

Duration: 3hrs

[Max Marks: 80]

- N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

- 1 Attempt any FOUR [20]
- a Explain the term thermal and shot noise.
 - b Compare AM, FM and PM.
 - c Explain the following terms w.r.t. radio receivers: sensitivity, selectivity and image frequency.
 - d Discuss the importance of quantizer in PCM transmitter and receiver.
 - e Discuss the need for modulation.
- 2 a Explain the generation of DSB-SC signal using balanced modulator. [05]
An SSB transmitter radiates 0.5kW when the modulation percentage is 60%. [05]
How much of the carrier power is required if we want to transmit the same message by an AM transmitter?
- b Explain TV broadcasting of video. [05]
- c A sinusoidal carrier having amplitude of 12V and frequency 25kHz is amplitude modulated by a sinusoidal voltage of amplitude 5V and frequency 2kHz. Modulated voltage is developed across a 50Ω resistance. i) Write the equation for the modulated wave ii) determine the modulation index and calculate the total power in the modulated wave iv) Draw the spectrum of the modulated wave v) How much is the power saving if the carrier is suppressed? [05]
- 3 a Draw the block diagram of Armstrong frequency-modulation system and explain its working. [10]
- b Compare Narrowband and Wideband FM. [05]
- Find the carrier and the modulating frequencies, the modulation index, and the maximum deviation of the FM represented by the voltage equation $v=20\sin(8 \times 10^8 t + 10 \cos 2500t)$. What power will this FM wave dissipate in a 10Ω resistor? [05]

- 4 a Draw block diagram of superheterodyne receiver and explain its working. [05]
In a superheterodyne receiver having no RF amplifier. Find the loaded Q of the antenna coupling circuit if the IF is 455kHz, and the image frequency rejection ratio for the tuning at 1200kHz is 130. 2) hence find the image frequency and its rejection ratio for the tuning at 20MHz. [05]
- b Draw the block diagram of FM transmitter and explain its working. [10]
- 5 a State sampling theorem and explain the types of sampling. [10]
- b Explain generation and detection of PWM and PPM. [10]
- 6 a Explain Time Division Multiplexing with proper diagrams. [10]
- b Explain delta modulation with proper block diagram and waveforms. [10]