Code No: RR221102 **Set No.1**

II B.Tech. II Semester Regular Examinations, April/May -2005
COMMUNICATION ENGINEERING
(Bio-Medical Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain with the circuit diagram, the balanced modulator.
   (b) When the modulation percentage is 75, an AM transmitter produces 1OKW. How much of this is carrier power? What would be the percentage power saving if the carrier and one of the sidebands were suppressed before transmission took place?

2. (a) Draw the complete block diagram of the Armstrong frequency modulation system and explain the function of the mixer and multipliers. In what circumstances can we dispense with the mixer?
   (b) The equation of an angle-modulated voltage $v(t) = 10\sin(10^8t + 3\sin 10^4t)$ what form of angle modulation is this? Calculate the carrier and modulating frequencies, the modulation index and deviation and power dissipated in a 100-ohm resistor.

3. (a) Why frequency drift and scintillation should be very small in radio transmitter.
   (b) Give and explain radio frequency spectrum used for various communications.
   (c) Draw the block diagram of a filter type SSB-SC transmitter with 20 KHZ oscillator and emission frequency in the range of 6 MHZ. Explain the function of each stage.

4. (a) Explain the following special features of communication receiver with circuits wherever necessary:-
      i. Automatic Gain Control. (AGC)
      ii. Advantages of RF amplifier
      iii. Double Spotting
   (b) Calculate the image frequency rejection of receiver having an RF amplifier and an IF of 450 KHz if the Qs of the relevant coils are 60 each at an incoming frequency of 1100 KHz.

5. (a) Define and explain four specifications of receiver characteristics.
   (b) Explain the necessity for AGC in a radio communication system. What is meant by delayed AGC? Explain with a neat circuit diagram.

6. (a) Discuss the two different forms of pulse time modulation for the case of a sinusoidal modulating wave.
   (b) Discuss the features of pulse amplitude modulation.

7. (a) Draw the block diagram of binary PSK receiver and explain the working principle.
   (b) Write the difference between coherent and non coherent systems. Give example.

8. (a) Explain the two modes for transmitting binary data across a link.
   (b) compare the two methods of serial transmission. Discuss the advantages and disadvantages of each.
   (c) Explain the concept of modem.

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1. (a) Sketch the time domain and frequency domain representation of
   i. carrier
   ii. signal
   iii. standard AM,
   iv. DSB-SC and SSB-SC for single tone modulation.
   (b) Using the message signal $m(t) = \frac{1}{1+t^2}$ .Determine and sketch the modulated waves for the following methods for modulation.
   i. Amplitude Modulation with 50 percent modulation.
   ii. Single side band with only the lower side band transmitted.
2. (a) Draw the complete block diagram of the Armstrong frequency modulation system and explain the function of the mixer and multipliers. In what circumstances can we dispense with the mixer?
   (b) The equation of an angle-modulated voltage $v(t) = 10\sin(10^8t + 3\sin 10^4t)$ what form of angle modulation is this? Calculate the carrier and modulating frequencies, the modulation index and deviation and power dissipated in a 100-ohm resistor.
3. (a) Write about the classification of transmitters.
   (b) Draw the block diagram of Amplitude modulated transmitter and explain the functions of each block.
4. (a) Explain in detail the alignment and tracking of a radio receiver.
   (b) Draw a practical diode detector and explain.
   (c) Explain why local oscillator frequency should be higher than signal frequency.
5. (a) Explain various types of noise in communication systems. How it is possible to deduce the deleterious effect of noise in communication system?
   (b) A mixer circuits having noise figure of 16 dB is Preceded by an amplifiers having a noise figure of 9 dB and an available power gain of 25 dB. What is the overall noise figure of the combination?
6. (a) Discuss the principle behind the Frequency Division Multiplexing.
   (b) Complete and contrast PAM, PWM, PPM methods.
7. Draw the block diagram of QPSK transmitter and receiver and explain the operation.

