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Roll No.....

EC-503 (GS)**B.E. V Semester**

Examination, December 2017

Grading System (GS)**Digital Communication**

Time : Three Hours

Maximum Marks : 70

Note: i) Answer any five questions.

ii) All questions carry equal marks.

1. a) If X and Y are independent random variables then prove that: 7

$$i) \text{Var}(X + Y) = \text{Var}(X) + \text{Var}(Y)$$

$$ii) \text{Var}(X - Y) = \text{Var}(X) + \text{Var}(Y)$$

- b) Define the terms correlation and Auto correlation. Write any two properties of Auto correlation. 7

2. a) What do you mean by Sampling? Why is it needed? Define Natural and Flat top sampling. 7

- b) What is Quantization? Explain quantization error. 7

3. a) Draw block diagram of PCM and explain its operation. 7

- b) Explain the terms companding and eye patterns. 7

4. a) What is Delta Modulation? What are the limitations of DM? How to overcome them? 7

- b) What is QPSK system? How it differs from BPSK system? 7

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5. a) Define frequency shift keying. Differentiate orthogonal and Non-orthogonal FSK. 7

- b) What are Optimum and matched filters? Define. 7

6. a) What is a Correlator? Show that the performance of correlator and matched filter is identical. 7

- b) What is Entropy? Show that the entropy is maximum when all the symbols are equi-probable. 7

7. a) Apply Shannon Fano coding and find efficiency: 7

$$[x] = [x_1 \quad x_2 \quad x_3 \quad x_4 \quad x_5 \quad x_6 \quad x_7]$$

$$[p] = [0.4 \quad 0.2 \quad 0.12 \quad 0.08 \quad 0.08 \quad 0.08 \quad 0.04]$$

- b) What is Channel Capacity? Write its expression. 7

8. Write short notes (any two): 14

- a) Differential PCM

- b) PAM technique

- c) Central limit theorem

- d) Nyquist criterion
