

Roll No .....

**EC - 503**

**B.E. V Semester**

Examination, December 2015

**Digital Communication**

*Time : Three Hours*

*Maximum Marks : 70*

- Note:** i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.  
ii) All parts of each questions are to be attempted at one place.  
iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.  
iv) Except numericals, Derivation, Design and Drawing etc.

**Unit-I**

1. a) What do you understand by cumulative distribution function? Explain it with example.
- b) Discuss variance and standard deviation of random variable.
- c) What is error function? Mention its application in digital communication.
- d) The random variable X has a probability density uniform in the range  $0 \leq x \leq 1$  and zero elsewhere. The independent variable Y has a density uniform in the range  $0 \leq x \leq 2$  and zero elsewhere. Find and plot the density  $z = x+y$ .

OR

A random variable  $V = b+X$  where  $X$  is a Gaussian distributed random variable with mean zero and variance  $\sigma^2$  and  $b$  is a constant. Show that  $V$  is a Gaussian distributed random variable with mean  $b$  and variance  $\sigma^2$ .

**Unit-II**

2. a) Discuss sampling theorem.
- b) What do you understand by flat top and natural sampling?
- c) What is PWM and PPM? Discuss.
- d) Draw the diagram of continuously variable slope delta modulation and explain its working.

OR

What is vocoder? Explain working of channel vocoders.

**Unit-III**

3. a) What is phase shift keying.
- b) Discuss concept of Quadrature PSK.
- c) A 9.6 kb/s NRZ data stream is to be transmitted over a 2.4 kHz bandwidth channel. What modulation system would you choose if an error rate of  $10^{-4}$  is to be achieved with minimum S/N ratio.
- d) Discuss quantization noise effects in delta modulation. Draw waveforms of estimate of  $m(t)$  and error  $\Delta(t)$  when  $m(t)$  is sinusoidal.

OR

Calculate  $P_e$  for 16 QAM without using the union bound approximation.

**Unit-IV**

4. a) What is Bays theorem? Explain it.
- b) Discuss optimum receiver for both baseband and passband.
- c) What is matched filter and correlates?
- d) Obtain error of probability in BPSK and BFSK.

OR

Discuss the effects of white noise in matched filter.

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**Unit-V**

5. a) What is uncertainty in information theory?
- b) What is source coding theorem? Explain.
- c) What is channel capacity? Discuss Shannon channel capacity theorem.
- d) Discuss the relationship between bit error rate and symbol error rate.

OR

Discuss following coding in detail:

- i) Huffman coding.
- ii) Shannon Fano coding.

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- d) Explain the characteristics of relation. Also explain the relational databases.

OR

What are DDL, DML and DCL? Differentiate among the three and give one command for each of these.

### Unit-III

3. a) What do you mean by the terms loss-less decomposition?  
b) What is multivalued dependencies?  
c) Write a brief notes on trival and non trival dependencies.  
d) Prove that a relation which is in 4NF must be in BCNF.

OR

What is normalization? Justify the need for normalization with examples.

### Unit-IV

4. a) What is web databases?  
b) Compare OODBMS and DBMS.  
c) What are challenges in designing object-oriented data bases? Discuss.  
d) What problems occur in the database when transactions do not satisfy ACID properties? Explain explicitly using suitable examples.

OR

Explain the significance of multimedia and mobile database. Also give two examples for each.

### Unit-V

5. a) What is inline queries? Where it is used?  
b) How the "GROUP BY" clause works?  
c) Differentiate between Implicit and Explicit cursor.  
d) What is Triggers? Write various types of triggers.

OR

What is PL/SQL exception handling and why it is needed?

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