EC - 405

B.E. IV Semester Examination, December 2014
Analog Communication

Time : Three Hours

Maximum Marks : 70

Note: i)   Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each questions are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1) a)   State and prove the convolutional property of Fourier transform.

b)   Find the Fourier transform of $f(t)$ given by

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

c)   Show that the impulse response of an ideal lowpass filter is non-causal.

d)   Prove that a dirac comb is its own Fourier transform.

OR

Prove the parsevals theorem for power signals.

Unit - II

2) a)   What is the need of modulation in communication.

b)   Differentiate between DSB, SSB and VSB.

c)   Discuss the phase discrimination method for generation of SSB signal.

d)   A carrier $A\cos w_c t$ is modulated by a single tone modulating signal $f(t) = E_m \cos w_m t$. Find the total modulated power, r.m.s. value of the modulated signal and transmission efficiency for a 100 percent modulation.

OR

Determine the optimum value of time constant RC in terms of modulation index and modulating frequency for AM envelope detector.

Unit - III

3) a)   Determine the expression of frequency modulated waveform.

b)   Derive the expression for a Narrowband FM.

c) A single tone modulating signal cos $(15\pi \, 10^3 t)$ frequency modulates a carrier of 10 MHz and produces frequency deviation of 75 KHz. Find
   i) The modulation index and phase deviation produced in the FM waveform.
   ii) 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.

d) Analyse the Wideband FM signals, restricting your analysis to the single tone FM system.

OR

Discuss the principle working of Ratio Detector.

Unit - IV

4) a) Discuss the term selectivity and sensitivity in radio receiver.
   b) Discuss the advantages of super heterodyne receivers.
   c) What should be the criteria for the choice of intermediate frequency.
   d) With the help of block diagrams explain the working of AM Transmitter using Low level modulation and High level modulation.

OR

With the help of circuit diagram explain AVC and AFC.

Unit - V

5) a) Discuss the different types of noise.
   b) Explain about white noise and its power spectral density.
   c) Explain about the equivalent noise bandwidth.
   d) Discuss about the single noise source for linear system.

OR

Calculate the noise figure and noise temperature for cascaded system.

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