

(Please write your Enrolment No. immediately)

Enrolment No. _____

MID TERM EXAMINATION

B.TECH PROGRAMMES (UNDER THE AEGIS OF USICT)

3rd Semester, November, 2022

Paper Code: ECC-209

Subject: Analog Communications

Time: 1½ Hrs.

Max. Marks: 30

Note: Attempt Q. No. 1 which is compulsory and any two more questions from remaining.

Q. No.	Question	Max. Marks	CO(s)
1 (a)	Derive an expression for a single tone frequency modulation.	2	1, 2
1 (b)	The signal is modulated at 7.5 V and carrier voltage is of 9V, calculate modulation percentage.	2	1, 2
1 (c)	A carrier signal is frequency modulated with a sinusoidal signal of 2 KHz resulting in a maximum frequency deviation of 5 KHz. Find the bandwidth of the modulated signal.	2	1, 2
1(d)	In the demodulation process of DSB-FC using envelope detector, how the value of time constant RC determine the distortion in received signal.	2	1, 2
1(e)	Compare the SSB-SC and DSB-SC in terms of bandwidth and power saving. Also give the practical application of VSB.	2	1, 2
			1, 2
2 (a)	Explain the Phase Locked Loop Frequency demodulator with derivation.	5	1, 2
2(b)	Differentiate between NBFM and WBFM. Where they are used? What are the merits and Limitation of FM.	5	1, 2
3 (a)	An AM transmitter radiates 9kW power when the carrier is unmodulated and 10.125kW when carrier is sinusoidally modulated. Find the modulation index. Now if another sine wave corresponding to 40 % modulation is transmitted simultaneously, calculate the total radiated power.	5	1, 2
3 (b)	Explain the suppression of carrier in generation of DSB-SC with suitable diagram using balanced Modulator.	5	1, 2
4 (a)	Explain Superhetrodyne receiver with block diagram.	5	1, 3
4 (b)	b) A carrier voltage has a peak amplitude of 10 V at a frequency of 1 MHz. A sinusoidal signal of 1 kHz varies the amplitude of RF wave between 7.5 V and 12.5 V. Find the modulation index and equation of AM wave.	5	1, 2

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MID TERM EXAMINATION

B.TECH PROGRAMMES (UNDER THE AEGIS OF USICT)

3rd Semester, January 2023

Paper Code: ECC-209

Subject: Analog Communications

Time: 1½ Hrs.

Max. Marks: 30

Note: Attempt Q. No. 1, which is compulsory and any two more questions from remaining.

Q. No.	Question	Max. Marks	CO(s)
1 (a)	Define Modulation. Also list the significance of Modulation.	2	1, 2
1 (b)	Determine the percent modulation for an FM wave with a frequency deviation of 10 khz if the maximum deviation allowed is 25khz.	2	1, 2
1 (c)	Explain Selectivity and Sensitivity in Superhetrodyne receiver.	2	1, 3
1(d)	Differentiate between NBFM and WBFM.	2	1, 2
1(e)	What are the advantage of SSB over DSBSC. Also list the applications of VSB modulation.	2	1, 2
2 (a)	Explain FM generation using any method.	5	1, 3
2(b)	A FM wave is represented by the following equation, $v = 10\sin[5 \times 10^8 t + 4\sin 1250 t]$ a) Carrier and modulating frequency b) Modulation index and maximum deviation c) The power dissipated by FM wave in 50 ohm resistor	5	1, 2
3 (a)	Explain Envelop Detector using circuit Diagram.	5	1, 3
3 (b)	Explain the derivation of Amplitude modulation.	5	1, 2
4 (a)	Explain Superhetrodyne receiver with block diagram.	5	1, 3
4 (b)	b) A carrier voltage has a peak amplitude of 10 V at a frequency of 1 MHz. A sinusoidal signal of 1 kHz varies the amplitude of RF wave between 7.5 V and 12.5 V. Find the modulation index and equation of AM wave.	5	1, 2

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] FEBRUARY 2023

Paper Code: ECC-209

Subject: Analog Communication

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit.

Q1 Answer the following:-

(1x15=15)

- Write an expression for DSB_{SC} modulated wave.
- What is the bandwidth of SSB Signal?
- If A_c is 20 and the modulation index is 0.5. Determine the value of A_m .
- What is meant by the Fourier spectrum?
- What is Carson's Rule?
- How much is the maximum frequency deviation in FM?
- Define deviation ratio in FM.
- Why is the local oscillator frequency always higher than the signal frequency?
- What is a random process?
- What do you mean by PDF?
- What is the ergodic process?
- Define power spectral density.
- Define FOM in a receiver system.
- Define SNR.
- What do you mean by superposition of noise?

UNIT-I

- Q2 (a) Draw the block diagram of a communication system and explain the function of each block. (8)
(b) Define the Frequency shifting property of the Fourier Transform. Find the Fourier transform of $\cos(at)$. (7)
- Q3 (a) A sinusoidal carrier has an amplitude of 10 V and a frequency of 30 KHz. It is amplitude modulated by a sinusoidal signal having an amplitude of 3 V and frequency of 1 KHz. (i) write the equation of modulated wave. (ii) Plot the modulated wave showing maxima and minima in the waveform. (iii) Determine modulation index. (iv) draw spectrum. (8)
(b) Explain the envelope detector circuit with the importance of the RC time constant. (7)

UNIT-II

- Q4 (a) Derive the expression for single tone frequency modulated wave. (8)
(b) A FM wave is represented by $v(t)$. Find the Carrier frequency and modulating frequency with modulation index and maximum deviation. (7)
 $V(t) = 10\sin(5 \times 10^8 t + 4\sin(1250t))$
- Q5 (a) Explain the PLL method of FM detection. (8)
(b) Explain the Armstrong method for wideband FM generation. (7)

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UNIT-III

- Q6 (a) What are Probability and cumulative distribution function (CDF)? Explain their important properties.. (8)
 (b) A certain random variable is given by: (7)

$$F_X(x) = \begin{cases} 0 & \text{for } x \leq 0 \\ kx^2 & \text{for } 0 < x \leq 10 \\ 100k & \text{for } x \geq 10 \end{cases}$$

- (i) Find k (ii) Find $P(x \leq 5)$ and (iii) Find $P(5 < x \leq 7)$

- Q7 (a) Explain binomial distribution and find its mean and variance. (8)
 (b) Explain the different classification of the random process. (7)

UNIT-IV

- Q8 (a) Explain the receiver model with a diagram and comment on its utility. (8)
 (b) Explain the band-pass noise model. (7)
- Q9 (a) Derive the expression for FOM of the DSB_SC receiver. (10)
 (b) Explain the quadrature components of noise. (5)
