Total No. of Questions : 10] [Total No. of Printed Pages : 3

Roll No. .....

EC–405

B. E. (Fourth Semester) EXAMINATION, June, 2009

(New Scheme)

(Electronics & Communication Engg. Branch)

ANALOG COMMUNICATION

(EC–405)

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt *one* question from each Unit. Total *five* questions are to be attempted. All questions carry equal marks.

Unit–I

1. (a) Find the Fourier transform of the following signals :

(i)

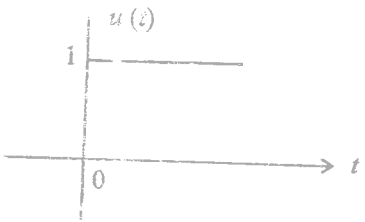

Fig. 1

(ii)

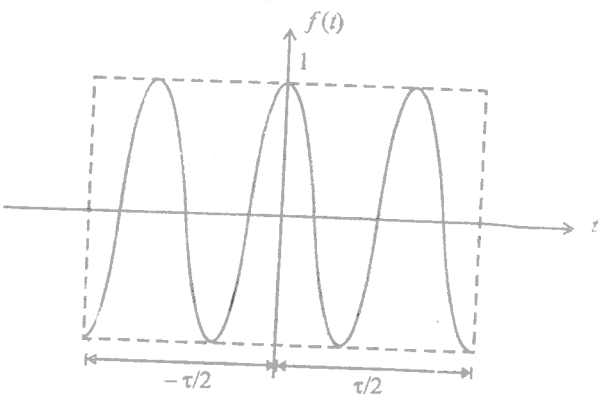

Fig. 2

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(b) A signal $e^{-3t}\,u\,(t)$ is passed through an ideal low pass filter with cut-off frequency of 1 rad per second. Test whether the input is the energy signal and find the input and output energy.

Or

2. (a) Show that the normalised Gaussian pulse is its own Fourier transform.

(b) Show that the unit impulse response of an ideal low pass filter is non-casual.

Unit – II

3. (a) Discuss the method of detection of AM-SC signal using costa receiver.

(b) Discuss the filter method for generation of VSB-SC signal. Also discuss the filter characteristic required for VSB signal generation.

Or

4. (a) A single tone modulating signal $e_m = \mathrm{E}_m \cos \omega_m t$ amplitude modulates a carrier $e_c = \mathrm{E}_c \cos \omega_c t$. Derive an expression for the AM wave and modulation index. Draw the frequency spectrum of the AM wave form and also draw the phasor diagram of AM wave form.

(b) Discuss the detection of AM wave form using linear diode detector. Also discuss the selection of time constant RC of the circuit.

Unit – III

5. (a) Explain Wide Band FM transmission. What should be the value of modulation index for it to behave as Narrow band FM ?

(b) A carrier A cos $\omega_c t$ is modulated by a signal

$$f(t) = 2\cos 10^4 \cdot 2\pi t + 5\cos 10^3 \cdot 2\pi t + 3\cos 10^4 \cdot 4\pi t.$$

Find the bandwidth of the FM signal by using Carson's rule. Assume $k_f = 15 \times 10^3$ Hz per volt. Also find modulation index m_f.

Or

6. (a) Explain the principle working of Ratio detector for FM detection.

(b) Discuss about the PLL detectors used for FM detection.

Unit – IV

7. (a) With the help of block diagram explain the working of high level transmitters.

(b) Explain the principle working of superheterodyne receiver.

Or

8. (a) What is image signal ? Why is the local oscillator frequency always kept higher than the signal frequency in superheterodyne receivers ?

(b) Explain in detail what do you understand by diversity reception.

Unit – V

9. Prove that the figure of merit for a DSB-SC system is unity.

Or

10. (a) A single tone modulating signal $f(t) = E_m \cos \omega_m t$ phase modulates a carrier A cost $\omega_c t$. Show that the figure of merit is given by $1/2\, m_f^2$.

(b) Explain the utility of de-emphasis circuit. Also determine its transfer function.