II B. Tech II Semester Regular Examinations, June/July - 2022
ANALOG COMMUNICATIONS
(Common to ECE &ECT)

Time: 3 hours   Max. Marks:
                                                                      70

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
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UNIT-I

1 a) With neat sketch explain Frequency Division Multiplexing.   [7M]

   b) Calculate the percentage power saving when the carrier and one of the sidebands are   [7M]
       suppressed in an AM wave modulated to a depth of 100% and 50%.
                                        Or
2 a) Develop the equation of a single tone modulation of AM system and explain the   [7M]
       power relations.
   b) With the help of waveforms and spectrum, describe the concept of Amplitude   [7M]
       modulation both in time domain and frequency domain.

UNIT-II

3 a) List out the methods for generation of SSB-SC signal and explain any one of the   [7M]
       method in detail.
   b) Find the various frequency components and their amplitudes in the voltage given by   [7M]
       v (t) = 50 (1+ 0.7 Cos 5000t- 0.3 Cos 1000t) sin $5x10^6$ t. Draw the single sided
       spectrum. Also evaluate the modulated and sideband power.
                                        Or
4 a) Explain the generation of DSB-SC signal using balanced modulator. Derive the   [7M]
       expression for DSB-SC signal.
   b) A carrier signal c (t) = 10 Cos ($2\pi.10^6$ t) is modulated by a message signal   m (t) =   [7M]
       2 Cos ($8\pi.10^3$ t) to generate a DSB-SC signal. Sketch the spectrum, calculate the
       B.W and power.

UNIT-III

5 a) Explain Armstrong method of generation of FM signal.   [7M]

   b) Distinguish between FM and PM by giving its mathematical analysis.   [7M]
                                        Or
6 a) Describe the frequency analysis of Angle modulated waves. Explain their   [7M]
       Bandwidth requirements.
   b) Compare AM and FM Systems noise performances.   [7M]

UNIT-IV

7 Explain the following (i) AGC (ii) RF sections.   [14M]
                                        Or
8 a) Discuss about frequency stability in FM Transmitter.   [7M]

   b) List out the advantages and disadvantages of TRF receiver.   [7M]

UNIT-V

9 a)   Explain, how a PPM signal can be generated from PWM signal.   [7M]
   b) Explain demodulation of PPM.   [7M]
                                        Or
10 Write short notes on   i) Single polarity and Double polarity PAM ii) Generation   [14M]
    and Demodulation of PWM

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UNIT-I

1. a) How AM is generated using square law modulator? Derive relevant expressions. [7M]
   b) Discuss (i) Single tone modulation (ii) Switching modulator [7M]

Or

2. a) With neat sketch, explain communication system. [7M]
   b) Comparison and contrast different AM Techniques. [7M]

UNIT-II

3. a) What is vestigial side band? Explain the process of generation and detection of VSB modulated wave using a carrier Ac $2\pi fct$ [10M]
   b) Give the applications of AM-FC and VSB modulation schemes. [4M]

Or

4. Describe the SSB in frequency domain and then explain how to generate SSB modulated wave using frequency discrimination method. Also, list the advantages of SSB [14M]

UNIT-III

5. a) With neat diagram, explain the FM demodulator using PLL. [7M]
   b) Discuss about the power and bandwidth requirements of FM? [7M]

Or

6. a) For an FM modulator with a modulating signal $m(t)= V_m \sin300 \omega t$, the carrier Signal $c(t)=8 \sin(6.5\times10^6)t$ and the modulation index $\beta = 2$. Find out the significant side frequencies and their amplitudes. [7M]
   b) Explain the difference between Narrow band FM and Wide band FM. [7M]

UNIT-IV

7. a) Draw the block diagram of superhetrodyne receiver and the function of each block. [7M]
   b) Discuss the factors influencing the choice of intermediate frequency (IF) for a radio receiver. [7M]

Or

8. a) Explain the Foster Seeley Discriminator method for FM demodulation with the help of neat circuit diagram. [7M]
   b) Explain working of FM transmitter using Armstrong method with a neat block diagram [7M]

UNIT-V

9. a) Write short notes on Modeling of Noise Sources. [7M]
   b) Explain about noise in AM systems. [7M]

Or

10. a) Explain the process of generation of PWM with neat diagrams. [7M]
    b) Write short notes on transmission bandwidth of PAM, PWM, and PPM. [7M]

