1. Attempt any **four** :—   **20**
  (a) A receiver connected to an antenna whose resistance is 50Ω has an equivalent noise resistance of 30Ω. Calculate the receiver's noise figure in decibles and its equivalent noise temperature.
  (b) Describe what is meant by linear summing and non-linear mixing.
  (c) Explain the Dynamic range of receiver.
  (d) Explain the granular noise.
  (e) Describe the term FM thresholding.

2. (a) Explain the term thermal noise. Prive that noise voltage $V_N = \sqrt{4KTBR}$. **12**

   For electronic device operating at a temperature of 17 °C with a band width of 10 KHz, determine : (i) thermal noise power in dBm. (ii) rms noise voltage for a 100Ω internal resistance and a 100Ω load resistance.
  (b) Describe the different ways in which the modulation index of AM signal can be measured. **8**

3. (a) One input to a conventional AM modulator is a 500 KHz carrier with an amplitude **12**
   of 20 V_p. The second input is a 10 KHz modulating signal that is of sufficient amplitude to cause a change in the output wave of ± 7.5 V_p. Determine :
   (i) side frequencies and modulation index.
   (ii) peak amplitude of the modulated carrier and the upper and lower side frequency voltages.
   (iii) maximum and minimum amplitudes of the envelope.
   (iv) Expression for the modulated wave.
   (v) Draw the output spectrum and output envelope.
  (b) Draw the block diagram of AM transmitter and explain each block in brief. **8**

4. (a) Explain the following form in brief :—   **10**
   (i) Pilot-carrier system
   (ii) Independent sideband system.
  (b) What are the limitations of TRF receiver ? Explain how these limitations are avoided **10**
   using Superhetrodyne receiver.

5. (a) What are the different methods of FM generation ? Sketch the circuit and explain **8**
   the principle of reactance modulator.
   If the modulating frequency in FM system is 400 KHz and modulating voltage is 2.4 V, and $M_f = 60$.
   Calculate :—
   (i) Maximum deviation.
   (ii) Modulation index when modulating frequency is reduced to 250 Hz and modulating voltage is simultaneously raised to 3.2 V.
  (b) Explain the Foster-Seeley Discriminator in detail.   **12**

6. (a) State and prove the sampling theorem for lowpass band limitted signal. Explain **10**
   aliasing error.
  (b) Explain the pulse code modulation (Diagram, working and wave forms.) **10**

7. Write a short note (any **two**) :—   **20**
  (a) TDM–PCM system
  (b) Tropospheric scatter propogation
  (c) Comparision of PWM, PAM and PPM.