Code: D - 12 Subject: COMMUNICATION ENGINEERING
Time: 3 Hours Max. Marks: 100

NOTE: There are 11 Questions in all.

   Question 1 is compulsory and carries 16 marks. Answer to Q. 1. must be written in the space provided for it in the answer book supplied and nowhere else.
   Answer any THREE Questions each from Part I and Part II. Each of these questions carries 14 marks.
   Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or best alternative in the following: (2x8)
   a.   The bandwidth of speech signal used for AM broadcasting is about
(A) 3.1 kHz. **(B)** 5 kHz.
(C) 15 kHz. **(D)** 20 kHz.
b. In a communication system, the thermal noise is
(A) internal and continuous. **(B)** internal and impulsive.
(C) external and impulsive. **(D)** external and continuous.

c. Diagonal clipping may occur in

   (A) demodulation of PDM signals.
   (B) demodulation of PCM signals.
   (C) diode (envelope) detector for AM signals.
   (D) frequency discriminators for FM signals.

d. The use of a limiter in FM receiver limits the

   (A) modulation index. **(B)** maximum deviation.
   (C) bandwidth. **(D)** amplitude.

e. A PLL consists of
   (A) a phase comparator and a VCO.
   (B) a phase comparator and an integrator.
   (C) a phase modulator and an integrator.
   (D) a phase modulator and a VCO.
f. The height of a geo-stationary satellite above the earth is about

   (A) 850 km. **(B)** 9600 km.
   (C) 36000 km.. **(D)** 42300 km.

g. In TV transmission systems, equalising pulses are accommodated during

(A) colour burst. **(B)** horizontal retrace.
(C) horizontal blanking. **(D)** vertical blanking.

h. The VSWR on a transmission line lies in the range

(A) 0 to 1. **(B)** 1 to ∞.
(C) 0 to ∞. **(D)** -1 to +1.

PART I
Answer any THREE Questions. Each question carries 14 marks.

Q.2 a. Describe thermal noise. **(7)**

b. Am amplifier of 3 dB noise figure and 15 dB available gain is followed by another amplifier of 12 dB noise figure and 30 dB gain. Find the overall noise figure and available gain of the combination. Express the answers in decibels. **(7)**

Q.3 a. Describe amplitude modulation. Draw an AM signal waveform with sinusoidal modulation. With the help of this waveform, define the depth of modulation. **(7)**

b. A 360 W carrier is simultaneously modulated by two audio tones with modulation depths 55% and 65%. Find the total sideband power. **(7)**

Q.4 a. Describe the phase shift method of generation of SSB signals. **(7)**

b. Estimate the bandwidth of an FM signal given by $s(t) = 10\cos\left(2\pi 10^{6} t + 5\sin 3000\,t + 10\sin 5000\,t\right)$ **(7)**

Q.5 a. Give a labelled block diagram of a high power AM transmitter. Give a brief description. **(7)**

b. What do you understand by modes in a rectangular waveguide? Give the meaning of TE_{10} mode and sketch the field variations. **(7)**

Q.6 Write short notes on

       (i)   Pulse Code Modulation.
       (ii)   Telemetry. **(14)**

PART II
Answer any THREE Questions. Each question carries 14 marks.

Q.7 a. Explain the application of transmission line sections as circuit elements. **(7)**

b. The primary constants of a transmission line are 128 pF/m and $2 \mu H/m$. Find its characteristic impedance at 2 MHz. **(7)**

Q.8 a. Describe a horn antenna. **(7)**

    b. Find the beamwidth between nulls of a 2.8 m paraboloid reflector when used at 6 GHz. **(7)**

Q.9 Describe ionosphere and skywave propagation. **(14)**

Q.10 Describe and explain either MATRIX SUM or HAMMING code for single error correction. **(14)**

Q.11 Write short notes on
    (i)   Optical fibers.
    (ii)   Frequency shift keying. **(14)**
    (14)