Code No: RR321001 **Set No.1**

III B.Tech. II Semester Regular Examinations, April/May -2005
COMMUNICATION ENGINEERING
(Electronics & Instrumentation Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) The antenna current of an AM transmitter is 8A when only the carrier is sent but it increases to 8.93A when the carrier is modulated by a single sine wave. Find the percentage modulation. Determine the antenna current when the percent of modulation changes to 0.8.
   (b) A carrier A cos $W_c t$ is modulated by a modulating signal $f(t) = E_1 \cos w_1 t + E_2 \cos w_2 t + E_3 \cos w_3 t$. Derive the expressions for
      i. total modulated power
      ii. net modulation index of the AM wave.

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.

3. (a) Explain the operation of FM transmitter and draw the modified diagrams for frequency stability.
   (b) Explain the classification of radio transmitter according to type of modulation used.

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) 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) Distinguish between PAM, PWM and PPM.
   (b) What is TDM? Distinguish between synchronous and asynchronous TDM.

7. (a) What is companding? Why is it used? Why is it preferable to quantizing with tapered steps? Illustrate your answer with a sketch of typical companding curves.

   (b) What are the advantages and applications of Pulse-code Modulation?

8. (a) Write the important signaling functions for circuits-switching networks?

   (b) What are the in channel and common channel signaling?

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1. (a) Explain the balanced modulator using FET amplifiers.
   (b) Compare various methods of SSB generation.
2. (a) Explain how the frequency modulation is generated using Armstrong system with neat block diagram. In which circumstances can we dispense with the mixer?
   (b) When the modulation frequency in FM system is 400 Hz and modulating voltage is 2.4v the modulating index is 60. Calculate the maximum deviation. What is the modulation index when the modulating frequency is reduced to 250Hz and the modulating voltage is simultaneously raised to 3.2V?
3. (a) With a block diagram , explain the working of phase modulated FM transmitter?
   (b) Explain the working of frequency modulated transmitters using reactance tube modulators.
4. (a) What is simple automatic gain control? What are its functions? What is delayed AGC and what are its merits compared to simple AGC?
   (b) Discuss the considerations in the choice of I.F. and the design of I.F. stage.
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) Discuss the basic problems involved in the design of digital multiplexer.
   (b) Draw the functional model of pass band data transmission system and explain.
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. Explain what do you understood by the following terms used in relation to packet switched data network.
   (a) Datagram
   (b) Virtual circuit

(c) Logical channel

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Code No: RR321001 **Set No.3**

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(Electronics & Instrumentation Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

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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) Explain clearly envelop detector one method of demodulation of AM wave.
   (b) A certain transmitter radiates 9Kwwith the carrier unmodulated and 10.125 KW when the carrier is sinusoidally modulated. Calculate the modulation index and percent of modulation. If another sine wave, corresponding to 40

3. (a) A certain transmitter radiates 9 KW with the carrier unmodulated , and 10.125 KW when the carrier is sinusoidally modulated . Calculate the modulation index. If another sine wave, corresponding to 40 % modulation, is transmitted simultaneously , determine the total radiated power.
   (b) Explain the classification of radio transmitter based on the frequency range involved?
   (c) Explain the classification of radio transmitter based on the type of service involved?

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) 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) Plot the spectrum of a PAM wave produced by the modulating signal $m(t) = A_m \cos(2\pi f_m t)$ 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) Illustrate the Delta modulation with neat diagram.

   (b) Illustrate the two different forms of quantization error in delta modulation.

8. (a) How is X.21 able to eliminate most of the control circuits of the EIA standards?

   (b) What is the difference between balanced and unbalanced circuits?

   (c) Using RS-423 (unbalanced mode), what is the data rate if the distance between DTE and DCE are 1000 feet.

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Code No: RR321001 **Set No.4**

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw the circuit diagram of a balanced modulator and show that it produces DSB-SC wave.
   (b) An AM wave $10[1+0.6 \cos 2\Pi \times 10^3 t) \cos(2\Pi \times 10^6 t)$ is to be detected by a linear diode detector. Find
      i.) the time constant
      ii. the value of resistance R if the capacitor used is 100PF.
2. (a) Explain clearly envelop detector one method of demodulation of AM wave.
   (b) A certain transmitter radiates 9Kwwith the carrier unmodulated and 10.125 KW when the carrier is sinusoidally modulated. Calculate the modulation index and percent of modulation. If another sine wave, corresponding to 40
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) Explain the principle of a simple Automatic Gain Control (AGC) of super heterodyne AM receiver.
   (b) What is the necessity for tracking in radio receivers? Explain briefly the tracking techniques used in radio receivers.
   (c) Write about separately exited mixer.
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 a Delta Modulation and explain its operation with waveform.
   (b) What is meant by Slope-overload error in Delta modulation? Explain.

8. (a) Explain the different layers in OSI reference model.
   (b) Write notes on
      i. user sub network
      ii. communication sub-network.

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