2017

M.Sc.

3rd Semester Examination

ELECTRONICS

PAPER—ELC-302

Full Marks : 50

Time : 2 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

(Communication System)

Answer Q. No. *1* and any *three* questions from the rest.

1. (a) A tuned circuit oscillator in a simple AM transmitter employs 50 mH Coil and 1 nF capacitor. If the oscillator output is modulated by audio frequencies up to 10 KHz. What is the frequency range occupied by the side bonds ? 2

(b) Explain the principle of operation of QAM. 2

(c) What is the function of RF amplifier in a super heterodyne AM reciver ? 2

(d) Explain the term companding associated with PCM 3

(e) Discuss the slope detection method in connection with FM demodulation. 2

2. (a) Discuss with proper circuit diagram the function of a ring modulator in connection with DSB-SC generation. How can you convert the carrier frequency of a DSB-SC signal from W_e to W_I using frequency Mixer ?

(b) Explain with suitable circuit diagram the principle of operation of an Envelope detector. (4+3)+3

3. (a) Compare phasi-shift Method and Selective filtering method in connection with SSB generation what is Weaver's Method ?

(b) Prove that

$$Ho(f) = \frac{1}{Hi(f + fi) + Hi(f - fi)} \text{ for } | f | \leq B$$

Where $Ho(f)$ is the transfer function of VSB equilizer filter at the receiver and $Hi(f)$ is the VSB shaping filter.

(2+2+2)+4

4. (a) Discuss with circuite diagram the Armstrong method of wide band FM generation.

(b) Design an Armstrong in direct FM modulator to generate an FM signal with carrier frequency 97.3 MHz and of = 10.24 KHz, A NBFM generator of Sc_1 = 20KHz and $\Delta f = 5Hz$ is available. Only frequency doublers can be used as multipliers. Additionally a local oscillator with adjustable frequency between 400 and 500 KHz is readily available for frequency mixing.

5. (a) State and prove the Nyquist Sampling theoreas.

(b) Prove the interpolation formula for ideal reconstruction of signal

$$g(t) = \sum g(KTs)\ \ sine(2\pi Bt - k\pi)$$

6. (a) For a PCM system prove that

$$\bar{q}^2(t) = \lim_{T \to \alpha} \frac{1}{2BT} \sum_k \bar{q}^2(kTs)$$

Where $q(b)$ us the quantization noise,

(b) If $M(t)$ is the message signal and mp is the peak amplitude that a aquantizer can accept prove one the SNR of a

qunatizer $\frac{So}{No} = 3L^2 \frac{\tilde{m}^2(t)}{m_p^{\ 2}}$

Where L is the no of subintervals of quantization. 5+5

(Internal Assessment : 10 Marks)