

(Following Paper ID and Roll No. to be filled in your Answer Book)										
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; padding: 5px;">PAPER ID : 3085</td> <td style="width: 10%; padding: 5px;">Roll No.</td> <td style="width: 10%; padding: 5px;"><input type="text"/></td> </tr> </table>	PAPER ID : 3085	Roll No.	<input type="text"/>							
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B. Tech.**FIFTH SEMESTER EXAMINATION, 2006-07****PRINCIPLES OF COMUNICATION**

Time : 3 Hours

Total Marks : 100

- Note :**
- (i) Attempt **ALL** questions.
 - (ii) All questions carry equal marks.
 - (iii) In case of numerical problems assume data wherever not provided.
 - (iv) Be precise in your answer.

1. Attempt *any four* parts of the following : (5x4=20)

- 01633
- (a) What are baseband and passband signals ? How their transmission differs from each other ?
 - (b) State and derive convolution theorem in time domain's and explain its significance and use in the communication system.
 - (c) A periodic signal $g(t)$ is expressed by the fourier series :

$$g(t) = 3\cos t + \cos\left(5t - \frac{2\pi}{3}\right) + 2\cos\left(8t + \frac{2\pi}{3}\right)$$

Sketch the amplitude and phase spectra for the trigonometric series.

- (d) Explain the Information capacity theorem in Communications Process.
- (e) Show that an exponential e^{-at} starting at $-\infty$ is neither an energy nor a power signal for any real value of a . However, if a is imaginary, it is a power signal with power $P_g = 1$ regardless of the value of a .
- (f) What is digital communication ? Explain with the help of block diagram.

2. Attempt *any four* parts of the following : (5x4=20)

- (a) Why modulation is required for transmission of the signals ? Under what conditions do you prefer Amplitude Modulation over frequency modulation ?
- (b) A carrier wave of 10MHz is amplitude modulated to 50% with a tone of 5000Hz. Sketch the waveform and amplitude distribution in time and frequency domain. If carrier amplitude of 10Volts write down the equation of above wave and show the two side bands. Determine their frequency and amplitude.
- (c) What is the need Multiplexing ? Compare the Time Division and Frequency Division Multiplexing.
- (d) Compare the following amplitude modulated system for Transmission/reception efficiencies :
 - (i) DSB with carrier
 - (ii) DSB/SC
 - (iii) SSB
 - (iv) V. S. B.
- (e) Draw the block diagram of Phase shift method for generating the SSB signal and explain its working.

- (f) What is the principle of operation of an envelope detection ? Compare its performance with a synchronous detector.

3. Attempt *any two* parts of the following : (10x2=20)

- (a) What is Narrow Band and Wide Band F. M ? In an F. M wave, the frequency deviation is 25kHz. What maximum phase deviation does this represent if the modulation signal is :

(i) 100Hz (ii) 10000Hz

- (b) Draw the circuit diagram of a Foster-Seeley discrimination. Explain its principle of operation with the help of relevant phasor diagrams.

- (c) What is the significance of sampling theorem in T. D. M. Systems ? Explain the Pulse-width modulation and how are PWM waves generated and demodulated.

4. Attempt *any two* parts of the following : (10x2=20)

- (a) What is noise ? What are various forms and sources of noise ? Discuss the importance of S/N ratio in a radio-receiver.

- (b) Three amplifiers have following characteristics

$$F_1 = 9\text{dB}, G_1 = 48\text{dB} ; F_2 = 6\text{dB}, G_2 = 35\text{dB} ;$$

$$F_3 = 4\text{dB}, G_3 = 20\text{dB}$$

The amplifiers are connected in random.

Determine the sequence of combination which gives best noise figure referred to the input. Calculate overall noise figure and equivalent noise temperature, in this case.

- (c) Two resistors $20\text{k}\Omega$ and $50\text{k}\Omega$ are at room temperature. Calculate for a bandwidth of 100kHz ; the thermal noise voltage :
- For each resistor
 - For two resistors in series
 - For two resistors in parallel

5. Attempt *any two* parts of the following : (10x2=20)

- (a) Explain the terms :
- Partition Noise
 - Thermal Agitation and
 - Transit Time Noise

Thermal noise from a resistor is measured as $4 \times 10^{-17}\text{W}$, for a given bandwidth and at a temperature of 20°C . What will be the noise power when temperature is changed to

- 50°C
 - 70°K
- (b) For a signal, the B. W is 3kHz and S/N ratio is 15. Calculate :
- The channel capacity
 - If the B. W is increased to 4kHz and the signal is transmitted over the same channel, calculate the required S/N ratio and the percentage change in the signal power.
- (c) What is the use of Companding in PCM system ? A message signal bandlimited to 5kHz is sampled at the minimum rate as dictated by the sampling theorem. The samples are quantized and encoded into six binary bits. Calculate the bit transmission rate and the maximum signal to quantization noise ratio.

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