Seat No.: _____ Enrolment No._____

KADI SARVA VISHWAVIDYALAYA

BE SEMESTER 6TH EXAMINATION – APRIL 2015

SUBJECT CODE: EC-601 **SUBJECT NAME: DIGITAL COMMUNICATION**
DATE: 27/04 /2015 **TIME: 10.30 to 01.30** **TOTAL MARKS: 70**

Instructions:

1. Answer each section in separate answer sheet.
2. Use of scientific calculator is permitted.
3. Attempt all questions.
4. Indicate **clearly,** the option you may attempted along with its respective question number
5. Use the last page of main supplementary for rough work.

SECTION - 1

Q.1	**(a)**	Describe the pulse code modulation with a diagram. What is the effect of under-sampling?	**05**
	(b)	What is Delta Modulation? Draw the block diagram of Delta modulator and explain its working with waveforms.	**05**
	(c)	Explain in details the amplitude shift keying (ASK)	**05**
		OR	
	(c)	What is the use of scrambling and regenerative repeater in digital communication? Also enlist all the properties of transmission or line code	**05**
Q.2	**(a)**	Define cumulative Distribution Function (CDF).What are the important properties of CDF? Prove any two of them.	**05**
	(b)	Two dice are thrown. The sum of the points appearing on the two dices is a random variable x. Find the values taken by x, and the corresponding probabilities.	**05**
		OR	
	(a)	Derive the equation for Bernoulli trials.	**05**
	(b)	State and explain in detail the central limit theorem.	**05**
Q.3	**(a)**	Define (1) Entropy (2) AWGN (3) Redundancy (4) Channel capacity.	**05**
	(b)	A memory less source emits messages M1 to M6 with probabilities 0.30, 0.25, 0.15, 0.11, 0.10, 0.09 respectively. Find the 4-ary (quaternary) Huffman compact code. Calculate the Length of this code (L), entropy of source (H), Code efficiency and redundancy.	**05**
		OR	
	(a)	Derive the equation for channel capacity of discrete memory less channel.	**05**
	(b)	A source emits seven messages with probabilities 1/3, 1/3, 1/9, 1/9, 1/27, 1/27, 1/27 respectively. Obtain the 3-ary compact code. Find the Length of this code (L), entropy of source (H), Code efficiency and redundancy.	**05**

SECTION - 2

Q.4	**(a)**	Prove that the channel capacity of AWGN channel is:	**05**
		$C = B \log_2 (1+ S/N)$ ----- (1)	
	(b)	Explain the concept of trade-off between bandwidth and SNR in equation (1) of - 4 (a).	**05**
	(c)	Explain in detail the components of digital communication system.	**05**
		OR	**05**
	(c)	The sum of the points on two tossed dice is a random variable x, as analyzed in	**05**

example Q-2(b). Determine the mean , the mean square and variance of x.

Q.5 **(a)** For a (6,3) code , the generator matrix G is, **05**

$$G = \begin{matrix} 1 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{matrix}$$

Find the code word for all possible eight data word, and verify that this code is a single-error correcting code.

(b) What is systematic code?. In (3, 1) repetition code 0 is transmitted by 000 and 1 by 111. **05**

(1) Is this a systematic code?

(2) If so, find the generator matrix G.

OR

(a) The generator matrix $g(x) = x^3+x^2+1$ is given for a (7, 4) cyclic code. Find the code vector for following dada vector: 1010, 1111, 0001. **05**

(b) Construct the systematic (7, 4) cyclic code using $g(x) = x^3+x^2+1$ for the data vector 1010. **05**

Q.6 **(a)** Explain briefly BPSK modulation with neat sketch. **05**

(b) Explain the Time division multiplexing using neat diagram. **05**

OR **05**

(a) What is compandor? Explain the nonuniform quantization with A- law. **05**

(b) With diagram explain the generation of BFSK signals. **05**

*****ALL THE BEST*****