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S. No. of Question Paper : 1532-A

Unique Paper Code : 2343703

F-7

Name of the Paper : CS703 Principles of Communication Engineering

Name of the Course : B.Tech. in Computer Science — Allied Course

Semester : VII

Duration : 3 Hours

Maximum Marks : 75

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

There are two parts of the question paper Part I and Part II.

Part I has one question which is compulsory.

From Part II attempt any four out of six questions.

**Part I**

Question No. 1 is compulsory.

1. (a) Fill in the blanks :

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(i) Elements of communication system are .....

(ii) Mathematically in the time domain and frequency domain Sin wave signal are represented as .....

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- (iii) Steps involves in conversion of analog signal to digital signal are .....
- (iv) Carrier recovery circuit is needed at the recovery produce a coherent local carrier called ..... effect.
- (v) Delay distortion is not important in ..... but important in .....
- (vi) For communication most important signals is/are (Analog or Digital or Both) .....
- (vii) Input function  $x(t)$  is said to be transmitted without distortion if the output signal  $y(t)$  is defined as .....
- (viii) Let the bandwidth of signal is B, sampling rate needed for the same is .....
- (ix) We need to compute noise is db; what will be the formula .....
- (x) Envelope is the original signal; show it graphically in pictorial form .....
- (xi) In communication system the noise analysis is based on an idealized form of noise is called ..... noise.
- (xii) In Amplitude Modulation (AM), let the carrier voltage and modulating voltage are  $V_c$  and  $V_m$ , respectively, be represented by ..... and .....



- (xiii) In the standard method of evaluating the modulation index when calculating from a waveform such as may be seen on an oscilloscope, i.e. when both carrier and the modulating voltages are known, equation for the same is .....
- (xiv) Mathematical representation (PM) of unmodulated carrier signal is expressed as .....
- (xv) A transmission of line is said to be lossless if  $R = G =$  .....
- (b) (i) Explain the need of modulation in communication system. 2
- (ii) Discuss the type, causes and effects of the various form of noise which may be created within a receiver or an amplifier. 3
- (c) (i) Draw block diagram of Amplitude Shift Keying and explain in brief. 2
- (ii) Explain Balanced Modulator, explain its working. 3
- (d) (i) Explain Doubling Stub Matching in brief. 2
- (ii) The characteristic for Impedance  $Z_o = R_o + jX_o$ , write expression for General, Lossless and Distortionless cases. 3
- (e) (i) Power spectrum density of signal voltage is 100 volts and of noise is 10 volts, compute the noise figure for receiver in terms of dB. 3
- (ii) Explain any two high frequency transmission lines. 2

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**Part II**

Attempt any *four* questions from this part. *All* questions carry equal marks.

2. (a) Draw block diagram of a communication system, mention the elements of a communication system and describe their functionality. 5
- (b) What do you understand by non-linear distortions ? Explain it mathematically as well as with the diagram which shows the non-linearity. 5
3. (a) Explain amplitude modulation, theoretically as well as mathematically and define modulation index of AM wave. 5
- (b) Explain transmission line parameters, equation, with equivalent circuit model of a differential length  $\Delta z$  of two-conductor transmission line. 5
4. (a) An audio signal given as " $15 \sin 2\pi(1500t)$ " amplitude modulates a carrier given as " $60 \sin 2\pi(100000t)$ " determine the following : 5

**Note :** *You may assume signals for (i, ii & iii); use above signals for (iv and v).*

- (i) Sketch the audio signal.
- (ii) Sketch the carrier signal.
- (iii) Construct the modulated signal.
- (iv) Determine the modulation index and percent modulation.
- (v) What is the frequency of the audio signal and the carrier ?



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- (b) A bandwidth of 20 MHz is to be considered for the transmission of AM signals. If the highest audio frequencies used to modulate the carriers and not to exceed 3 kHz, how many stations could broadcast within this band simultaneously without interfering with one another ? 5
5. (a) Explain Frequency Modulation mathematically and define the advantages and disadvantages of Frequency Modulation over Amplitude Modulation. 5
- (b) Explain the concept of Angular Modulation mathematically with instantaneous angular velocity, define the relationship between Phase Modulation (PM) and Frequency Modulation. 5
6. (a) Consider a transmission line of length  $L$ , explain mathematical expression to compute impedance, standing wave ratio (SWR) and Power ? 5
- (b) What are the different transmission line charts ? Explain smith chart in detail. 5
7. (a) Explain mathematically the noise in AM and Angle Modulation system. What are the effects in small noise and large noise ? 5
- (b) What are the circuit elements ? Use of transmission line as circuit elements, why ? Conventional circuit element do not behave as expected at high frequency. 5

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