M.Sc. PHYSICS
THIRD SEMESTER
ELECTRONICS & COMMUNICATION TECHNOLOGY-I
MSP-304B
[USE OMR FOR OBJECTIVE PART]

SET A

Duration: 1:30 hrs.

Full Marks: 35

(**Objective**)

Time: 15 mins.

Marks: 10

Choose the correct answer from the following: *1×10=10*

1. A carrier of peak voltage 15 V is used to transmit a message signal. If the modulation index is 70%, then what will be the peak voltage of the modulating signal?
   - a. 12 V
   - b. 11 V
   - c. 10.5 V
   - d. 30 V

2. What happens when the amplitude of the modulating signal is greater than the amplitude of the carrier?
   - a. Decay
   - b. Distortion
   - c. Amplification
   - d. Attenuation

3. What are FM and AM collectively referred together as?
   - a. Modulation
   - b. Angle modulation
   - c. Fast band modulation
   - d. Hi-fi Modulation

4. According to Carson's rule, what is the bandwidth of the signal with a deviation of 30kHz and a maximum modulating signal of frequency 5kHz?
   - a. 70 kHz
   - b. 90 kHz
   - c. 100 kHz
   - d. 80 kHz

5. Which of the following is not a form of pulse modulation?
   - a. Pulse amplitude modulation
   - b. Pulse width modulation
   - c. Pulse position modulation
   - d. Pulse frequency modulation

6. What type of digital modulation is widely used for digital data transmission?
   - a. Pulse amplitude modulation
   - b. Pulse width modulation
   - c. Pulse position modulation
   - d. Pulse code modulation

7. The signals which are obtained by encoding each quantized signal into a digital word is called as
   - a. PAM Signal
   - b. PCM Signal
   - c. FM Signal
   - d. Sampling and Quantization

8. Choosing a discrete value that is near but not exactly at the analog signal level leads to
   a. PCM error
   b. Quantization error
   c. PAM error
   d. Sampling error

9. The leakage current in the transmission lines is referred to as the
   a. Resistance
   b. Radiation
   c. Conductance
   d. Polarisation

10. Which of the following parameters of a transmission line is not a primary parameter?
    a. Resistance
    b. Attenuation constant
    c. Capacitance
    d. Conductance

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Descriptive

Time : 1 hr. 15 mins.   Marks : 25

[Answer question no.1 & any two (2) from the rest]

1. A sinusoidal carrier has amplitude of 10 V and frequency 30 kHz.   1+1+1.5
   It is amplitude modulated by a sinusoidal voltage of amplitude 3   +1.5=5
   V and frequency 1 kHz. Modulated voltage is developed across 30
   Ω resistance.
   i.   Determine the modulation index
   ii. Write the equation for modulated wave
   iii. Plot the modulated wave showing maxima and minima of
        waveform.
   iv. Draw the spectrum of modulated wave

2. a. Explain the mathematical analysis of a Wide Band Frequency   8+2=10
      Modulation (WBFM) and draw the frequency spectrum.
   b. Write down two point of difference between NBFM and WBFM.

3. Apply the sampling theorem to represent the signal x(t) through   10
   its samples and subsequently illustrate the process of
   reconstructing the signal from these samples.

4. a. Draw the transfer characteristic curves for midtread and midrise   6+4=10
      quantizers, and compute the quantization error for each
      configuration.
   b. A television signal with a bandwidth of 4.2 MHz is transmitted
      using binary PCM. The number of quantization level is 512.
      Calculate-
      i.   Code word length
      ii. Transmission bandwidth
      iii. Final bit rate
      iv. Output signal to quantization noise ratio

5. **a.** Derive the transmission line equations for voltage and current   7+3=10
and write the expression for series impedance, shunt admittance
and the propagation constants.
b. Find the solutions of the transmission line equations derived in
section (a).

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