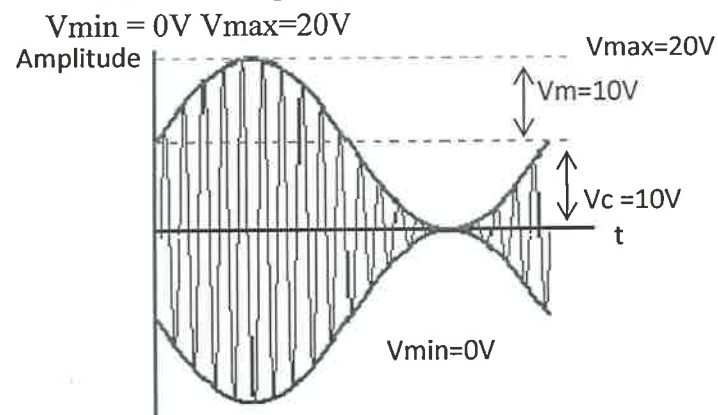


- Q1) Attempt any four
- What is Comanding (05)
  - Explain Pre-emphasis and De-emphasis (05)
  - Discuss various types of noise in communication system (05)
  - Draw the physical appearance of the following giving their mathematical equation (05)
    - DSB-FC: equation and waveform
    - DSC-SC: equation and waveform
  - Thermal noise & thermal noise voltage (05)

- Q2) a) Phase shift method for SSB generation circuit diagram (03)  
 Explanation, (04)  
 Mathematically how the carrier and unwanted side band is suppressed (03)
- b) Given:  $V(t) = [10 + 10 \sin(2\pi \times 10^3 t)] \sin 6\pi \times 10^4 t$   
 $V_c = 10, V_m = 10, \omega_m = 2\pi \times 10^3 t, \omega_c = 6\pi \times 10^4 t, R = 10$   
 $f_m = 10^3 = 1\text{kHz}, f_c = 3 \times 10^4 = 30\text{kHz}$
- Modulation index  $m = V_m/V_c = 10/10 = 1$  (02)
  - Sideband components,  $f_{lsb} = f_c - f_m = 30\text{kHz} - 1\text{kHz} = 29\text{kHz};$  (02)  
 $f_{usb} = f_c + f_m = 30\text{kHz} + 1\text{kHz} = 31\text{kHz}$
  - Band width:  $B_w = 2f_m = 2 \times 1\text{kHz} = 2\text{kHz}$  (02)
  - Total power  $P_t = [1 + m^2/2] \times P_c; P_c = V_c^2/2R = 5 \text{ watt}; P_t = 7.5 \text{ watt}$  (02)
  - Sketch the envelope of this signal in time domain (02)



- Q3) a) ADM block diagram. (02)  
 Explanation (02)  
 Waveform (02)
- b) PCM-TDM system diagram (03)  
 Expalnation (03)
- c) Superhetrodyne receiver block diagram. (03)  
 Explanation (03)  
 Waveform (02)

- Q4) a) PWM modulator diagram, Explanation, Graph (05)  
 PWM demodulator diagram, Explanation, Graph (05)  
 b) Balanced slope detector diagram (03)  
 Explanation (04)  
 Response curve (03)
- Q5) a) Varactor diode modulator circuit diagram (04)  
 Explanation (04)  
 b) selectivity and sensitivity definition and graph (06)  
 c) A FM wave is represented by the equation  
 $V_{fm} = 20 \sin(6 \times 10^8 t + 20 \sin 1450 t)$ ;
- Given:  $V_c = 20V$ ,  $\omega_c = 6 \times 10^8$ ,  $m = 20$ ,  $\omega_m = 1450$
- Carrier and modulating frequencies:  $f_c = 95.5 \text{ MHz}$   $f_m = 230 \text{ Hz}$  (02)
  - Maximum deviation:  $\delta = m \times f_m = 20 \times 230 = 4600 \text{ Hz}$  (02)
  - Power dissipated in a  $5\Omega$  resistor:  $P_t = V_c^2 / 2R = 40 \text{ watts}$  (02)
- Q6) Write short note on (Any Four)
- Differentiate between low level modulation and high level modulation (05)
  - What is PAM? Describe its generation with waveform (05)
  - AFC (05)
  - Explain noise triangle (05)
  - Compare ASK, FSK and PSK (05)
  - If the lowest frequency and the highest frequency of the audio signal is 40Hz and 20kHz respectively. If audio signal modulates a carrier of 1.5MHz, Find the height of the antenna without modulation.  
 Given:  $f_l = 40 \text{ Hz}$ ,  $f_h = 20 \text{ kHz}$ ,  $f_c = 1.5 \text{ MHz}$   
 Height  $h = \lambda/4 = c/4f$  or  $h = \lambda/2 = c/2f$  (01)
- |   |  |      |
|---|--|------|
| Without Modulation  | Without Modulation   |      |
| Height $h_L = 3 \times 10^8 / 4 \times 40 = 1875 \text{ km}$    | Height $h_L = 3 \times 10^8 / 2 \times 40 = 3750 \text{ km}$   | (01) |
| $h_H = 3 \times 10^8 / 4 \times 20 \text{ k} = 3.75 \text{ km}$ | $h_H = 3 \times 10^8 / 2 \times 20 \text{ k} = 7.5 \text{ km}$ | (01) |
| antenna height should lie between 3.75km to 1875km              | antenna height should lie between 7.5km to 3750km =            | (02) |
- g) Two point tracking (05)
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