(3 Hours)   [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
       (2) Attempt any **four** questions out of remaining **six** questions.

1. (a) Derive an expression for noise voltage.   20
   (b) What is companding ?
   (c) Compare ground wave propagation with space wave propagation.
   (d) Define Nyquist Rate. What is the standard sampling frequency for speech signals ?

2. (a) An AM transmitter developes an unmodulated power output of 100 watts across a 10Ω
       load. The carrier is modulated by a sinusoidal signal with a modulation index of 0·5.
       Assuming f_m = 5 KHz and f_c = 2 MHz :
       (i)   Write the equation of AM.   4
       (ii) Find the total power of the modulated output.   4
       (iii) Draw the spectrum.   2
   (b) Differentiate low level modulation from high level modulation. Explain the working of 10
       collector modulated class C amplifier for AM generation.

3. (a) Draw the block diagram of a phase cancellation SSB generation and explain how the 10
       carrier and unwanted side band are suppressed. What change is necessary to supress
       the other side band ?
   (b) Draw the block diagram of AM superhetrodyne receiver and explain its working.   10

4. (a) What are the different methods of FM generation ? Explain the working of reactance   10
       modulator.
   (b) A FM signal is given by V = 5 sin [6 × 10^6 t + 2 sin 1000 t].   10
       Find :
       (i)   Carrier and modulating frequencies.
       (ii) Modulation index and maximum deviation.
       (iii) The power dissipated by this FM wave in a 5Ω resistor.

5. (a) State and prove sampling theorem for low pass band limited signal. Explain aliasing error. 10
   (b) Draw neat block diagram of Delta modulator and explain its working. What are the   10
       drawbacks of Delta modulator and how are they overcome by ADM ?

6. (a) Describe the following terms :   10
       (i)   Skip distance
       (ii) Critical frequency
       (iii) Virtual Height
       (iv) Maximum usable frequency.
   (b) What is multiplexing in Communication System ? Draw the block diagram of TDM-PCM 10
       system and explain.

7. Write short notes on any **two** :–   20
       (a) Automatic Gain Control
       (b) FM Ratio Detector
       (c) Ring Modulator
       (d) Pre-emphasis and De-emphasis.