

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

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

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

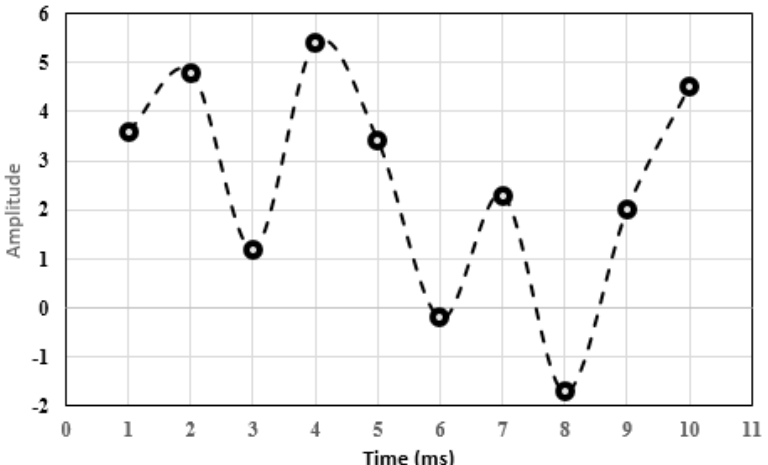
Instructions: Answer all questions.
Diagrams must be neat and clean

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	A song is recorded digitally on a CD using PCM technique. The highest frequency present in the song is 15 kHz and no encoded bit used in binary coder is 10. If the song occupies a space of 108 megabits then what is the duration of the song .	4	CO1
Q 2	What is BPSK ? Find the probability of error of BPSK modulation scheme using white noise analysis.	4	CO3
Q 3	If 4 E1 lines are multiplexed and in between each line 10 synchronization bits are used, then find the minimum transmission rate and bandwidth required to transmit it.	4	CO2
Q 4	Delta modulation uses only 1 bit (either 0 or 1) to encode each sample point for the transmission, whereas a standard PCM uses 8 bits to encode each sampled points, but still the rate of transmission in PCM is less than Delta modulation. Why?	4	CO2
Q 5	Determine the minimum bandwidth required to transmit the spectrum for first null point and second null point of DS0 line using 16-PSK modulation.	4	CO3

SECTION B
(4Qx10M= 40 Marks)

Q 6	Deduce the formula for finding the total power of AM wave . A message signal $2\cos 50\pi t$ modulates a carrier of frequency 100 MHz . The maximum frequency deviation of the resultant angular modulated wave is 60 Hz. Determine the bandwidth required to transmit by FM and PM technique.	5+5	CO1
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Q 7	Draw the block diagram of and signal space diagram of transmitting a QPSK modulated wave.	10	CO3
Q 8	How a super heterodyne receiver receives an SSB signal of frequency 1.25 MHz . Illustrate with neat diagram and shows the frequency at each path of the receiver.	10	CO1
Q 9	<p>Convert the following signal into AMI line coding and determine the transmission rate. The quantization step size is 1 volt. The circular spots are the sampling points.</p> 	10	CO2

SECTION-C
(2Qx20M=40 Marks)

Q 10	<p>Design a MODEM using Binary Phase Shift Keying modulation scheme.</p> <p>The rate and maximum amplitude of incoming bit is 200 bps and 2 volt respectively and the frequency of the carrier signal, fed to the modulator, is 90 kHz. Find the frequency at each path of the MODEM.</p> <p>Draw the eye diagram of the same technique and determine the distance between 2 symbols.</p>	15+5	CO3
Q 11	<p>(a) A signal attains a transmission rate of 3000 kbps after passing through PCM system. It is transmitted using Polar line coder, and then fed into a modulator. The carrier frequency of the modulator is 10 MHz.</p> <p>How much bandwidth is required for transmitting using any two types of phase shift keying modulation technique? Draw the spectrum in the two cases.</p>	10+10	CO2

	<p>(b) An engineer designed a digital link between two stations. There is direct line of communication radio link between the two stations. The maximum allowable bandwidth supported by the link is 40 kHz. The engineer recorded a speech signal for 5 minutes. The maximum allowable frequency of this speech signal was limited to 10 kHz. It was converted into streams of 0s and 1s using PCM technique. The number of bits required to encode one sampled signal is 6. The PCM signal is fed into a modulator. Which type of digital modulation scheme the engineer has to choose for an uninterrupted transmission?</p>		
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