EC–405(N)

B. E. (Fourth Semester) EXAMINATION, Dec., 2010

(New Scheme)

(Electronics & Communication Engg. Branch)

ANALOG COMMUNICATION

[EC–405(N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

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

Unit – I

1. (a) Prove the following properties of Fourier transform :

   (i) Frequency differentiation theorem

   (ii) Time integration theorem

   (b) A 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 output energy

   Or

2. (a) Find the Fourier transform of the following :

   (i) $\cos \omega_c t$

   (ii) $f(t) = \begin{cases} e^{jt} & |t| < 1 \\ 0 & \text{otherwise} \end{cases}$

   (b) State and prove Parseval's theorem for energy signals.

Unit – II

3. (a) A single tone modulating signal $e_m = E_m \cos \omega_m t$ amplitude modulates a carrier $e_c = E_c \cos \omega_c t$.

   (i) Derive an expression for the AM wave $e(t)$.

   (ii) Derive an expression for modulation index.

   (iii) Draw the AM waveform and its spectrum.

   (b) Explain the synchronous detection method for detection of SSB-SC signal. Also discuss the effect of phase and frequency error in synchronous detection.

Or

4. (a) What are the various methods for AM generation ? Explain balanced modulator method in detail.

   (b) Explain envelope detector method for demodulation of AM waves. Discuss the choice of time constant RC. Derive the relation for obtaining optimum value of time constant RC.

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 for the following :

   (i) The FM wave

   (ii) Expression for narrow band FM

   (b) Explain with block diagram Armstrong method for FM generation.

Or

6. (a) Define and differentiate in detail the following :

   (i) Frequency and phase modulation

   (ii) NBFM and WBFM

   (b) Explain slope detection method for FM detection.

Unit — IV

7. (a) What is the difference between AM transmitter employing low level modulation and high level modulation ? Explain both type of AM transmitters with block diagram.

  (b) Define and explain the receiver characteristics of the following :

   (i) Selectivity

   (ii) Fidelity

   (iii) Sensitivity in detail

   Also discuss the intermediate frequency selection.

Or

8. (a) Explain with block diagram the working of FM transmitters. Also discuss the multiplication applied to FM signals.

  (b) Discuss the advantages and disadvantages of superheterodyne receivers over TRF receiver. Explain the working of superheterodyne receivers.

Unit — V

9. (a) Define noise bandwidth, noise figure and equivalent noise temperature.

  (b) Evaluate the figure of merit for DSB-SC system which uses synchronous detection at the receiver.

Or

10. (a) Explain white noise. Discuss its power density and draw its power spectrum.

  (b) Compare noise performance of AM and FM.