**AKGEC/IAP/FM/02**

**Ajay Kumar Garg Engineering College, Ghaziabad**

**Department of ECE**

**Sessional Test-2**

Course: B.Tech Semester: V

Session: 2017-18 Section: EC-1, 2, 3

Subject: Principle of Communication Sub. Code: NEC-502

Max Marks: 50 Time: 2 hour

***Note*** : Answer **all** the sections.

**Section-A**

1. Attempt **all** the parts. **(5x2 =10)**
2. Write expression for A-law compandng.
3. Write exact data rates of T1carrier system Hierarchy.
4. Why non uniform quantization is preferred over uniform quantization.
5. Write steps of converting a signal from analog to digital.
6. Why thermal noise act as an important factor affecting output power in PCM technique.

**Section-B**

1. Attempt **all** the parts. **(5x5 = 25)**
2. Derive expression of Flat Top Sampling with required block diagram.
3. A modulating signal x(t) with a trapezoidal waveform as shown in fig. 1 is used for
4. Frequency Modulating a carrier signal of 2 MHz frequency with a frequency deviation constant Kf of 5 KHz/V.
5. Phase modulating a carrier with a phase deviation constant Kp of 5 rad/V.

In each of these cases, find the maximum instantaneous frequency of the modulated signal.

x(t)

10V

t (ms)

0 2 4 6

**Fig. 1**

8. For the FM wave expression given below, find the following:

(a) Power content in the FM signal.

(b) Maximum phase deviation and maximum frequency deviation if the carrier frequency is 1 MHz.

(c) Determine the approximate bandwidth of the FM signal.

1. Explain direct methods of FM generation with their different types.
2. Explain Armstrong method of indirect FM generation.

**Section-C**

1. Attempt **all** the parts. **(2x7.5 = 15)**
2. Describe PCM TDM for T1 carrier system with required block diagram. Explain frame formation, if this system is used for telephone switching system.
3. Prove that SQNR value for normalized input to uniform quantizer is given by   
   (SQNR)dB = 4.8 +6 n , where ‘n’ is number of bits per symbol. A sinusoidal message signal of peak voltage 25V and having frequency of 5 KHz is transmitted through 256 level PCM system. Sampling rate is 30% higher than Nyquist rate. Find Rb, Tb, fs, n, B.W. & Δ.