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

P.T.O.

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 ?

(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

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