

- What do you mean by bandwidth of channel? Describe some typical communication channels with their advantages and disadvantages? A signal with a bandwidth of 4000 Hz is being sampled at Nyquist rate. If 8bit word is used for transmission, what should be the minimum bandwidth of the channel?
- What are the primary resources of communication system? What is Shannon's capacity of a noisy channel? A telephone line has a bandwidth of 4000Hz. The signal-to-noise ratio is 3162. Find the maximum capacity of the channel.
- What is noise? What are the different types of noise? An amplifier has a 10-k $\Omega$  input resistor. What is the rms noise voltage at the input to this amplifier if the ambient temperature is 27°C? (Boltzmann's constant,  $k = 1.38 \times 10^{-23}$  J/K).
- Define amplitude modulation. Describe switching modulator, rectifier demodulator, and envelope detector with circuits for AM/DSB-WC.
- A 10V, 1MHz carrier is being modulated by a single tone with 30% modulation index. Find out the transmission efficiency if the modulator is I. DSB-WC II. DSB-SC II. SSB-SC modulator.
- What do you mean by baseband transmission and passband transmission? Why modulation is used to transmit signals? For transmitting a baseband signal of 1Hz, what should be the order of antenna length?
- What is communication? What are the challenges of communication systems? Describe a communication system with basic elements.
- Prove that, maximum efficiency for AM is 33%. A source with bandwidth of 4000Hz is sampled at Nyquist rate. Assuming that the resulting sequence can be approximately modeled by a DMS with alphabet  $A = \{-2, -1, 0, 1, 2\}$  and with corresponding probabilities  $\{1/2, 1/4, 1/8, 1/16, 1/16\}$ , determine the rate of source in bits/sec.