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13/6/13FN

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**Question Paper Code : 21511**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Fifth Semester

Information Technology

IT 2302/IT 52 – INFORMATION THEORY AND CODING

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give the Kraft-Mc millan inequality for the instantaneous code.
2. State Shannon's theorem.
3. What is meant by residue in LPC?
4. What is Dolby AC-1?
5. What are the features considered for video compression?
6. What is the minimum frame/sec required in MPEG?
7. State the properties of cyclic codes.
8. What is Co-set and Co-set leader?
9. What are the difference between block and convolutional codes?
10. What is interleaver in a turbo code?



PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the properties of entropy. (6)

(ii) A discrete memory less source has sequence of symbols

“ABACADABACADABACABAB”

Derive the Huffman code tree for this source, entropy and the average codeword length of the source encoder. (10)

Or

- (b) (i) Explain channel capacity and derive the channel capacity for binary symmetric channel. (8)

(ii) Discuss about mutual information and its properties. (8)

12. (a) Assume that the character set and probabilities are  $e=0.3$ ,  $n=0.3$ ,  $t=0.2$ ,  $w=0.1$ ,  $o=0.1$ . Derive the codeword value for the string “went”. Explain how the decoder determines the original string from the received codeword value.

Or

(b) Explain masking techniques in detail.

13. (a) With the aid of a diagram, identify the 5 main stages associated with the baseline mode of operation of JPEG and give a brief description of the role of each stage.

Or

(b) Explain the compression principles for P and B frames.

14. (a) Consider the (7,4) hamming code defined by the generator polynomial  $g(x)=1+x+x^3$ . The code word 0111001 is sent over a noisy channel, producing the received word 0101001 that has a single error. Determine the syndrome polynomial  $s(X)$  for this received word and show that it is identical to the error polynomial  $e(X)$ .

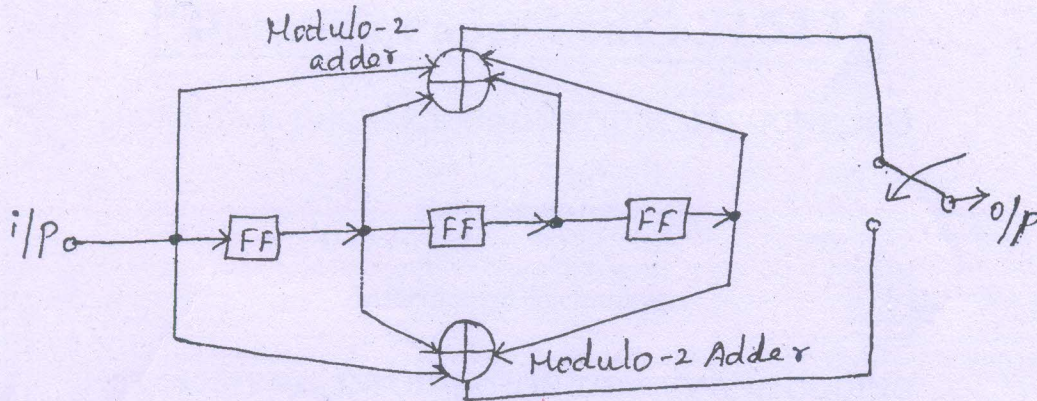
Or

(b) (i) Define syndrome and its properties. (6)

(ii) Discuss about syndrome decoding in linear block codes with example. (10)



15. (a) (i) The convolution encoder for a rate  $r = \frac{1}{2}$ , constraint length  $K=4$ , determine the output codeword for the message (10111). (10)



- (ii) Draw the code tree for the above convolutional encoder. (6)

Or

- (b) Explain Viterbi algorithm in detail.