Q1) a) Block diagram, explanation & Graph (05)

b) Definition, how it is achieved using circuit Diagram and graph (05)

c) List of noise, explain thermal noise (05)

d) Circuit diagram, Explanation and waveforms (05)

Q2) a) Block diagram of filter method, Explanation (10)

b) Given: $Vm=10$, $fm=10^3=1kHz$, $Vc=20$, $fc=10^5=100kHz$

    i. Modulation index $m = Vm/Vc = 10/20 = 0.5$ (02)

    i. Sideband components, $f_{lsb} = fc-fm = 100kHz-1kHz = 99kHz$; (02)

        $f_{usb} = fc+fm = 100kHz-1kHz = 101kHz$

    i. Bandwidth, $BW = 2fm = 2 \times 1kHz = 2kHz$ (02)

    v. Transmission efficiency; $\eta = m^2/(2+m^2) \times 100\% = 11.11\%$ (02)

    v. Sideband powers for load of 50 ohms; $Pusb = Plsb = m^2 Vc^2/8R = 0.25$ watt (02)

Q3) a) Block diagram and graph (04)

    Explanation, (04)

    Limitations (02)

b) Draw and Explain FDM Group formation hierarchy, (02)

    Block diagram and receiver (08)

Q4) a) PWM generation circuit and waveforms (05)

    PWM detection block diagram and waveform. (05)

b) Balanced slope detector diagram and response curve (06)

    Explanation (04)

Q5) a) Armstrong method for FM generation block diagram (05)

    explanation (05)

b) selectivity and sensitivity : definition and curve (04)

c) Given: $fm=200Hz$, $Vm=2V$, $m=80$ Calculate

    i. maximum deviation $\delta 1 = m \times fm. = 80 \times 200 = 16kHz$ (01)

        Bandwidth $BW = 2(\delta 1 + fm) = 2(16kHz+200) = 32,4kHz$ (01)

    ii. What is modulation index when modulating frequency is reduced to 150 Hz and modulating voltage is increase to 3.0 V?

        Given: $fm2 = 150Hz$, $Vm2 = 3V$, find : $m2 = \delta 2/fm2$

        1. We know $\delta = kVmfc$; thus kfc is common in both cases (01)

        2. From Case1: kfc $= \delta 1/Vm = 16kHz/2 = 8kHz/V$ (01)

        3. Therefore $\delta 2 = kfcVm2 = 8 \times 3 = 24kHz$ (01)

        4. $m2 = \delta 2/fm2 = 24k/150 = 160$ (01)

Q6) Write short note on (Any Four)

a) Compare AM and FM (05)

b) PCM transmitter (05)

c) AFC (05)
d) AM tracking (05)
e) Compare ASK, FSK and PSK (05)