Name :
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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

07 THRISSUR CLUSTER

FIRST SEMESTER M.TECH. DEGREE EXAMINATION DEC 2017

Electronics & Communication Engineering

Communication Engineering & Signal Processing

07EC6203 ADVANCED DIGITAL COMMUNICATION

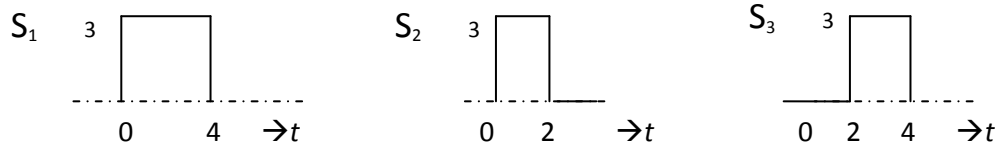
Time : 3 hours **Max.Marks: 60**

Answer all six questions. Part 'a' of each question is compulsory.

Answer either part 'b' or part 'c' of each question

Q.no.	Module 1	Marks
1a	State Law of large numbers and Central limit theorem	**4**
	Answer b or c	
b	i) If random variable X is $N(0,2)$, find $P(1 \leq x \leq 2)$. (ii) A fair coin is tossed 3 times and the random variable X equals the number of heads. Find and sketch $F_X(x)$ and $f_X(x)$	**5**
c	Define Moment Generating Function (MGF) and show how MGF can be used to find Mean and Variance of a Random variable	**5**

Q.no.	Module 2	Marks
2a	Define Stationary random process. Explain WSS and SSS	**4**
	Answer b or c	
b	Derive the average error probability in an AWGN channel, with binary signalling	**5**
c	Find the orthonormal basis for the following three signals	**5**



Q.no.	Module 3	Marks
3a	Deduce MAP detection rule and an optimum receiver for digital signal detection in AWGN channel	**4**
	Answer b or c	

b	Derive a correlation receiver for the coherent detection of binary signals in AWGN channel	**5**
c	Derive impulse response of a Matched Filter, for pulse detection	**5**

Q.no.	**Module 4**	**Marks**
4a	Give a mathematical model of the received signal in a time-varying multipath environment. Show how the model varies for a time-invariant channel with same number of multipath components	**4**
	Answer b or c	
b	Show the impulse response of a multipath channel is related to mean delay, RMS delay spread, Coherence bandwidth, and Coherence time	**5**
c	Distinguish between Rayleigh and Rician fading channels	**5**

Q.no.	**Module 5**	**Marks**
5a	Discuss the probability of error performance of any two *M*-ary digital modulation schemes in wireless multipath channels	**5**
	Answer b or c	
b	Form a constellation diagram for 16-QAM . Discuss its probability of symbol error in AWGN channel.	**7**
c	i) Explain Nyquist criterion for zero ISI. ii) How does the roll-off factor affect pulse-shaping and ISI?	**7**

Q.no.	**Module 6**	**Marks**
6a	Show how MLSE does equalization	**5**
	Answer b or c	
b	Explain frequency and phase synchronization.	**7**
c	Compare zero forcing linear and decision feedback equalization techniques.	**7**