**53 (EC 402) ANCM**

**2018**

# ANALOG COMMUNICATION

Paper : EC 402

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer **any five** questions.*

1. *(a)* Show that it is not possible to amplitude modulate by adding the message signal to the carrier. 10

   *(b)* Prove that the system bandwidth *(B)* and rise time $(t_r)$ are related by $t_r = 0{\cdot}35/B$; consider a first order system. 10

2. $x(t) = exp(-t/\tau) \cdot u(t)$ is applied as input to an L-section high-pass RC filter with time constant of '$\tau$' sec. Find the Energy Spectral Density (ESD) at the output of this filter. Also express the output signal as a percentage of the input signal energy. 15+5=20

3. Derive the condition on the filter transfer function necessary to demodulate a VSB-SC signal. Hence draw the filter transfer function. 15+5=20

4. *(a)* Discuss the operation of a Class C collector modulated amplifier in connection with the generation of a DSB-FC signal. What is the function of the Radio Frequency choke (RFC) in the circuit? 8+2=10

   *(b)* Show that the Hilbert transform of a signal, changes the phase of the input signal by $\pm 90°$. 10

5. *(a)* Explain the working principle of a Foster-Seeley discriminator circuit. 10

   *(b)* Discuss Armstrong method for the generation of WB (Wide band) angle modulated signal. 10



6. Show that for an AM system with envelope detector, the figure of merit is given by —

$$\text{F.O.M.} = \frac{m^2 \cdot \overline{x^2}}{1 + m^2 \overline{x^2}};$$

where the symbols have their usual meaning. 20

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