S.E sem 3 KT 'C' Scheme Winter 2025 - INFT Date: 20.11.2025

Time : 3 Hours Marks: 80

N.B. (1) Question No. 1 is compulsory.
(2) Out of remaining questions attempt three.
(3) Figures to right indicate full marks.

Q1) Solve any four **20 M**

a) What is modulation? Explain the need of modulation. Justify it with any two examples.
b) Compare Analog and Digital Modulation.
c) Explain in brief the process of quantization.
d) Explain pre-emphasis and de-emphasis circuits.
e) Compare FDM and TDM.

Q2) **20 M**

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.
b) State and prove following properties of Fourier Transform
i) Convolution
ii) Frequency Shifting

Q3) **20 M**

a) For DSBFC modulation with the carrier frequency is fc is 100KHz and maximum modulating frequency is fm(max)=5KHz, determine
1. Frequency limits for upper and lower sideband.
2. Bandwidth
3. Upper and lower sideband frequencies produced when the modulating frequency is a single frequency 3KHz tone.
4. Draw the output frequency spectrum.
b) With the help of neat circuit diagram explain Indirect method of FM generation.

Q4) **20 M**

a) Explain in brief super-heterodyne AM receiver.
b) Draw the block diagram of PAM generator and detector. Explain the working giving waveforms at the output of each block

Q5) **20 M**

a) State and prove Sampling theorem for low pass filter.
b) Compare ground wave, sky wave, space wave and tropospheric scatter propagation

Q6) **20 M**

a) Explain how slope overload error is overcome by adaptive delta modulation.
b) Explain the generation and detection of FSK signal.
