B. Tech Odd Semester Examination, February, 2023

Electronics & Communication Engineering

(7th Semester)

Course No.: ECE-703B

(Error Correcting Codes)

Full Marks: 50
Pass Marks: 15

Time: 2 hours

Note:
1. Attempt any five questions.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the right margin indicate full marks for the question.
6. All the mathematical symbols and abbreviations have their usual meanings.

1. a) What are the differences between analog and digital signals?

   b) Why periodic signal is considered for communication purpose?

   c) Describe the procedure of converting an analog signal to a digital signal.

   d) What are the advantages of using digital signals over analog signals for communication and other working? 2+1+4+3=10

2. a) What are the different ways for knowing error in digital communication?

   b) Mention the advantages and disadvantages of introducing single parity bit in the digital message stream.

c) Describe how single parity bit two types in the digital message stream check the error. 2+2+2+4=10

3. a) What do you mean by linear block codes?

b) In a linear block coding method, each block contains total codewords 15 bits, out of which 11 bits are message or data bits, find the redundant or parity bits and code rate of that error correcting technique.

c) Explain repetition code for error correcting in digital bit stream with suitable examples. 2+4+4=10

4. a) What are group and subgroup of a set of numbers?

b) Explain finite field and finite rings.

c) What do you mean by cosets and how it is expressed? 2+2+2+2+1+1=10

5. a) Why Hamming code is popular in error correcting codes?

b) Describe Hamming code error correcting method taking 11 bits as data bits at encoding and decoding end.

c) Is Hamming code a linear block code and why? 2+3+3+2=10

6. a) Explain binary cross over probability in a binary symmetric channel.

b) What is binary symmetric channel capacity?

c) What do you mean by identity matrix and indempotent matrix? 5+2+3=10

7. a) What is cyclic redundancy check (CRC)?

b) Discuss cyclic redundancy check method taking message 10 bits and pre-determined divisor 6 bits at encoding (sender) and decoding (receiver) stage.

c) Explain convolution coding technique in error correction, 2+3+2+3=10

8. a) Illustrate Bose-Chaudhuri-Hocquenghem (BCH) code technique in error correcting.

b) What is the advantage of BCH code?

c) Explain Reed Solomon Code in error correcting technique. 4+1+5=10

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