Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER-1 (NEW) EXAMINATION – WINTER 2016

Subject Code: 2714106 **Date:04/01/2017**

Subject Name: Digital Modulation and Coding

Time: 2:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Describe standard array decoding for the linear block codes with a suitable (6,3) code example.	**07**
	(b)	Describe M-ary PAM in detail with derivation for energy of modulated signals, minimum euclidean distance and signal constellation diagrams for M= 2,4,8.	**07**
Q.2	**(a)**	For a (6,3) systematic linear block code, three parity check digits are V3= u0+u1+u2 V4= u0+u1 V5= u0+u2, Where u0, u1 and u2 are message digits. Then construct the appropriate generator matrix and code table. With corresponding decoding table, decode the data word if received word is: 101100.	**07**
	(b)	Describe C.P.M with full and partial response. Also discuss about phase tree and signal space diagram of binary C.P.F.S.K.	**07**
		OR	
	(b)	Discuss MPSK modulation in detail and derive the energy and Euclidean distance for the modulated signal. Also explain the signal space diagram for M= 2, 4, 8.	**07**
Q.3	**(a)**	Describe burst error correcting code in detail.	**07**
	(b)	Explain MFSK signal constellation diagrams for orthogonal and bi-orthogonal signals.	**07**
		OR	
Q.3	**(a)**	Describe Reed Solomon code.	**07**
	(b)	Discuss interleaved codes in detail.	**07**
Q.4	**(a)**	Compare convolution codes with linear block codes and explain encoding of rate R= ½ non systematic feed forward convolution encoder.	**07**
	(b)	Draw convolution encoder (2,1,3) for generator matrix G (D) = [$1+D+D^2+D^3$ $1+D+D^3$] and hence obtain state table, code tree and trellis diagram for the same.	**07**
		OR	
Q.4	**(a)**	Discuss fundamental ideas behind turbo codes and hence explain basic turbo encoding structure.	**07**
	(b)	Draw convolution encoder (2,1,2) for generator matrix G (D) = [$1+D$ $1+D+D^2$] and hence obtain state table, code tree and trellis diagram for the same.	**07**
Q.5	**(a)**	State the advantages of LDPC codes over turbo codes and describe basic formation of LDPC codes based on Gallager's idea.	**07**
	(b)	Write a short note on BCH codes.	**07**
		OR	
Q.5	**(a)**	Explain encoding and decoding of systematic (7,4) cyclic code with suitable example.	**07**
	(b)	Compare FDMA & TDMA and briefly explain fundamentals of CDMA.	**07**