INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech IV Semester End Examinations (Regular/Supplementary) - July, 2021

Regulation: R18

ANALOG COMMUNICATIONS

Time: 3 Hours   **(ECE)**   **Max Marks: 70**

Answer FIVE Questions choosing ONE question from each module
(NOTE: Provision is given to answer TWO questions from any ONE module)
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Explain operation of square law detector with circuit diagram and waveforms. **[7M]**

    (b) A modulating signal $m(t) = 10cos(2\pi * 10^3 t) is amplitude modulated with a carrier signal c(t)=50 cos(2\pi*10^5 t). Find the modulation index, the carrier power, and the power required for transmitting AM wave.$ **[7M]**

2. (a) Describe multi-tone amplitude modulation using time and frequency domain equations. **[7M]**

    (b) The RC load for a diode envelope detector consists of a 1000 pF capacitor in parallel with a 10K resistor. Calculate the maximum modulation depth that can be handled for sinusoidal modulation at a frequency of 10 KHz if diagonal peak clipping is to be avoided. **[7M]**

MODULE – II

3. (a) What do you mean by modulation of VSBSC wave? Elaborate the phase discrimination method for generation of SSB. **[7M]**

    (b) Calculate the total power in case of SSB technique. A 500 W carrier is amplitude modulated to a depth of 75%. How much power is achieved for SSB compared to AM and DSBSC? **[7M]**

4. (a) Explain the generation of SSBSC AM wave with neat figures.List the advantages disadvantages and applications of SSBSC AM wave. **[7M]**

    (b) In a filter-type SSB generator, a crystal lattice filter is used. The two crystal are 3.0 and 3.0012 MHz. Calculate the filter bandwidth. **[7M]**

MODULE – III

5. (a) Explain in detail the principle of phase modulation.Write the relation between FM and PM? **[7M]**

    (b) An FM wave is given by s(t)=20 cos(8 $\pi*10^6$ t+9sin(2 $\pi*10^3$t)). Calculate the frequency deviation, bandwidth and power of FM wave. **[7M]**

6. (a) Demonstrate the generation of narrow band FM and wide band FM generation. **[7M]**

(b) An FM radio link has a frequency deviation of 30 kHz. The modulating frequency is 3 kHz. Calculate the bandwidth needed for the link. What will be the bandwidth if the deviation is reduced to 15 kHz? **[7M]**

MODULE – IV

7. (a) Elucidate the different types of noise. Explain the phenomenon of noise in DSBSC. **[7M]**

   (b) Find output noise power spectral density and noise power having 2 sided power spectral density 4kw/Hz is passed through low pass filter whose cut off frequency is 2KHz **[7M]**

8. (a) What is FM threshold effect? How threshold reduction is achieved in FM receiver in detail. **[7M]**

   (b) A cable has a power loss of 3 dB is connected to the input of an amplifier, which has a noise temperature of 100K. Calculate the overall noise temperature referred to the cable input. **[7M]**

MODULE – V

9. (a) Interpret the factors influencing the choice of the intermediate frequency for a radio receiver. **[7M]**

   (b) An AM super hetrodyne receiver is tuned to 600kHz.If the Q of its tank circuit is 60 and the IF is 450kHz, find the image rejection of the receiver in dB. What will be the image rejection in case of 2-stage RF amplifier? **[7M]**

10. (a) Demonstrate the working of FM transmitter and FM receiver with suitable diagrams. **[7M]**

    (b) Elaborate the working principle of pulse amplitude modulation(PAM) with block diagrams. **[7M]**

$- \circ \circ \bigcirc \circ \circ -$