INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR
B.TECH IT 5TH SEMESTER MID SEMESTER EXAMINATION 2021
SUBJECT – INFORMATION AND CODING THEORY (IT 3105)

Full Marks = 30 Time: 45 min

(Answer all the questions. Write your name and roll number on the front page. Scan your answer script, make a single .pdf file of your answer script and upload in the google classroom.)

1. (a) What is an extended DMS? Represent order-n extension DMS.
   (b) Construct the order 2 extension of the source where symbols of the original source are characterized by the probabilities $P(X = x_1) = ½$, $P(X = x_2) = P(X = x_3) = 1/8$ and $P(X = x_4) = ¼$ and calculate its entropy.

5 + 10 = 15

2. (a) For a (7, 4) Hamming Code with generator matrix given below, find the generator matrix in its systematic form.
   (b) Compute the Parity check matrix.
   (c) Design the (7, 4) encoder circuit.

$$G' = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}.$$

5 + 5 + 5 = 15