[4658] – 562

Seat No.	

T.E. (E&TC) (Semester – I) Examination, 2014
DIGITAL COMMUNICATION
(2012 Pattern)

Time : 3 Hours Max. Marks : 70

Instructions : *1) Answer Q. **1** or Q. **2,** Q. **3** or Q. **4**, Q. **5** or Q. **6**, Q. **7** or Q. 8.*
*2) **Neat** diagrams must be drawn **wherever** necessary.*
*3) Figures to the **right** side indicate **full** marks.*

1. a) Explain the flat-top sampling with functional diagram. Draw spectral diagram for the flat-top sampled signal and aperture effect. **8**

   b) With the help of neat schematic, explain early-late synchronizer. **6**

   c) A voltage V(t) which is a Gaussian Ergodic Random process with a mean of zero and a variance of 4 volt^2, is measured by a dc meter, a true RMS meter and a meter which first squares V(t) and then reads its dc component. Find the output of each meter. **6**

OR

2. a) Explain with neat schematic and mathematical analysis, a transmitter and receiver for DPCM. **8**

   b) Derive the expression for power spectral density of polar NRZ signal. **6**

   c) Define Random process. Explain various time averages associated with the random process. **6**

3. a) Derive the expression of SNR for integrator and dump filter and explain working of integrator and dump filter. **8**

   b) Explain Gram - Schmit procedure for orthogonalization. **8**

OR

4. a) Derive the expression of probability error (Pe) for matched filter. **8**

   b) Find decision threshold if conditional probability density functions after addition of noise are of Gaussian distribution and voltage V_1 represents symbols S_1 and V_2 symbol S_2 for noise case, show the threshold when apriori probabilities are equal and unipolar signal $V_1 = +V$ and $V_2 = 0$. **8**

P.T.O.

5. a) In a digital communication system, the bit rate of NRZ data stream is 5Mbps and carrier frequency of transmission is 100 MH_2. Find. **9**
   a) Mathematical equation
   b) Symbol rate
   c) Band width
   for the following modulation schemes.
   i) BPSK
   ii) QPSK
   iii) 16-ary PSK.

   b) Draw the block diagram of DPSK transmitter and explain its operation with proper waveforms. **6**

   c) Explain the concept of OFDM. **3**

OR

6. a) Given the input binary sequence 1100100010, sketch the waveforms of the in-phase and quadrature components of a modulated wave obtained by using the QPSIC scheme. **9**

   b) Compare BPSK, QPSK and M'ary PSK with the help of equations, signal space representation, symbol rate and bandwidth. **9**

7. a) A spread spectrum system has the following parameters. **6**

   Information bit duration $T_b = 4.095$ m sec.

   PN chip duration $T_c = 1\,\mu$ sec.

   Find the processing gain. What is the number of shift registers required ? Also find the jamming margin if the $\frac{Eb}{No} = 10$ for the BPSK scheme.

   b) Draw block diagram of DSSS - PSK transmitter. **2**

   c) What are the properties of maximal length sequences ? Give the graphical representation of auto correlation property of random data and a PN sequence and explain. **8**

OR

8. a) Draw and explain FHSS spread spectrum system with transmitter and receiver section. **8**

   b) Explain various wireless standards for Wi - Fi and Wi Max. **4**

   c) Write short note on Personal Communication Systems (PCS). **4**

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