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

PAPER ID : 3101   **Roll No.** [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

B. Tech.

(SEM. VI) THEORY EXAMINATION 2010-11
ANALOG & DIGITAL COMMUNICATION ENGINEERING

Time : 3 Hours   *Total Marks : 100*

Note :   (1)   Attempt **all** questions.

    (2)   All questions carry equal marks.

1.   Attempt any **four** parts of the following :   **(4×5=20)**

    (a)   Derive equation for AM wave. Sketch clearly waveform and derive for the modulation index. Also calculate the power contained in the signal.

    (b)   A certain transmitter vadiates 9 kW with the carrier unmodulated, and 10.125 kW when the carrier is sigsueidally modulated. Calculate the modulation index. If another sine wave, corresponding to 40 per cent modulation, is transmitted simultaneously, determine total radiated power.

    (c)   How the vestigial side band signals are generated ?

    (d)   Explain the methods for SSB-SC signal generation.

    (e)   A mixer stage has a noise figure of 20 dB, and this is preceded by an amplifier that has a noise figure of 9 dB and an available power gain of 15 dB. Calculate the overall noise figure referred to the input.

    (f)   Define the terms sensitivity, selectivity and image frequency in AM receiver.

2. Attempt any **four** parts of the following : (4×5=20)

   (a) Derive the expression for the instantaneous value of an FM voltage and define the modulation index.

   (b) A carrier of frequency 1 MHz and amplitude 3v is frequency modulated by a sinusoidal modulating waveform of frequency 500 Hz and peak amplitude 1V. As a consequency, the frequency deviation is 1 kHz. The level of modulating waveform is changed to 5 V peak and the modulating frequency is changed to 2 kHz. Write the expression for new waveform.

   (c) Explain the working of reactance modulator used as FM generator. Support with proper expression.

   (d) Explain FM demodulation using phase locked loop.

   (e) What is noise ? Describe different types of internal noise.

   (f) Derive the expression for figure of merit in AM system.

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

   (a) What are the advantages of pulse modulation ? Define and describe pulse-position modulation and explain with waveform how it is derived from PWM.

   (b) What is the pulse code modulation ? Explain the DPCM and DM with heat block diagram.

   (c) Write short notes on :
       (i) Granularity and slope-overload error in Delta modulation.
       (ii) Non-uniform quantization and its applications.

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

   (a) Draw the block diagram of transmitter and receiver of PSK. Explain its working and also calculate probability of error.

   (b) Giving modulated waveforms, signal space diagrams and probability of bit errors, draw the optimum receiver structures for DPSK and coherent FSK modulation schemes.

   (c) Describe matched filter. What do you understand by physical realisability of matched filter ? Write properties of matched filter.

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

   (a) Explain the TDM digital hierarchy used in North America.

   (b) Design binary Hulfman code for a discrete source of five independent symbols A,B,C,D and E with probabilities 0.4, 0.2, 0.3, 0.08 and 0.02 respectively such that the variance of code-word length is minimum.

   (c) Explain briefly :

   (i) Shannon's channel capacity theorem.

   (ii) AT & T M12 multiplexer.