[Ths question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1305 A

Unique Paper Code : 32227613

Name of the Paper : Communication System

Name of the Course : **B.Sc. (Hons.) Physics – CBCS–DSE**

Semester : VI

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **FIVE** questions in all.
3. **All** questions carry equal marks.
4. Question No. 1 is compulsory.
5. Scientific (non-programmable) calculators are allowed.

1. Answer any **five** of the following questions : (5×3=15)

   (a) Discuss the need of modulation in electronic communication system.

(b) An FM transmitter has a frequency deviation of 20 kHz. Determine the percentage modulation of this signal if it is broadcasted in 88-108 MHz band.

(c) What is the advantage of Flat Top Sampling over Natural Sampling?

(d) Distinguish between Time Division and Frequency Division Multiplexing.

(e) Define the terms quantization error and coding efficiency.

(f) What do you understand by ASK and FSK. Explain using wave forms.

(g) List out the frequency bands used for satellite services.

(h) Explain how cell splitting improves the capacity in a cellular network.

2. (a) Explain the generation of FM wave using VCO. (6)

(b) Explain the mathematical analysis of AM wave using frequency spectrum. A 50 MHz carrier signal with a voltage of 5 V is amplitude modulated by a sine wave of 5 kHz with a voltage of 2.5 V. Draw the frequency spectrum of AM wave. (9)

3. (a) With the help of circuit diagram explain the working of emitter modulator to obtain an amplitude modulated wave. (10)

(b) Find the power in each side band of a DSB-SC signal with the carrier at 1 MHz and of a peak signal voltage of 100V modulated simultaneously by three different signals. The frequency of the modulating signals are 2 kHz, 3 kHz and 5 kHz respectively and the peak modulating voltages are 10 V, 20 V and 30 V respectively. Assume a resistance of 100Ω. (5)

4. (a) What is alising explain how it can be removed. Explain PWM using waveform and its importance in modulation. (5)

(b) Explain the theory of TDM in a PAM signal by using a block diagram. (10)

5. (a) Explain uniform quantization and derive the expression for signal to quantization Noise ratio. (9)

(b) For a minimum line speed with an 8-bit PCM speech signal ranging up to IV

(i) Calculate the resolution and quantization error

(ii) Calculate the coding efficiency for a resolution of 0.0 IV with 8 bit PCM. (6)

6. (a) Explain Geosynchronous satellites. Write advantages and disadvantages of geosynchronous satellites. Draw and explain the simplified block diagram of an earth station. (10)

(b) Explain the operation of GPS. (5)

7. (a) With the help of a block diagram explain Global System for Mobile Communication. Describe in detail about different components and the interfaces between them. Briefly explain various frequency bands used for satellite communications and frequency allocations for mobile satellite service. (8)

(b) What do you understand by look angles and range for a geostationary satellite with respect to an earth station? Explain limits of visibility of a satellite with respect to an earth station and explain the method for its calculation? (7)