

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2023

Course: Communication System
Program: B. Tech ECE
Course Code: ECEG 2042

Semester: IV
Time 03 hrs.
Max. Marks: 100

Instructions: Answer all questions.
Diagrams must be neat and clean

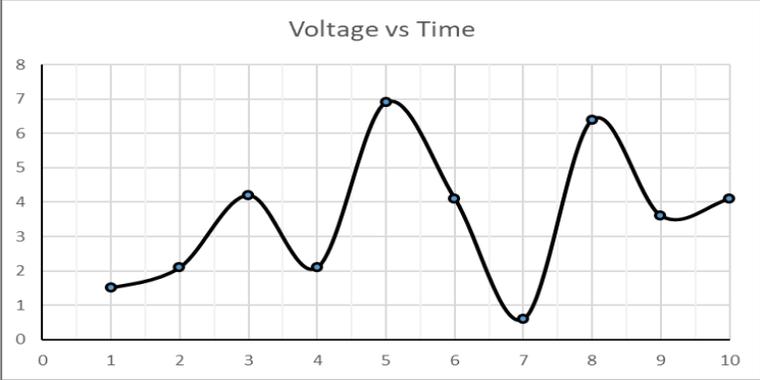
SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	A song is recorded digitally and stored on a CD using PCM technique. The highest frequency present in the song is 15 kHz and number of quantisation level is 1024. If the song occupies a space of 60 MB then what is the duration of the song.	4	CO2
Q 2	Convert the given sequences into AMI, B6ZS, HDB3, and UP-NRZ line coding. 1 0 1 0 1 1 1 0 0 0 0 0 0 0 1 0 1 0 1	4	CO1
Q 3	The voltage limit of a quantiser is 4 volts to 20 volts and the number of quantisation level is 64. Find the step size and SQR.	4	CO1
Q 4	Draw the frame structure of T1 line and calculate its rate of transmission.	4	CO2
Q 5	The output voltage of a AM transmitter is given as: $v(t) = (1+0.5 \cos 3140t) \sin 2\pi \times 105t.$ Determine the carrier frequency, carrier amplitude, modulating frequency, power and transmitted bandwidth.	4	CO2

SECTION B
(4Qx10M= 40 Marks)

Q 6	(a) Deduce the formula for finding the total power and efficiency of AM wave. (b) Determine how much more bandwidth is required for FM broadcasting if the frequency deviation of the standard FM broadcasting is increased to 150 kHz. What would be the number of side bands in this case.	6+4	CO3
Q 7	How a super heterodyne receiver receives an FM signal at 102 MHz. Illustrate with neat diagram and shows the frequency at each path of the receiver.	10	CO2

Q 8	<p>(a) Sketch the waveform showing the two limitations of Delta Modulation. Mention the two advantages of Delta Modulation over PCM.</p> <p>(b) A standard telephone line is made to transmit using Delta Modulation scheme. The frequency of the pulse train of the system is 4 times the standard Nyquist sampling rate of the telephone line. If the step size of the DM system is 200mV, then determine the average amplitude of the message passing through the telephone line.</p>	4+6	CO2
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Q 9	<p>Convert the following signal into string of 0 and 1, then code the resultant binary codes into AMI line coding and determine the transmission rate. The quantization step size is 1volt. The circular spots are the sampling points.</p> 	10	CO3
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SECTION-C
(2Qx20M=40 Marks)

Q 10	<p>(a) Draw the block diagram of and signal space diagram of a MODEM working on Binary Phase Shift Keying.</p> <p>(b) Derive the equation of probability of error of binary ASK modulation scheme using white noise and matched filter.</p>	10+10	CO2
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Q 11	<p>(a) A signal containing two frequencies of 8 kHz and 2 kHz is converted into binary digits using PCM with the help of a quantiser. The step size of the quantiser is 0.16 volt, while the range of the quantiser is from 0.24 volt to 1.32 volt. The output bit stream is fed to a QPSK modulator. What would be the bandwidth required by the channel to transmit the signal smoothly? Draw the spectrum with proper frequency scale. Find the baud rate also.</p> <p>(b) If 4 E1 lines are multiplexed and in between each line 10 synchronization bits are used, this multiplexed line is needed to transmit using Manchester line coding. Then find the minimum transmission rate and bandwidth required.</p>	10+10	CO4
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