Set A

Unique Paper Code	:	**32227613**
Name of the Paper	:	**Communication Systems**
Name of Course	:	**B.Sc. Hons. Physics-CBCS_DSE**
Semester	:	**VI- Semester**
Duration	:	**2 Hours**
Maximum Marks	:	**75**

Attempt any four questions in all. All questions carry equal marks.

1. What is TRAI and what is its role for radio communication system in India. Describe Super heterodyne receiver using a block diagram and explain the function of each block.
   Explain step by step the process of receiving the data by Superheterodyne receivers if the RF stage is tunable to frequency range from 540 KHz to 1650 KHz and local oscillator is capable of generating the signal from 0.995 MHz to 2.105 MHz.

2. Explain the Common Emitter configuration of a transistor used in the generation of amplitude modulation. An AM broadcast radio transfer radiates 10K watts of power if modulation percentage is 60. Calculate how much of this is the carrier power. Prove that in amplitude modulation, maximum average power transmitted by an antenna is 1.5 times the carrier power.
   For a low power transistor modulator with a modulation coefficient m=0.4, a quiescent voltage gain of A_q=80, and an input carrier amplitude of 0.002V, determine (a) Maximum and minimum voltage gains, (b) Maximum and minimum voltages for v_{out}. Then, (c) Sketch the modulated envelope.

3. State and prove sampling theorem. Explain quantization of a signal and obtain expression for signal to noise ratio. Distinguish between pulse amplitude modulation (PAM), pulse width modulation (PWM) and pulse position modulation (PPM) techniques with help of suitable waveforms.

4. State the advantages and disadvantages of digital transmission over analog transmission of a signal. Explain binary phase shift keying with the help of mathematical expressions and constellation diagram. What do you understand by bit rate and Baud rate? How are they related in a) ASK b) FSK c) BPSK? Also draw ASK, FSK, BPSK waveforms for the data 10010011.

5. Explain the uplink and downlink models of satellite communication system with the help of a block diagram. Why uplink frequency is greater than the downlink frequency in satellite communication?
   An earth station satellite transmitter has an HPA with a rated saturated output power of 10,000 W. The back-off ratio is 6 dB, the branching loss is 2dB, the feeder loss is 4 dB, and the antenna gain is 40 dB. Determine the actual radiated power and the EIRP.

6. Explain briefly the working principle of Global Positioning *System* (GPS)**.** Discuss the Difference between GPS and Satellite Navigation System. Draw the block diagram of mobile unit. State the function of logic and control unit in mobile handset**.** Make a comparison between (a) GSM and CDMA (b) TDMA and FDMA.