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

II B.Tech II Semester Supplementary Examinations, November/December 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 10KW. 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? [8+8]

2. (a) In an Armstrong Modulator the crystal oscillator frequency is 200 KHz. It is desired in order to avoid distortion to limit the maximum angular deviation to ϕ_m =0.2. The system is to accommodate modulation frequencies down to 40Hz. At the output of the modulator the carrier frequency is to be 108 MHz and the frequency deviation 80KHz. Select multiplier and mixer oscillator frequencies to accomplish this.
   (b) Explain the effect of random noise on the output of an FM receiver fitted with amplitude limiter. Develop the concept of noise triangle. [8+8]

3. (a) Explain how frequency stability is achieved in modern transmitter.
   (b) Describe with aid of suitable diagram, the principal method of SSB generation.
   (c) Describe the advantages of a SSB SYSTEM for high frequency point to point communication and explain why it is unsuitable for broadcasting. [5+5+6]

4. (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+6+4]

5. (a) Calculate the mean squared noise voltage at the terminals of RC circuit.
   (b) Write about noise figure and obtain the relation between noise figure and equivalent noise temperature of a cascaded network. [6+10]

6. (a) What is meant by Sampling?
   (b) Explain in detail about Natural and Flat top Sampling.
   (c) Distinguish between TDM and FDM. [4+6+6]

7. Draw the block diagram of DPSK transmitter and receiver and explain the operation. [16]

8. (a) An asynchronous transmission uses 8 data bits, an even parity bit, and 2 stop bits. What percentage of clock inaccuracy can be tolerated at the receiver with respect to framing error? Assume that the bit samples are taken at the middle of the clock period. Also assume that, at beginning of the start bit, clock and incoming bits are in phase.

   (b) Suppose that the sender and receiver agree not to use any stop bits. Could this work? If so, explain any necessary conditions. [8+8]

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

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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. [10+6]

2. (a) Explain slope detection method for detecting FM signal. Give its advantages and disadvantages.
   (b) Write short notes on pre-emphasis. [10+6]

3. (a) Explain how frequency stability is achieved in modern transmitter.
   (b) Describe with aid of suitable diagram, the principal method of SSB generation.
   (c) Describe the advantages of a SSB SYSTEM for high frequency point to point communication and explain why it is unsuitable for broadcasting. [5+5+6]

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. [8+8]

5. (a) Write brief notes on the sources of noise, that arise in electronic equipment.
   (b) Describe how the power spectral density varies with frequency in each case. [8+8]

6. (a) What is Pulse-width Modulation? What other names does it have? How is it demodulated?
   (b) Distinguish between Natural and flat-top Sampling.
   (c) Explain the principle of basic transistor PAM modulator with a circuit.[8+4+4]

7. (a) Illustrate the waveforms of the three basic forms of signaling binary information

i. ASK
ii. FSK
iii. PSK [16]

8. (a) Write the comparisons of communication switching techniques?
   (b) Draw the event timing for circuit switching and packet switching and explain? [8+8]

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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. [8+8]
2. (a) Explain clearly the difference between Amplitude, Frequency, and Phase modulations, beginning with the difinition of each type and the meaning of the modulation index in each case.
   (b) Explain with the block diagram the Armstron method of FM generation. [8+8]
3. (a) What is variable capacitor diode modulator? Explain.
   (b) What is FET reactance modulator? Explain with circuit diagram. [8+8]
4. (a) Draw a neat diagram of a double conversion receiver and explain.
   (b) Define sensitivity, selectivity and fidelity.
   (c) Calculate the image frequency rejection of double conversion receiver which has a first IF of 2 MHz and second IF of 200 kHz, on RF amplifier whose tuned circuits has a Q of 75 (Same as that of mixer) and which is tuned to a 30MHz signal. Give the answer in decibels. [5+3+8]
5. Write notes on:
   (a) Fading and diversity reception.
   (b) Amplitude limiter. [8+8]
6. (a) Define the term Multiplexing. Explain TDM with the help of block diagram.
   (b) Compare TDM and FDM. [8+8]
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+8]
8. (a) Draw a circuit to compute the parity bit for a character and explain the difference between the term odd and even parity.
   (b) Draw a timing diagram showing the state of all E1A - 232 leads between two DTE- DCE pairs during the course of a data call on the switched telephone network. [8+8]

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

Answer any FIVE Questions
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1. (a) What are advantages and disadvantages of FM over AM.
   (b) The single-tone modulating wave m(t) $=A_m \cos 2\pi f_m t$ is used to generate the following Vestigial Side Band modulated wave
   $s(t) = aA_mA_c\cos[2\pi(f_c+fm)t] + A_mA_c(1-a)\cos[2\pi(f_c-f_m)t]$ where a is a constant. Find the in-phase and quadrture components of the VSB modulatd wave. For what value of constant 'a', s(t) reduces to a DSB-SC modulated wave. [8+8]

2. (a) Explain the principle & working of Transistor Reactance modulator for FM generation.
   (b) compare FM with AM . [8+8]

3. Explain the operation of radio transmitter in detail with a block diagram. [16]

4. (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+6+4]

5. (a) The noise factor of a radio receiver is 15:1. Calculate its noise figure. Determine the output S/N ratio when the input S/N ratio to the receiver is 35 db.
   (b) The parallel tuned circuit at the input of a radio receiver is tuned to resonate at 120 MHz by a capacitance of 25 pF. The Q factor of the circuit is 30. The channel bandwidth of the receiver is limited to 10 KHz by the audio sections. Calculate the effective noise voltage appearing at the input at room temperature. [8+8]

6. (a) A narrow band signal has a bandwidth of 10kHz centered on a carrier frequency of 100kHz. It is proposed to represent this signal in discrete time form by sampling its inphase and quadrature components individually. What is the minimum sampling rate can be used for this representation?
   (b) Explain the working of PAM modulator. [8+8]

7. Discuss the various encoding procedures in PCM. [16]

8. With the brief description of the application and limitation of the following types of transmission media.

(a) Two wire open lines
(b) Twisted Pair lines
(c) Co-axial cable lines
(d) Optical fiber [16]

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