

B.Tech 6th Semester Exam., 2014

INTRODUCTION TO COMMUNICATION SYSTEMS

Time : 3 hours

Full Marks : 70

Instructions :

- (i) All questions carry equal marks.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Answer any seven of the following :

- (a) What is the basic purpose of an electronics communication system?
- (b) What is meant by base band signal? Give an example.
- (c) What are modulation and demodulation in simple terms?
- (d) What happens if multiple messages are transmitted simultaneously without frequency translation or modulation?
- (e) What is the function of a modem?

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(f) Give specific reasons to prefer digital technology over analog technology.

(g) Define the term EIRP. How is it related to transmitter power and transmitter antenna gain?

(h) List four different types of communication channel.

(i) What is meant by a Fourier series?

(j) How is 1 kHz sine wave represented in the frequency domain? What is its limitation?

2. (a) Describe periodic and aperiodic signals.

(b) Write down the trigonometric form of the Fourier series representation of a periodic signal. State the necessary and sufficient conditions for the existence of the Fourier series representation for a signal.

3. Define 'amplitude modulation'. Derive the relationship between the total transmitted power and carrier power in an AM system when several frequencies simultaneously modulate a carrier.

4. Describe the DSBSC wave generation process using balanced modulator.

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X 5. (a) The antenna current of an AM transmitter is 8 amperes (8A) when only the carrier is sent, but it increases to 8.93 A when the carrier is modulated by a single sine wave. Find the percentage modulation. Also determine the antenna current when the percent of modulation changes to 0.8.

(b) Determine the modulation index for sinusoidal FM signal for which $V_c(\text{max}) = 10\text{ V}$, $f_c = 20\text{ kHz}$, $V_m(\text{max}) = 3\text{ V}$, $f_m = 1\text{ kHz}$ and deviation constant, $k_f = 2000\text{ Hz/V}$. Also write the resulting expression for FM signal.

6. (a) Define the terms sensitivity, selectivity and image frequency.

(b) Draw the block diagram for an AM superheterodyne receiver and describe its operation and the primary function of each stage.

7. With the help of neat block diagram, explain PPM in detail. Compare among PAM, PWM and PPM.

X 8. Draw the block diagram of a monochrome TV transmitter and describe each block in brief.

9. Write notes on the following :

(a) FDM

(b) CCD flat panel displays