

- 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
- What is modulation? Explain the need of modulation. Justify it with any two examples.
  - Compare Analog and Digital Modulation.
  - Explain in brief the process of quantization.
  - Explain pre-emphasis and de-emphasis circuits.
  - Compare FDM and TDM.
- Q2) 20 M
- 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.
  - State and prove following properties of Fourier Transform
    - Convolution
    - Frequency Shifting
- Q3) 20 M
- For DSBFC modulation with the carrier frequency is  $f_c$  is 100KHz and maximum modulating frequency is  $f_m(\max)=5$ KHz, determine
    - Frequency limits for upper and lower sideband.
    - Bandwidth
    - Upper and lower sideband frequencies produced when the modulating frequency is a single frequency 3KHz tone.
    - Draw the output frequency spectrum.
  - With the help of neat circuit diagram explain Indirect method of FM generation.
- Q4) 20 M
- Explain in brief super-heterodyne AM receiver.
  - Draw the block diagram of PAM generator and detector. Explain the working giving waveforms at the output of each block
- Q5) 20 M
- State and prove Sampling theorem for low pass filter.
  - Compare ground wave, sky wave, space wave and tropospheric scatter propagation
- Q6) 20 M
- Explain how slope overload error is overcome by adaptive delta modulation.
  - Explain the generation and detection of FSK signal.