



18EC53

**Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026**  
**Principles of Communication Systems**

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

**Module-1**

- 1 a. Define Amplitude Modulation. Explain AM demodulation using envelope detector with the help of neat circuit diagram and waveform. (10 Marks)
- b. Derive an expression for total power of AM. An audio signal  $10 \sin(2\pi \times 500t)$  is used to amplitude modulate a carrier of  $50 \sin(2\pi \times 10^5t)$ . Assume  $\mu = 0.2$ . Determine :
  - i) Sideband frequencies
  - ii) Amplitude in each sideband
  - iii) Bandwidth required
  - iv) Total power of AM. (10 Marks)

OR

- 2 a. Define DSBSC. Explain generation of DSBSC using ring modulator and sketch necessary waveforms. (10 Marks)
- b. Explain QAM transmitter and receiver with relevant block diagram and equations. (10 Marks)

**Module-2**

- 3 a. Define Frequency modulation. Implement PM using FM and FM using PM. (10 Marks)
- b. Compare AM and FM. The equation for FM wave is  $s(t) = 10 \sin[5.7 \times 10^8 t + 5 \sin 12 \times 10^3 t]$ . Calculate :
  - i) Carrier frequency
  - ii) Modulating frequency
  - iii) Modulation index
  - iv) Frequency deviation
  - v) Power dissipated is  $100 \Omega$  (10 Marks)

OR

- 4 a. Explain Superheterodyne receiver with a neat block diagram. (10 Marks)
- b. Explain FM demodulation using frequency discrimination method/Balanced Slope Detector. (10 Marks)

**Module-3**

- 5 a. Explain different types of Internal Noise. (10 Marks)
- b. With the help neat block diagram explain Pre-emphasis and De-emphasis. (10 Marks)

OR

- 6 a. Define Noise Factor and Noise Figure. In a TV receiver the antenna is often mounted on a tall mast and a long cable is used to connect the antenna to the receiver. To overcome the effect of lossy cable pre amplifier is mounted on the antenna as shown in fig. 6(a). Find overall noise figure of the system.

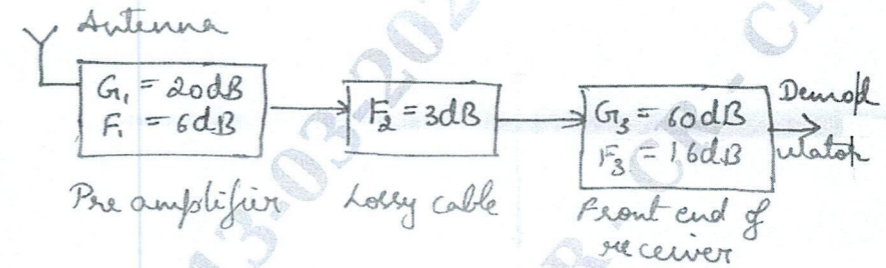


Fig. Q.6 (a)

- b. Prove that figure of Merit of DSBSC receiver is unity. (10 Marks)

**Module-4**

- 7 a. State Sampling Theorem. Explain the concept of Under Sampling over sampling and Nyquist Sampling with the help of spectrum diagram. (10 Marks)
- b. What are the advantages of digital signals over analog signals. An analog signal is expressed by equation  $x(t) = 3 \cos(50\pi t) + 10 \sin(300\pi t) + \cos(100\pi t)$ . Calculate the Nyquist rate and Nyquist interval. (10 Marks)

OR

- 8 a. Explain Time Division Multiplexing with a neat block diagram. (10 Marks)
- b. Explain generation and recovery of PAM signal with necessary equations and spectrum diagram. (10 Marks)

**Module-5**

- 9 a. Define Quantization. Derive an expression to signal to quantization noise ratio for a sinusoidal message signal. (10 Marks)
- b. Explain each of the following line codes and represent the bit sequence 1 0 0 11 0 11 in all the 5 line codes.
  - i) Unipolar NRZ
  - ii) Polar NRZ
  - iii) Unipolar RZ
  - iv) Bipolar RZ
  - v) Manchester
 (10 Marks)

OR

- 10 a. With the help of neat block diagram explain Pulse Code Modulation. (10 Marks)
- b. With the help of neat block diagram of waveforms and equations explain Delta Modulation. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.