Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

SEVENTH SEMESTER BTECH. (E & C) DEGREE END SEMESTER EXAMINATION
DECEMBER 2021-JANUARY 2022
SUBJECT: INFORMATION THEORY AND CODING (ECE - 4075)

TIME: 85 MINUTES **MAX. MARKS: 20**

Instructions to candidates
- Answer **ALL** questions.
- Missing data may be suitably assumed.

Q. No.	PART B
1A.	Construct a minimum variance Huffman code for the source shown in the following table using the code alphabet X= {0, 1, 2, 3}. S: s1 s2 s3 s4 s5 s6 s7 s8 s9 s10 P(s_i): 0.20 0.18 0.12 0.10 0.10 0.08 0.06 0.06 0.06 0.04 Find efficiency and redundancy of this code.
1B.	Let S_0 be the third extension of a zero-memory binary source with the probability of a 0 equal to p. Another source observes the output of S_0 and emits either a 0, 1, 2 or 3 according to whether the output of S_0 had 0,1, 2, 3 zeros. Determine $H(S_0)$ and $H(S)$.
1C.	Determine the Mutual information of a Binary Symmetric Channel (with the error probability p) if it is extended to 2nd order. Compare this mutual information with that of original channel.
	(4+3+3)
2A.	Decode the following binary sequence using Adaptive Huffman coding Procedure for a source with 26 letter alphabet **A to Z**: **1001000000000100011110001101l0.**
2B.	Explain decoding procedure and update procedure of Adaptive Huffman coding.
2C	Justify two real time scenarios for the additivity of Mutual information.
	(5+3+2)