* 5 4 8 5 / 5 4 8 6 *

5485/5486

B. E. III (Sem. VI) (EC/ECC/IC) Examination

October / November – 2005

Analog & Digital Communication : Paper – 1

Time : 3 Hours] [Total Marks : 100

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. III (Sem. VI) (EC/ECC/IC)

Name of the Subject :

☛ Analog & Digital Communication : Paper – 1

☛ Subject Code No. : 5 4 8 5 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

(2) All abbreviations and notations have their usual meanings.

(3) Figures to the **right** hand side indicate marks of that question.

(4) Assume data, if required.

(5) Answers to **two** sections must be written in **two separate** answer-books.

1 (a) Prove the following properties of Fourier transform : 10

(i) Symmetry property

(ii) Time convolation

(iii) Time differentiation

(iv) Time integration.

(b) Find Fouries transform of function in Fig. 1. $g(t)$ 8

Also sketch and $G(w)$.

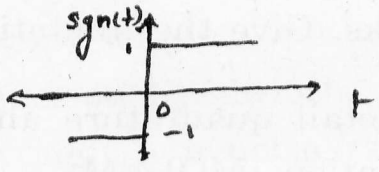

Fig. 1

2 (a) Explain the concept of amplitude demodulation and various types of distortion that may occur. Also find the conditions to avoid them.

(b) An AM transmittes radiater 12 kwatts of power when the carrier is unmodulated and 16 kwatts when the carrier is sinusoidally madulated. Find the modulation index, percentage of modulation. Now, if another sinewave corresponding to 40% modulation is transmitted simultaneously, then calculate the total radiated power. 8

OR

2 (a) Explain Nonlinear modulators using diode as an element. Also derive the expression for its o/p current starting from relationship between voltage and current.

(b) A base band signal $x(t) = 5\cos 2\pi\left(15\times10^{3}\right)t$ angle modulates a carrier signal Acosw W_0t Determine modulation index and bandwidth for FM and PM system.

3 (a) Find the equation for NBFM, starting from the basic definition of FM. Suggest a possible method of its generation and draw block diagram.

(b) Explain SSB generation method using selective filtering and phase shift method.

OR

3 (a) Explain the concept of Phased Locked Loop (PLL) used in synchronous demodulation. Hence, explain how the PLL works. Give the limitations and applications.

(b) Explain in detail quadrature amplitude modulation and demodulation (MODEM).

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4 (a) Explain the following terms : **10**

(a) Sampling thorem.

(b) Nyquist rate.

Find the Nyquist rate and Nyquist interval for signal

$$x(t) = \frac{1}{2\pi} \cos(4000\,\pi t) \cos(1000\,\pi t).$$

(b) Compare Instantaneous sampling, Natural sampling and flat top sampling. **6**

5 (a) Draw the block diagram of PCM transmitter. Explain the concept of quantization. **8**

(b) A television signal having a bandwidth of 4.2 MHz is transmitted using binary PCM system. Given number of quantization level is 512, determine : **8**

(i) Code word length.

(ii) Transmission bandwidth.

(iii) Output signal to noise ratio.

OR

5 (a) Compare PCM and DM with reference to following parameters : 8

(a) Number of bits.

(b) Levels and step size.

(c) Quantization error and distortion.

(d) Transmission bandwidth.

(e) Feedback usage in circuit.

(f) Complexity of implementation.

(b) The pulse rate in an DM system is 56000 per sec. The input signal is $\mathbf{5\cos(2\pi\,1000\,t) + 2\cos(2\pi\,2000\,t)}\ V$ find the minimum value of step size which will avoid slope overload distortion. What would be disadvantage of choosing a valve larger than the minimum ? 8

6 Write shorts note on any three : 18

(a) Pulse width modulation

(b) Concept of distortionless transmission through system

(c) Time division multiplexing

(d) Effect of under sampling

(e) Coherent demodulation techniques.