B.E. Information Technology Sem IV Re

Con. 3609-10. (REVISED COURSE) AN–3520

Principles of Communication Engineering.

(3 Hours) [Total Marks : 100

N.B.: (1) Question No 1 is compulsory.
(2) Attempt any **Four** questions out of remaining **six** questions.
(3) Figures to the right indicate full marks.
(4) Assume **suitable** data whenever required but **justify** the same.

1. Attempt any four of the followings- (20)
   a) Describe three different ways in which the modulation index of an AM signal can be measured.
   b) What is the quantisation process in PCM? Define quantisation error.
   c) Explain VSB technique of transmission.
   d) State and prove sampling theorem.
   e) Compare TDM and FDM.

2. (a) Define noise figure. Derive the friiss formula for the calculation of the total noise figure for two amplifier connected in cascade. (10)

   (b) In an AM receiver having no RF stage, the loaded Q of the aerial coupling circuit is 125. If the intermediate frequency is 465 KHz, Find- (10)
   (i) The image frequency and its rejection at 1MHz and 30 MHz.
   (ii) The IF required to make the image rejection ratio as good at 30 MHz as it is at 1MHz.

3. (a) In an FM system, the audio frequency is 1 KHz and the audio Voltage is 2 Volts. The deviation is 4 KHz. If the AF voltage is now increased to 8 volts and its frequency dropped to 500 Hz, find the modulation index in each case and approximate bandwidth of the signal. (08)

   (b) Prove the following properties of the Fourier Transform- (06)
   (i) Time shifting;
   (ii) Convolution in time domain.

   (c) What are the energy signals and power signals? Give the examples in each case. How do you represent it in frequency domain? (06)

4. (a) Sketch the circuit of a practical diode detector and explain its working. What is Negative peak clipping? Calculate the maximum modulation index that the above detector can tolerate without causing negative peak clipping. (10)

(b) An amplitude modulated waveform has a form- (10)

$X_C(t) = [\ 10(\ 1+ 0.6\ \text{Cos}\ 2000\pi t + 0.4\ \text{Cos}\ 4000\pi t)\ \text{Cos}\ 20,000\pi t\ ]$;

(i) Sketch the amplitude spectrum of $X_C(t)$.

(ii) Find the power content of each spectral component including carrier.

(iii) Find the total power and sideband power.

(iv) What is the modulation index?

5. (a) What is multiplexing in communication system? Draw the block diagram of TDM-PCM system, Explain each block. Also calculate the bit rate at the output of this system. (10)

(b) Draw the circuit diagram of a Foster- Seeley Phase discriminator and explain its Principle of operation with the help of relevant waveform. (10)

6. (a) Draw the block diagram of phase cancellation SSB generator and explain how the Carrier and unwanted sidebands are suppressed. What change is necessary to suppress the other sidebands? (10)

(b)Explain with the help of block diagram of adaptive delta modulation (ADM) for generating digital modulated signal. Why it is preferred over delta modulation? (10)

7. Write short notes on any four of the followings- (20)

(i) Optical Fiber Communication Systems.

(ii) International standards for communication systems and assignments.

(iii) Satellite Communication System.

(iv) Wireless Communication System.

(v) Multiplexing Techniques in Satellite, Optical Communication and Wireless Communication.