This question paper contains 4+1 printed pages]

Roll No. | | | | | | | | | | | |

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 : 15×1

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

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

P.T.O.

(*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 my 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 it's 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

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 My 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 ? 1

(*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 may 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 chats ? 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