Total No. of Questions : 10] [Total No. of Printed Pages : 4

Roll No. ....

EC–405

B. E. (Fourth Semester)
EXAMINATION, June, 2012
(Grading/Non-Grading)
(Electronics & Communication Engg. Branch)
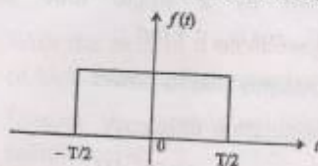ANALOG COMMUNICATION
(EC–405)

Time : Three Hours

Maximum Marks : $\begin{cases} GS : 70 \\ NGS : 100 \end{cases}$

Note : Attempt *one* question from each Unit. All questions carry equal marks.

Unit—I

1. (a) Find the convolution with itself of a rectangular pulse shown in Fig. :

    (i) Graphically

    (ii) Using time convolution theorem

   (b) The signal $e^{-3t} u(t)$ is passed through an ideal low pass filter with cutoff frequency of 1 rad per second :

    (i) Test whether the input is an energy signal.

    (ii) Find the input and output energy.

P. T. O.

Or

2. (a) Evaluate the following integral using convolution theorem :

$$I = \int_{-\infty}^{\infty} \frac{\sin 4x}{x} \cdot \frac{\sin (t-x)}{(t-x)} \, dx$$

(b) Find the power of the signal $a + f(t)$ where a is a constant and $f(t)$ is a power signal with zero mean value.

Unit—II

3. (a) Discuss the effect of phase and frequency errors in synchronous detection.

(b) Discuss the choice of time constant $R-C$ for a linear diode detector of AM signal.

Or

4. (a) Explain the generation of SSB-SC signals using frequency discriminator method.

(b) For a single tone AM signal, a carrier $A \cos \omega_c t$ is modulated by a single tone modulated signal $f(t) = E_m \cos \omega_m t$. Find :

(i) total modulated power

(ii) modulation efficiency

Unit—III

5. (a) A carrier $A \cos \omega_c t$ is frequency modulated by a single tone modulating signal, $f(t) = E_m \cos \omega_m t$. Find the expression of FM wave in terms of its modulation index.

(b) A single tone modulating signal $\cos(15\pi \cdot 10^3 t)$ frequency modulates a carrier of 10 MHz and produces a frequency deviation of 75 kHz. Find :

   (i) The modulation index.

   (ii) Phase deviation produced in the FM wave.

   (iii) If another modulating signal produces a modulation index of 100 while maintaining the same deviation, find the frequency and amplitude of the modulating signal, assuming $k_f = 15$ kHz per volt.

Or

6. (a) Discuss the sideband terms produced in wide band frequency modulation.

   (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.

Unit—IV

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

   (b) Discuss the method of Diversity reception used in radio receiver.

Or

8. (a) Discuss the working of a superheterodyne receiver.

   (b) With the help of circuit diagram explain the working of AVC.

Unit – V

9. (a) Explain about the noise from single and multiple noise source for linear systems.

   (b) Calculate the noise figure for cascaded systems.

Or

10. (a) Determine the relationship between noise figure and equivalent noise temperature.

   (b) Calculate the noise temperature for cascaded systems.