

Code: 9A10505

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## B.Tech III Year I Semester (R09) Supplementary Examinations June 2017 **PRINCIPLES OF COMMUNICATIONS**

(Common to E.Con.E & EIE)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions All questions carry equal marks

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- 1 (a) Explain the usefulness of the convolution theorem of Fourier transform in determining the convolution of two continuous-time signals.
  - (b) Show that the power spectral density of a power signal, x(t), is the Fourier transform of its auto-correlation function.
- 2 (a) A carrier signal is sinusoidally modulated to a depth of m = 0.8. What percentage of the total power of the modulated signal is in two sidebands?
  - (b) Calculate the percentage power saving, when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of: (i) 100%. (ii) 50%.
- 3 (a) Define the term, 'modulation index' for FM in the case of single-tone modulation and for a general modulation signal.
  - (b) In a wideband FM generator using the indirect method, the narrowband FM signal initially generated has a carrier frequency of 200 kHz and a frequency deviation of 49 Hz. Choose appropriate values for the local oscillator frequency for the mixer and the frequency multiplication required before and after the mixer if the final WBFM signal is to have a carrier frequency of 91.2 MHz and the standard frequency deviation of 75 kHz.
- 4 (a) State the low pass sampling theorem and briefly explain its significance.
  - (b) Explain how a PPM signal may be converted into a PAM signal. Also, explain how a PAM signal may be generated. How can it be demodulated?
- 5 (a) With the help of block diagrams of the transmitter and the receiver, explain the working of binary PCM system.
  - (b) When quantization noise as well as channel noise is considered, derive an expression for the destination (SNR) of a binary PCM system.
- 6 (a) What are the advantages and disadvantages of M-ary signaling over binary signaling insofar as baseband data transmission is concerned?
  - (b) Explain the principle of DPSK encoding.
- 7 (a) State Kraft's inequality and explain its significance.
  - (b) What are the lower and upper bounds for the average length of a uniquely decipherable code?
- 8 (a) What are the two broad strategies adopted for error control in digital communications?(b) In an (n, k) linear block code, how many code words will be there. Justify you answer.