Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VI Examination-Nov/Dec-2011

Subject code: 161001 **Date: 21/11/2011**
Subject Name: Digital Communication
Time: 10.30 am -1.00 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 **Answer the Following**

(a) Draw the block diagram of digital communication system and explain the three major signal processing tasks. **04**

(b) Describe the burst error detecting and correcting codes. **04**

(c) "The power spectral density and the correlation function of a periodic waveform are a Fourier transform pair" Justify. **03**

(d) Define : (i) Auto correlation (ii) PDF and (iii) CDF **03**

Q.2 **(a)** Derive the equation for channel capacity of continuous AWGN channel. **07**

(b) For a (6,3) systematic LBC the three parity check digits c_4, c_5 and c_6 are **07**

$C_4=d_1+d_3$
$C_5=d_1+d_2+d_3$
$C_6=d_1+d_2$

1. Construct the code generated by this matrix
2. Prepare a suitable decoding table
3. Decode 100100 and 101011.

OR

(b) A binary channel matrix is given by **07**

	y_1	y_2
x_1	2/3	1/3
x_2	1/3	2/3

x_1,x_2=input
y_1,y_2=output

$P_x(x_1)=1/2$ and $P_x(x_2)=1/2$. Determine H(X), H(Y), H(X/Y), H(Y/X) and I (X;Y).

Q.3 **(a)** State and explain The Central Limit Theorem. **05**

(b) Compare coded and uncoded Digital transmission systems under the similar Constrain of signal power, transmission rate and modulation scheme. **05**

(c) "Hamming bound is a necessary but not sufficient condition for higher error correcting codes whereas is a necessary and sufficient condition for single error correcting codes". Justify. **04**

OR

Q.3 **(a)** Derive the formula for signal to quantization noise ratio for PCM. **05**

(b) Obtain the power spectral densities for the NRZ and biphase data stream 10110101 and compare the same. **05**

(c) In (3,1) repetition code 0 is transmitted by 000 and 1 by 111. **04**
(1) Is this a systematic code?
(2) If so, find the generator matrix G.(PTO)

Q.4	**(a)**	Explain briefly QPSK modulation with neat sketch.	**05**
	(b)	Explain briefly the Nyquist sampling theorem.	**05**
	(c)	Define (1) Mean (ii) Central Moment (iii) Variance and (iv) Standard Deviation for random variables.	**04**

OR

Q.4	**(a)**	Explain briefly BPSK modulation with neat sketch.	**05**
	(b)	Compare delta modulation and Adaptive Delta Modulation in terms of their figure of merits.	**05**
	(c)	Compare ASK and FSK in terms of their figure of merits.	**04**
Q.5	**(a)**	Explain the Convolution coding in brief.	**07**
	(b)	Describe the effect of slope overloading and hunting in delta modulation.	**07**

OR

Q.5	**(a)**	What is companding process in PCM? State laws for the same.	**07**
	(b)	Explain the detection for PSK with required block diagram.	**07**

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