USN ｜ 0٠ JST (8E٠055 ｜ Code: EC520

JSS MAHAVIDYAPEETHA
JSS SCIENCE AND TECHNOLOGY UNIVERSITY
SRI JAYACHAMARAJENDRA COLLEGE OF ENGINEERING
JSS Technical Institutions Campus, Mysuru – 570 006, Karnataka

JANUARY/FEBRUARY 2021 SEMESTER END EXAMINATIONS

PROGRAMME: B.E.
BRANCH: E&C
SEMESTER: V
SECTION: 'A' & 'B'
PAPER SETTER: Mrs. Gayitri H.M.

DATE: 21.01.2021
DAY: Thursday
TIME: 9.30 A.M. to 12.30 P.M.
DURATION: 3 hrs.
MAX. MARKS: 100

ADVANCED COMMUNICATION SYSTEMS

NOTE:
1. PART-A is compulsory.
2. Answer PART-B using Internal Choices

PART – A

Q. No.	CO	CD	QUESTION	MARKS
1.	CO1	L2	Explain with a neat circuit diagram and Mathematical equations, the square law modulator.	10
2.	CO2	L3	Bandwidth of input signal to the PCM is restricted to 4 KHz. The input varies from -3.8V to 3.8V and has the average power of 30mW, the required signal to quantization noise power ratio is 20dB. The modulator produces binary output. Assume uniform quantization. Calculate i) The number of bits required per sample. ii) Outputs of 30 such PCM coders are time division multiplexed. What is the bandwidth?	10
3.	CO3	L2	Explain with a neat diagram and waveforms the working of generation and coherent detection of BPSK signal.	10
4.	CO4	L2	Explain any five properties of Line codes.	10
5.	CO5	L4	The parity check matrix of a particular (7,4) linear block code is expressed as $$[H] = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$ i) Obtain the generator matrix (G). ii) List all the code vectors. iii) What will be the minimum distance between code vector? iv) How many errors can be detected and corrected?	10

PART – B

Q. No.	CO	CD	QUESTION	MARKS
6.	CO1	L4	Calculate the carrier swing, carrier frequency. frequency deviation and modulation index for an FM Signal which reaches a maximum frequency of 99.047MHz and a minimum frequency of 99.023 MHz. The frequency of the modulating signal is 7KHz.	10
			OR	
7.	CO1	L4	The output voltage of a transmitter is given by $400[1+0.4 \cos 6280t]\cos 3.14 \times 10^7 t$. This voltage is fed to a load of 600Ω resistance. Determine (a) Carrier frequency. (b) Modulating frequency. (c) Carrier power (d) Total power output	10

Q. No.	CO	CD	QUESTION	MARKS
8.	CO1	L3	A TV Signal having a bandwidth of 4.2MHz is transmitted using binary PCM System. Given that the number of quantization levels is 512. Determine i) Code word length ii) Transmission bandwidth iii) Final bit rate iv) Output Signal to quantization noise ratio.	10
			OR	
9.	CO2	L3	Twenty four voice signals are sampled uniformly and then have to be time division multiplexed. The highest frequency component for each voice signal is equal to 3.4 KHz. Now i) If the signals are pulse amplitude modulated using Nyquist rate sampling, what would be the minimum channel bandwidth required. ii) If the signals are pulse code modulated with an 8-bit encoder. What would be the sampling rate? The bit rate of the system is given by 1.5×10^6 bits/sec.	10

Q. No.	CO	CD	QUESTION	MARKS
10.	CO3	L2	Explain with the block diagram of a differential PCM transmitter and reconstruction of DPCM Signal.	10
			OR	
11.	CO3	L2	Explain with the block diagram the Adaptive delta modulation and demodulation with relevant mathematical equations and waveforms.	10

12.	CO4	L2	Represent the bit sequence 1011101011 to be transmitted using the following formats. i) Unipolar RZ & NRZ ii) Bipolar RZ & NRZ iii) Split – phase Manchester iv) AMI RZ	10
			OR	
13.	CO4	L2	Deduce the Nquist's criterion for distortion less baseband binary transmission.	10

14.	CO5	L4	A DMS X has 5 symbols x, x_2, x_3, x_4 and x_5 with $P(x_1) = 0.4, P(x_2) = 0.19, \quad P(x_3) = 0.16, P(x_4) = 0.15$ and $P(x_5) = 0.1$. i) Construct a Shannon – Fano code for X and calculate the efficiency of the code. ii) Repeat for the Huffman code and compare the results.	10
			OR	
15.	CO5	L4	The generator polynomial of a (7,4) cyclic code is $G(P) = P^3 + P + 1$. Obtain all the code vectors for the code in non-systematic and systematic form.	10

Course Outcome

CO–1	Explain and analyze the fundamental concepts of analog communication.
CO–2	Design and demonstrate modulation and demodulation of waveform coding technique and also by using simulation tool for system analysis.
CO–3	Demonstrate the working of different kind of Modulation and demodulation circuits.
CO–4	Analysis and evaluate various baseband transmission techniques.
CO–5	Analyse and evaluate various error-detection and correction techniques.
CO–6	Involve in independent / team learning, communicate effectively and engage in life-long learning.

--- **End** ---