Sem 4/IT/Principle of Comm. Engg

ws-Sept-2011-197

Con. 6638–11. **MP–4417**

(3 Hours) **[Total Marks : 100**

N. B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of the remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) Assume **suitable** data if **necessary**.

1. Attempt any **four** of the following :– 20
   (a) Explain the need of modulation.
   (b) Find the Fourier transform of the following signal $y(t) = e^{-at}\, u(t) * u(t)$.
   (c) What is double spotting in a radio receiver ?
   (d) Explain Pre-emphasis and De-emphasis in FM.
   (e) What is ASK ? Explain with the help of suitable waveform.

2. (a) Define Noise Factor. A three stage amplifier has the following power gains and noise factor for each stage. 10

Stage	Power gain	Noise factor
1	10	2
2	20	4
3	30	5

Calculate the power gain, noise figure and the noise temperature for the entire amplifier assuming matched conditions.

   (b) Draw the block diagram of phase cancellation SSB generation and explain how the carrier and unwanted sidebands are suppressed. What changes are necessary to suppress other sideband ? 10

3. (a) An FM wave is represented by the following equation 10

$$V_{FM} = 10 \sin [5 \times 10^8 t + 4 \sin 1250 t]$$

Find : (i) Carrier and modulating frequencies.
(ii) Modulation index and maximum deviation.
(iii) The power dissipated by this FM wave in a 5Ω resistor.
(iv) Bandwidth of FM using Carson's rule.

   (b) State and prove the sampling theorem for low pass band limited signal. Explain aliasing error. 10

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4. (a) A sinusoidal carrier $V_c = 100 \cos (2\pi \times 10^5 t)$ is amplitude modulated by a sinusoidal voltage $V_m = 50 \cos (2\pi \times 10^3 t)$ upto a modulation depth of 50%. Calculate the amplitude and frequency of each sideband and the RMS voltage of the modulated carrier. 6

(b) What is peak clipping and diagonal clipping in diode detectors ? 4

(c) Draw the block diagram of Armstrong frequency modulation system and explain the functions of mixer and multiplier. In what circumstances can the mixer be dispensed with ? 10

5. (a) How is adaptive delta modulation better than linear delta modulation ? Draw block diagram of adaptive delta modulation and explain each block in detail. 10

(b) In an AM radio receiver the loaded Q of the antenna circuit at the input to the mixer is 100. If the intermediate frequency is 455 KHz, calculate the image frequency and its rejection at 1MHz. 6

(c) Explain the following in relation to radio receiver :– 4

(i) Selectivity

(ii) Sensitivity.

6. (a) What is multiplexing in communication systems ? Draw the block diagram of TDM-PCM system and explain each block. 10

(b) Draw the circuit diagram of Ratio detector and explain its working. Compare its performance with that of Foster-Seeley discriminator. 10

7. Write short notes on any **three** of the following :– 20

(a) AGC principle in receivers

(b) Applications of multiplexing in satellite, optical and wireless communications.

(c) International standards for communication systems and frequency assignments.

(d) Properties of Fourier transform.
