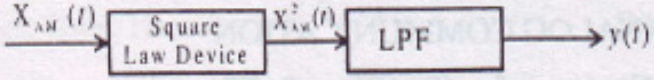
PART–II

3. (a) Derive an expression to show that an AM signal can be demodulated by squaring it and then passing the resulting signal through a LPF, as shown below : 10



(b) The input to an envelope detector is a signal-tone AM signal i.e.

$$X_{AM}(t) = A(1 + \mu \cos \omega_m t) \cos \omega_c t.$$

Here, μ is a constant, $0 < \mu < 1$ and $\omega_c \gg \omega_m$. Show that it detector output is to follow the envelope at all times, it is required that

$$RC \leq \frac{1}{\omega_M} \cdot \frac{\sqrt{1-\mu^2}}{\mu}.$$ 10

4. (a) Explain the concept of SSB modulation. What are the possible methods of SSB generation ? 10

(b) Explain the concept of frequency division multiplexing with a suitable example. 10

PART–III

5. (a) Consider an angle modulated signal as

$$x_c(t) = 10 \cos (\omega_c t + 3 \sin \omega_m t)$$

Now, assuming phase modulation and F_m = 1 kHz, calculate modulation index and find bandwidth when (i) F_m is doubled; (ii) F_m is decreased to half. 10

(b) Compare NBFM and WBFM with suitable example. 10

Roll No. ..... Total Pages : 3

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BT-3/D07

ANALOG COMMUNICATION

(Common for Computer & IT)

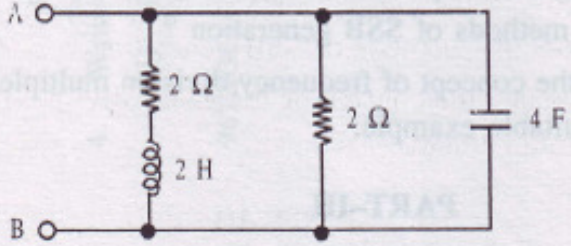
Paper – ECE-203-E

Time : Three Hours] [Maximum Marks : 100

Note : Attempt any *five* questions, selecting at least *one* question from each part.

PART–I

1. (a) For the passive network shown below, determine the power density spectrum of thermal noise voltage across terminals AB : 10



(b) Derive the expression for the additive effects of noise when several amplifiers are connected in series. 10

2. (a) Write a note on the measurement and calculation of noise figure in a network. 10

(b) Two resistors R_1 and R_2 at absolute temperature T_1 and T_2 are connected in series to form white noise source. Find the equivalent noise temperature. 10

6. (a) Explain FM generation methods. 10

(b) Discuss the concepts of pre-emphasis and de-emphasis. 10

PART–IV

7. (a) Write short notes on the following :

(i) Frequency scintillation.

(ii) Frequency drift. 5+5=10

(b) Explain FM transmitter using Reactance modulator. 10

8. (a) Explain Superheterodyne receiver in detail with the help of diagram using the concept of frequency mixing. 10

(b) Explain the concept of Automatic gain control and Automatic frequency control. 10
