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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Fifth Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; Dec. - 2014

Digital Communication

Time: 3 hrs

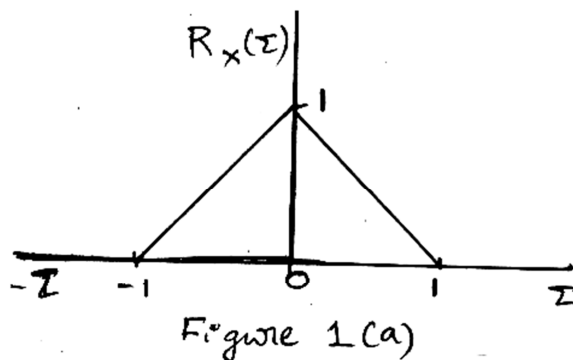
Max. Marks: 100

Note: i) Answer any **FIVE** full questions, selecting at least **TWO** full questions from each part.

ii) Assume suitable missing data if any.

PART - A

1. a. The auto correlation function of a wide stationary process $x(t)$ is shown in Fig. 1(a)



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Find the power spectral density $S_X(f)$ of the random Process $X(t)$

- b. Define the power spectral density $S_X(f)$ of wide sense stationary process $X(t)$. Specify its properties.
2. a. Explain the concept of ideal sampling. Derive the interpolation formula :

$$g(t) = \sum_{-\infty}^{\infty} g\left(\frac{n}{2w}\right) \text{sinc}(2wt - n)$$

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- b. The spectrum of a band pass signal $g(t)$ has a band width of 0.6 kHz centered around 12 kHz. Find the Nyquist rate for quadrature sampling of in phase and quadrature components of the signal $g(t)$.

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3. a. Draw the block diagram of PCM system and explain the operation of basic elements of PCM system.

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- b. The Bandwidth of TV video & audio signal is 4.5 MHz. The signal is converted to PCM bit stream with 1024 quantization levels. Determine the numbers of bits/second generated by the PCM system. Assume that signal is sampled at the rate of 20% above Nyquist rate.

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- c. What are the types of quantizing? Explain the concept of mid-riser type of quantizing with related graphs.

5

- 4 a Explain the block diagram of DPCM transmitter and receiver with related equations. 10
- b. Define slope overload distortion and granular noise in DM and explain how it is overcome by using ADM. 10

PART - B

- 5 a. Draw the encoded waveforms for the bit stream 101101010110 for the following schemes: 10
 - i) Polar
 - ii) Bipolar
 - iii) Manchester coding.
- b. Explain the Nyquist criterion for distortion less base band binary transmission by using raised cosine spectrum. 10
- 6 a. Explain the Gram-Schmitt Orthogonalization Procedure with related diagrams. 10
- b. Explain the Geometric interpretation of signals. 10
- 7 a. Explain the operation of coherent binary PSK system. 10
- b. Differentiate between the transmitters of QPSK and MSK systems. 10
- 8 a. Explain the following with related equations: 10
 - i) Maximum likelihood receiver for AWGN channel
 - ii) $(SNR)_0$ of a matched filter.
- b. With related diagrams and equations, explain the operation of a 'Non-coherent receiver using a matched filter. 10

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