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UNIT-I

1 a) With suitable diagram explain the square-law diode modulation method for AM generation.   [7M]

   b) An amplitude modulated voltage is given by V = 50 (1 + 0.2 cos 100 t + 0.001 cos 3500t) cos 10^6 t. State all frequency components present in the voltage, and find modulation index for each modulating voltage term. What is the effective modulation index of V?   [7M]

Or

2 a) Describe an expression for AM wave and sketch its frequency spectrum.   [7M]

   b) Explain the square law detection of AM signals.   [7M]

UNIT-II

3 a) Explain the Frequency discrimination method for generating SSB signal.   [7M]

   b) With neat sketch explain COSTAS Loop?   [7M]

Or

4 a) Explain the phase discrimination method for generating SSB.   [7M]

   b) Explain the principle of coherent detection of DSB-SC with neat block diagram.   [7M]

UNIT-III

5 a) With the help of waveforms and spectrum, describe the concept of FM.   [7M]

   b) With neat circuit diagram explain the working of a Balanced Frequency discriminator.   [7M]

Or

6 a) Draw the block diagram of FM transmitter using indirect method and explain its working.   [7M]

   b) Describe the working of a varactor diode modulator of FM   [7M]

UNIT-IV

7 a) Mention the advantages of superhetrodyne receiver over TRF receiver   [4M]

   b) Distinguish between simple AGC and delayed AGC   [5M]

   c) Draw the block Schematic for FM broad cast receiver and explain the function of each unit   [5M]

Or

8 a) Explain the effect of feedback on performance of AM transmitter.   [7M]

   b) Write a short notes on amplitude limiting.   [7M]

UNIT-V

9 Write short notes on i) Single polarity PAM ii) Generation of PWM   [14M]

Or

10 a) What is Noise figure? Find the Average Noise Figure of cascaded networks   [7M]

    b) Discuss threshold effect in angle modulation systems   [7M]

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UNIT-I

1　a)　Derive the equation for power relation of a single tone modulation of AM system.　[7M]
　　b)　The antenna current of an AM transmitter is 9A when only carrier is transmitted but it increases to 10.6A when the carrier is modulated by a single sine wave. Find the percentage of modulation.　Determine the antenna current when the percentage of modulation changes to 0.8?　[7M]

Or

2　a)　Draw the Envelope detector and illustrate the process of detection of AM wave.　[7M]
　　b)　An amplitude modulated signal represented in time domain as $4\cos(1800\pi t) + 10\cos(2000\pi t) + 4\cos(2200\pi t)$. Sketch the spectrum and calculate the band width and total power.　[7M]

UNIT-II

3　a)　What is DSB-SC modulator? Explain the ring modulator for generation of DSB-SC.　[7M]
　　b)　A DSB signal is to be generated with a carrier frequency of 1MHz using a nonlinear device with input and output characteristics $v_0 = a\,v_i + b\,v_i^3$. The output of the non-linear device can be filtered by an appropriate BPF and $v_i = m(t) + \cos(2\pi f_1 \times t)$. Find the value of f_1.　[7M]

Or

4　a)　Discuss about the power and bandwidth requirement of DSB-SC.　[7M]
　　b)　With neat sketch explain the Envelope detection of a VSB wave pulse carrier.　[7M]

Or

5　a)　With neat diagram explain generation of FM using reactance modulator.　[7M]
　　b)　With neat diagram explain the detection of FM using Zero crossing detector.　[7M]

6　a)　Explain the working of Varactor diode modulator in FM.　[10M]
　　b)　Make a comparison of AM with FM.　[4M]

UNIT-IV

7　a)　Describe the operation of variable reactance type and phase modulated FM transmitter.　[7M]
　　b)　What is the significance of AGC circuit? Differentiate between simple, delayed and amplify AGC.　[7M]

Or

8　a)　Draw the block diagram of a superheterodyne receiver and explain its operation What are the advantages of this receiver?　[7M]
　　b)　List out the advantages and disadvantages of TRF receiver.　[7M]

UNIT-V

9　a)　Explain the effect of Noise in SSB system　[7M]
　　b)　With neat sketch explain the significance of Pre-emphasis and De-emphasis.　[7M]

Or

10　a)　Mention and explain different methods for generation of PWM　[7M]
　　b)　Define the following (i) thermal noise (ii) shot noise (iii) noise figure (iv) equivalent noise temperature　[7M]