53 (EC 402) ANCM

2014

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)* Define Modulation. Why it is required? Show fundamental difference with mathematical and graphical representation between AM, FM and PM. 2+3+10

   (b) Find the Fourier transform of

   $$g(t) = u(t)\cos(2\pi ft)$$

   where $u(t)$ is unit step function. 5

2. *(a)* Describe suitable method for generation of DSB-SC signal. Explain how the same DSB-SC signal can be converted into an SSB-SC signal. 10

(b) Describe effect of frequency and phase discrepancy in DSB-SC modulation. 10

3. (a) What is pre envelope and complex envelope of a band pass signal. If $S(t)$ is a band pass signal and represents SSB-SC signal for Upper Side Band, graphically show that the inphase component is the message signal itself. That means $S_C(t) = \frac{1}{2} A_C \, e_m(t)$ where $S(t) = S_C(t) \cos 2\pi ft - S_S(t) \sin 2\pi ft$, $S_C(t)$ and $S_S(t)$ are inphase and quadrature component respectively. 14

(b) Determine the transmission efficiency and the percentage of total power carried by the sidebands of a single tone sinusoidal AM when *(i)* $\mu = \cdot 5$ and *(ii)* $\mu = \cdot 3$. 6

4. (a) State advantage of generation of WBFM by indirect method compared to direct method. 5

(b) Describe FM demodulation using balanced frequency discriminator method. 10

(c) An FM commercial broadcast transmitter (Freq. deviation = 75*kHz*) is modulated 40% by a 5*kHz* test tone. When the percentage of modulation is doubled, what is the frequency swing of the transmitter. 5

5. (a) Draw general block diagram of low level and high level transmitter and discuss the difference between the two. 10

(b) Discuss working principle of direct crossby FM transmitter. 10

6. (a) Draw the block diagram of super heterodyne receiver and explain function of all blocks. 10

(b) What is image frequency ? In a broadcast super heterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit is 100. If the intermediate-frequency is 455*kHz*, calculate : 10

(i) The image frequency and it's rejection ratio for tuning at 1100*kHz* station.

(ii) The image frequency and it's rejection ratio for tuning at 25*MHz*.

7. Write short notes on : ***(any two)*** 2×10=20

(i) PAM

(ii) VSB-AM

(iii) Preemphasis and Deemphasis

(iv) Hilbert Transform and its properties

(v) AGC.