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 voice frequency band accommodated in telephone systems is

(A) 300-3400 Hz. **(B)** 50-5000 Hz.
(C) 100 Hz - 15 kHz. **(D)** 20 Hz – 20 kHz.

b. A system has a 3 dB noise figure. Its noise temperature is about

(A) 1160 K. **(B)** 870 K.
(C) 580 K. **(D)** 290 K.

c. An SSB signal can be demodulated by using

(A) an envelope detector. **(B)** an average detector.
(C) a discriminator. **(D)** a synchronous detector.

d. Frequency range used in a geostationary satellite lies in the

(A) EHF band. **(B)** SHF band.
(C) UHF band. **(D)** HF band.

e. The number of fields/sec. in TV system in India is

(A) 15625. **(B)** 625.
(C) 50. **(D)** 25.

f. The magnitude of reflection coefficient on a transmission line lies in the range

(A) 0 to 1. **(B)** 0 to ∞.
(C) 0 to 100. **(D)** 1 to ∞.

g. The dominant mode in a rectangular waveguide is

(A) TM_{01}. **(B)** TE_{01}.
(C) TE_{10}. **(D)** TEM.

h. A 100 MHz carrier is frequency modulated by a 1 KHz tone to a modulation index of 10. The bandwidth of the resulting FM signal is

(A) 2 kHz. **(B)** 22 kHz.
(C) 75 kHz. **(D)** 200 kHz.

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

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

b. A receiver connected to an antenna whose resistance is 36.5Ω, has an equivalent noise resistance of 50Ω. Find the receiver noise figure in decibels. **(7)**

Q.3 a. Describe the operation of a diode envelope detector for demodulation of AM signals. **(7)**

b. Consider an AM signal $10\left(1+0.5\cos 2\pi 10^3 t\right)\cos 2\pi 10^6 t$ volt applied across a 300Ω resistor. Find
(i) the carrier frequency
(ii) the depth of modulation and
(iii) signal power. **(7)**

Q.4 a. Describe a balanced modulator for generation of DSB-SC signals. **(7)**

b. Give a labelled block diagram of a medium wave AM superhet receiver. Which stages generally determine the image channel selectivity? **(7)**

Q.5 a. Explain stereophonic FM broadcasting. **(7)**

b. Explain the reasons for employing preemphasis - deemphasis in FM systems. Show simple PE-DE circuits and give their performance. **(7)**

Q.6 Write short notes on

(i) Phase Locked Loop.
(ii) Pulse width modulation. **(14)**

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

Q.7 a. A transmission line with $Z_o = R_o = 200\Omega$ is terminated into an unknown resistor R. The maximum and minimum voltages on the line are found to be 10 mV and 4 mV. Final all possible values of R. **(7)**

b. Find the input impedance of a short circuited lossless line of 0.2λ length and $Z_o = R_o = 75\Omega$. At 10 MHz, what component value does it represent? **(7)**

Q.8 a. Explain the following terms as related to antennas:

(i) Radiation resistance
(ii) Polarisation and
(iii) Beamwidth. **(7)**

b. Find the gain of a 2.8m paraboloid reflector at a frequency of 6 GHz. **(7)**

Q.9 Describe space wave propagation including super-refraction or ducting. **(14)**

Q.10 a. Discuss principles of scanning of pictures in television transmission. **(7)**

b. Describe cavity resonators and their applications. **(7)**

Q.11 Write short notes on

(i) Geostationary communication satellites.
(ii) PPM. **(14)**

(14)