

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2118

Roll No.

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B. Tech.

(SEM. V) ODD SEMESTER THEORY EXAMINATION
2010-11

PRINCIPLES OF COMMUNICATIONS*Time : 3 Hours**Total Marks : 100***Note :** (1) Attempt all questions.

(2) Each question carries equal marks.

1. Attempt any **four** of the following : (5×4=20)
 - (a) With the help of block diagram explain the working of Communication System.
 - (b) What is the need for modulation of signal before transmitting it to distant place ?
 - (c) With the support of mathematical expressions explain the working of Balanced modulator.
 - (d) How DSB-SC and DSD-C Demodulator works ? Explain.
 - (e) What is the importance of Quadrature Amplitude Modulator ? Explain receiving system for Amplitude Modulated Signal.
 - (f) The signal $v(t) = (1 + 0.1 \cos w_1 t + 0.1 \cos 2w_1 t) \cdot \cos w_c t$ is detected by a square-law detector, $v_o = 2v^2$.
2. Attempt any **four** of the following : (5×4=20)
 - (a) Relate phase and frequency Modulation. Show that phase Modulation is not linear.

- (b) Consider an angle modulated signal:

$$x(t) = 3 \cos[2\pi \cdot 10^6 t + 2 \sin(2\pi \cdot 10^3 t)].$$

Find its instantaneous frequency at time $t = 0.5$ ms and maximum phase deviation.

- (c) Derive Carson's rule. Discuss the effect of Modulation index β on Bandwidth in Tone Modulated FM signals.
- (d) Illustrate the principle of Armstrong system of generating PM signal.
- (e) With the help of Block diagram explain the working of FM demodulator.
- (f) With relevant figure explain the working of stereophonic broadcasting transmitter receiver.

3. Attempt any two of the following : (10×2=20)

- (a) What is sampling theorem? What is the relevance of Discrete Fourier transform in relation to Nyquist criterion?
- (b) Discuss and compare pulse width Modulation and pulse position Modulation. Three signals m_1 , m_2 and m_3 are to be multiplexed. m_1 and m_2 have a 50 kHz bandwidth and m_3 has a 10 kHz bandwidth. Design a commutator switching system so that each signal is sampled at its Nyquist rate.
- (c) (i) Explain FDM and TDM. Discuss T1 Digital System.
(ii) Explain the working of PCM Communication System.

4. Attempt any two of the following : (10×2=20)

- (a) With the help of Block diagram explain the working of Delta Modulation. How adaptive Delta Modulator improves the performance of Delta Modulator?
- (b) Discuss the classification, working advantages and one application of each type of vocoders.

- (c) Gaussian noise $n(t)$ of zero mean has a power spectral density :

$$G_n(f) = 2\mu V^2 / \text{Hz} \text{ for } |f| \leq \text{kHz} \\ = 0 \text{ elsewhere.}$$

- (i) What is the normalized power of noise?
- (ii) Write the probability density function $f(n)$ of the noise.
- (iii) The noise $n(t)$ is passed through a filter. The power output of the filter is one-half the power of $n(t)$. Write the probability density function for the output noise of the filter.

5. Attempt any two of the following : (10×2=20)

- (a) Analyze Noises present in Analog Modulation System and derive its signal to Noise Ratio.
- (b) What are various noises present in Frequency Modulation? What is pre-emphasis and de-emphasis and how SNR improves? Comment.
- (c) Classify various types of Noises and represent them by their mathematical model. Explain the working of Digital Phase Locked loop.