8. (a) Why FSK is not suitable for high speed modems.
   (b) Why are modems needed for telephone communications.
   (c) Explain the asymmetry of 56 k modems.

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Code No: RR221102 **Set No.3**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) Explain the balanced modulator using FET amplifiers.
   (b) Compare various methods of SSB generation.
2. (a) Explain slope detection method for detecting FM signal. Give its advantages and disadvantages.
   (b) Write short notes on pre-emphasis
3. (a) Explain how frequency stability is achieved in modern transmitter.
   (b) Describe with aid of suitable diagram, the principal method of SSB powe generation.
   (c) Describe the advantages of a SSB SYSTEM for high frequency point to point communication and explain why it is unsuitable for broadcasting.
4. (a) What are the advantages of Superheterodyne receiver as compared to a TRF receiver?
   (b) Explain clearly what is meant by image frequency in a superheat receiver and how it can be eliminated.
   (c) Define conversion transconductance of a mixer. With the help of a typical circuit diagram, explain the working of a separately excited mixer.
5. (a) Explain the phenomena of fading in detail.
   (b) Describe different diversity reception techniques including the MUSA system to combat fading.
6. (a) Plot the spectrum of a PAM wave produced by the modulating signal $\mathrm{m(t)} = \mathrm{A_m} \cos(2\pi f_m t)$ assuming a modulation frequency 0.25Hz, sampling period $T_s = 1$s, and pulse duration T = 0.45s.
   (b) Discuss the system for recovering message signal from PAM signal.
7. (a) Discuss the bandwidth efficiency of M-ary digital modulation techniques.
   (b) Draw the signal space diagram of coherent QPSK system and explain.
8. (a) Write the electrical specifications of RS-232 interface?
   (b) What is the primary difference between the RS-449 A interface and RS-232 interface.
   (c) Explain the CCITTX.21 standard?

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1. (a) Explain filter method of suppressing unwanted sideband.
   (b) A SSB-SC transmitter operating at a 16MHz has frequency stability of 1 part per million. If its transmission is reproduced by a receiver whose stability is 8 part per million, what is the maximum frequency error at the output of the receiver could have in reproducing the transmission.
2. (a) In an FM system, when the audio frequency (AF) is 500Hz and AF voltage is 2.4V, the deviation is 4.8 KHz. If the Af voltage is now increased to 7.2 V, What is the new deviation ? If the AF voltage is raised to 10V while the AF is dropped to 200Hz, what is the deviation? Find the modulation index in each case.
   (b) Draw the spectrum of FM wave and discuss about it in detail.
3. (a) Draw the block diagram of Armstrong FM transmitter and explain the operation.
   (b) Explain the frequency modulated transmitter using reactance tube modulator.
4. (a) Write short notes on:
      i. Frequency synthesizers
      ii. Spurious responses in radio receivers
   (b) Bring out the factors influencing the choice of IF and indicate the values of IF employed in each of the following cases
      i. AM Broadcast receivers
      ii. FM Broadcast receiver
      iii. TV receivers in the VHF and UHF bands.
5. (a) Differentiate between simple, delayed and amplified AGC and explain their action with the help of simple circuits blocks.
   (b) Discuss briefly similarities and differences between FM and AM receivers.
   (c) Write in detail about the limiter used in FM receiver.
6. (a) What is PAM? Explain the requirement of channel bandwidth for PAM signal. How PAM signal is demodulated?
   (b) Differentiate quantization and quantization noise.
7. (a) Draw the block diagram of PCM system and explain in detail the functions of each block.

(b) In what way it differs to other pulse modulation methods.

8. (a) Calculate the shot noise component of current present on a direct current of 1 mA flowing across a semiconductor junction, given that the effective noise band width of 1 MHz.

(b) Explain how thermal noise power varies

i. (i) with temperature and

ii. (ii) with frequency bandwidth.

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