

Total No. of Questions – [6]

Total No. of Printed Pages: 2

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| G.R. No. |  |
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**DECEMBER 2021 - ENDSEM EXAM**  
**T. Y. B. TECH. (E & TC) (SEMESTER - I)**  
**COURSE NAME: Information Theory and Coding**  
**Techniques**  
**COURSE CODE: ETUA31183B (PATTERN 2018)**

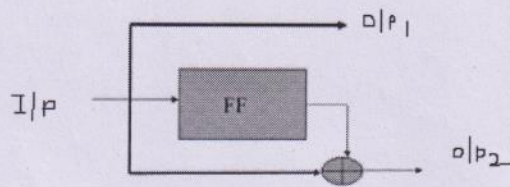
Time: [1Hr]

[Max. Marks: 30]

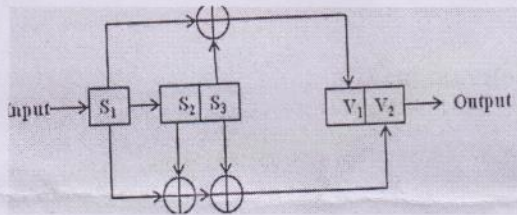
**Instructions to candidates:**

- 1) Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6.
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

- Q.1 a 3 is primitive element of  $GF(5)$  field. Justify the statement. [4]  
b Consider a systematic cyclic code (7,4) with  $g(x) = x^3 + x + 1$ . Obtain the code words for messages 1111, 1011 [6]
- OR**
- Q2 a Sketch for systematic cyclic code(7,4) with generator polynomial  $x^3 + x^2 + 1$  and state the significance of the connections with respect to generator polynomial [4]  
b Construct a generator matrix form generator polynomial  $x^3 + x + 1$  [6]
- Q.3 a Derive Galois field for  $GF(8)$  [4]  
b Design BCH code generator polynomial for  $n = 7$  and  $t_c = 1$  [6]
- OR**
- Q.4 a Design (7,3) RS double error correcting code .Use primitive polynomial over  $GF(2^3)$   $x^3 + x + 1$  [4]  
b Calculate systematic RS code for message  $(\alpha, \alpha^3, \alpha^5)$  using the generator polynomial derived in Q.4 a [6]
- Q.5 a For the convolution encoder shown in figure sketch state diagram representation and calculate  $d_{free}$  and error correcting ability from state diagram. [4]



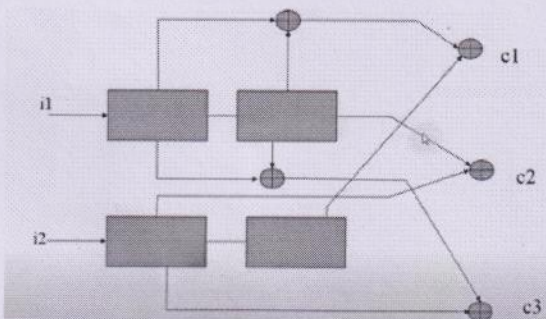
- b For the Convolution encoder show in figure, sketch state diagram  
Obtain the output data sequence 10011. [6]



OR

Q.6 a

For the convolution encoder shown in figure, how many generating functions we have? Write matrix representations of these generating functions [4]



- b For 1/3 rate convolutional encoder following are generator polynomials  
 $G_1 = [1 \ 0 \ 0]$ ,  $G_2 = [1 \ 0 \ 1]$ ,  $G_3 = [1 \ 1 \ 1]$  Sketch the encoder and find the  
codeword for  $[1 \ 1 \ 0]$  [6]