(3 Hours) **[Total Marks: 80]**

N.B. (1) Question No.1 is compulsory.
(2) Out of remaining attempt any three.
(3) Assume & mention suitable data wherever required.
(4) Figures to right indicates full marks.

Q.1. Solve any four **[20]**

a). Explain need of modulation. Justify it with example.
b). Define the following terms.
i) . Noise figure ii). Noise temperature iii). Noise bandwidth
iv) Noise voltage v) Modulation.
c). Compare AM and FM.
d). Explain in short pre-emphasis and De-emphasis.
e). What is PSK signal. Draw the PSK signal for the following binary signal 111010011.
f). Explain the principle of reflection and refraction.

Q.2 a). Define signal to noise ratio. Explain the effect of cascade connection on a signal to noise ratio. Derive Friss formula for two stage cascade amplifier. **[10]**
b).State and prove the following properties of Fourier transform with example
i) Convolution in time domain ii) Time scaling **[10]**

Q.3. a) The AM Transmitter develops an unmodulated power o/p of 400 Watts across a 50Ω resistive load. The carrier is modulated by a sinusoidal signal with a modulation index of 0.8. Assuming f_m= 5KHz and f_c= 1MHz. **[10]**
(i) Obtain the value of carrier amplitude Vc and hence write the expression for AM signal.
(ii) Find the total sideband power.
(iii) Draw the AM wave for the given modulation index.
b). With the help of neat circuit diagram explain Indirect method of FM generation. **[10]**

Q.4 a). What are the limitations of TRF receiver? Explain how these limitations are avoided using super-heterodyne receiver. **[10]**
b). Compare ground wave, sky wave, space wave and tropospheric scatter propagation.**[10]**

Q.5 a). State Sampling theorem, write down the steps to prove sampling theorem, draw waveform for low pass band limited signal. **[10]**
b). Draw the block diagram of PWM generator and detector. Explain the working giving waveforms at the output of each block. **[10]**

Q6. a). Explain slope overload error and hunting error in Delta modulation. Derive the condition to avoid slope overload distortion. **[10]**
b) . Explain the generation and detection of FSK signal. **[10]**