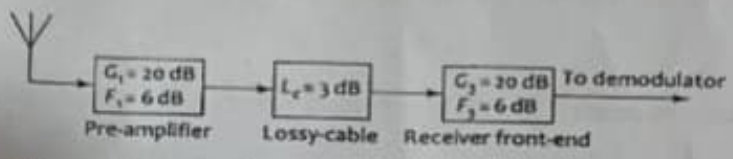
Class Number (s): VL2023240102607, VL2023240102611, VL2023240102612, VL2023240102605

Faculty Name (s) : Dr.T. Senthil Kumar, Dr.Karthikeyan D, Dr.E.Balaji, Dr.Jerart Julus L

Exam Duration: 90 Min. **Maximum Marks:** 50

General instruction(s): Answer all the questions

Q.No.	Question	Max Marks
1.	A satellite receiving system consists of a low-noise amplifier (LNA) that has a gain of 47 dB and a noise temperature of 120 K, a cable with a loss of 6.5 dB and the main receiver with a noise factor of 7 dB. Estimate the equivalent noise temperature of the overall system referred to the input for the following system connections. (i) LNA at the input followed by the cable connecting to the main receiver. (ii) The input direct to the cable, which is then connected to the LNA, which, in turn, is connected to the main receiver.	10
2	A Compact disc (CD) records audio signals digitally by using PCM. Assume the audio signal bandwidth to be 150 KHz. i) What is Nyquist rate? ii) If the Nyquist samples are quantized into L=25,000 levels and then binary coded, determine the number of binary digits required to encode a sample. iii) Determine the number of binary digits per second(bits/sec) required to encode the audio signal. iv) For practical reasons, the signals are sampled at a rate well above Nyquist rate at 44100 samples per second. If L=50,500 determine	10

	number of bits per second required to encode the signal and transmission bandwidth of encoded signal.	
3.	In TV receivers, the antenna is often mounted on a tall mast and a long lossy cable is used to connect the antenna to the receiver. To overcome the effect of the lossy cable, a pre-amplifier is mounted on the antenna as shown in Figure.  (i) Determine the overall noise figure of the system. (ii) Determine the overall noise figure of the system if the pre-amplifier is omitted and the gain of the front-end is increased by 20 dB.	10
4.	a) In a broadcast superheterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit is 1000. If the IF is 555 kHz, determine (i) the image frequency and its rejection ratio for tuning at 1125 kHz (ii) the image frequency and its rejection ratio for tuning at 75 MHz b) Find the figure of merit of an AM system when the depth of modulation is (i) 100 % (ii) 80 %, and (iii) 35 %	6 4
5.	a) A PCM System uses a uniform quantizer followed by a v bit encoder. Prove that rms signal to quantization noise ratio is approximately given by 1.8+6v dB. b) A signal of bandwidth 5KHz is sampled quantized and coded by a PCM system. The coded signal is then transmitted over a transmission channel of supporting a transmission rate of 35 K bits/sec, Calculate the maximum signal to noise ratio that can be obtained by this system. The input signal has peak to peak value of 5 volts and rms value of 0.4V. (6 Marks)	4 6

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