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CS/B.TECH(EE)(SEPARATE SUPPLE)/SEM-8/EE-802A/2011

2011

COMMUNICATION ENGINEERING

Time Allotted : 3 Hours | Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) Thermal noise is independent of
   - a) Bandwidth
   - b) Temperature
   - c) Centre frequency
   - d) Boltzman's constant.

   ii) A carrier is amplitude to a depth of 40%. The increase in power is
   - a) 40%
   - b) 20%
   - c) 16%
   - d) 8%.

   iii) Am FM signal can be detected by using
   - a) LPF
   - b) PLL
   - c) discriminator
   - d) SSB signal.

   iv) The image channel rejection in a superheterodyne receiver comes from
   - a) IF stage only
   - b) RF stage only
   - c) detector and RF stage only
   - d) detector, RF and IF stage only.

v) Which one is an advantage of AM over FM

a) FM is more immune to noise

b) FM has better fidelity

c) Probability of noise spike generation is less in AM

d) FM has wide bandwidth.

vi) A liasing occurs when the Nyquist rate is

a) $2\,fm$ b) $3\,fm$

c) $2{\cdot}5\,fm$ d) $1{\cdot}2\,fm$.

vii) A PAM signal can be detected by using

a) an ADC b) an integrator

c) a bandpass filter d) high pass filter.

viii) Which of the following modulation is analog in nature ?

a) PCM b) DPCM

c) DM d) none of these.

ix) The maximum frequency deviation in commercial FM is

a) 88 MHz b) 108 MHz

c) 75 KHz d) 15 KHz.

x) In a communication system, noise is most likely to affect the signal

a) at the transmitter

b) in the channel

c) in the information source

d) at the destination.

xi) Indicate the false statement :

Modulation is used to

a) Reduce the bandwidth

b) Ensure that intelligent may be transmitted over long distance

c) Allow the use of practicable antennas

d) Separate different transmissions.

xii) A. M. is the process of
   a) Superimposing a low frequency on a high frequency
   b) Carrier interruption
   c) Superimposing a high frequency on a low frequency
   d) Frequency shift & Phase shift.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Explain the operation of Envelope detector. State the condition for proper envelope detection of AM wave. 4 + 1
3. Explain the working principle of a ring modulator. Why it is called double balanced modulator ? 4 + 1
4. Define modulation. Why do we need modulation ? 2 + 3
5. Explain the operation of a PWM modulator using necessary waveforms. 5
6. Define the terms sensitivity and image frequency in AM receiver. 5
7. What are the similarities and dissimilarities between AM and NBFM ? 5

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

8. a) Draw the block diagram of a simple superheterodyne receiver and explain its principle.
   b) Compare TDM and FDM.
   c) 24 telephone channels, each band limited to 3·4 KHz are to be time division multiplexed by using PCM. Calculate the bandwidth of PCM system for 128 quantization levels and 8 KHz sampling frequency.
   5 + 3 + 4 + 3

9. a) How does PLL work as FM demodulator ?
   b) Explain briefly a general structure of satellite communication system. Define deviation ratio in FM.
   c) What is noise figure ? What is its signification ?
   d) Calculate $\frac{S}{N}$ ratio in AM system. 4 + 4 + 2 + 1 + 1 + 3

10. a) What is BPSK ? Draw and explain how BPSK in non-coherently detected.
   b) What is coding ? Classify different kinds of coding. Explain what is the function modem.
   c) Beech a amplitude modulator circuit and explain its operation. 5 + (1 + 2 + 2) + 5

11. a) Explain the generation of PAM signal with suitable diagram. How is PCM signal generated from PAM signal ?
   b) How does TDM differ from FDM ?
   c) What is DPSK ? Explain with a suitable diagram how DPSK is non-coherently detected. (3 + 3) + 4 + 5

12. a) What is thermal noise ? Give the voltage generator and current generator equivalent circuit for thermal noise and find out RMS noise voltage and current respectively.
   b) Two resistors of 20 K Ohms and 30 K Ohms are at room temperature. Calculate thermal noise voltage :
      i) for each resistor
      ii) for both the resistors in series
      iii) for both the resistors in parallel
      Take bandwidth as 100 KHz & KT = 4 × 10 – 21 w/Hz.
   c) Derive the signal-to-noise ratio at the output of the demodulator of a DSB – SC receiver. 5 + 5 + 5

13. a) What are the advantages of digital communication over analog communication ?
   b) Compare between ASK, FSK and PSK.
   c) Explain with a suitable diagram the working principle of a PCM transmitter. 3 + 5 + 7