Exam.Code:0928
Sub. Code: 33663

2015

B.E. (Electronics and Communication Engineering)

Fourth Semester

EC-407: Probability and Random Processes

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt <u>five</u> questions in all, including Question No. I which is compulsory and selecting two questions from each Section.

x-x-x

Q.1a)	What is the difference between mutually exclusive events and independent events? Give examples.	(5×2)
b)	Differentiate the phase velocity and group velocity.	
c)	What is Johnson Noise?	
d)	Find the capacity of the Binary Symmetric Channel when probability p is given as 0.6.	
e)	Define the terms: stationary and wide sense stationary processes.	
	Section A	
Q.2a)	State and prove the Bayes Theorem.	(5)
b)	Define the term Expectation. If X is a continuous random variable with pdf $f(x) = \frac{2}{x^3}$; $x \geq 1$ 0 ; $x < 1$ Find the Expectation of x.	(5)
Q.3a)	Discuss the Rayleigh Distribution and Gaussian Distribution?	(4)
b)	Axiomatic approach of probability theory overcomes the limitations of classical approach. Discuss with suitable examples.	(3)
c)	Find the probability that at most 5 defective fuses will be found in a box of 200 fuses, if experience show that 2 percent of such fuses are defective.	(3)
Q.4	Enlist the properties of distribution function for continuous random variable. Let X be a continuous random variable with pdf $f(x) = ax$; $0 \leq x \leq 1$ a ; $1 \leq x \leq 2$ $-ax + 3a$; $2 \leq x \leq 3$ 0 ; *otherwise* a) Determine the constant a; b) P(X≤ 1.5)	(10)
	Section B	
Q.5a)	"For a fixed signal power, and in the presence of white Gaussian Noise, the channel capacity approaches an upper limit with Bandwidth increased to infinity." Explain the related Trade-off.	(5)
b)	Verify that: H(XY)= H(Y/X) + H(X) where H represent the entropy and X, Y are transmitter and receiver respectively.	(5)

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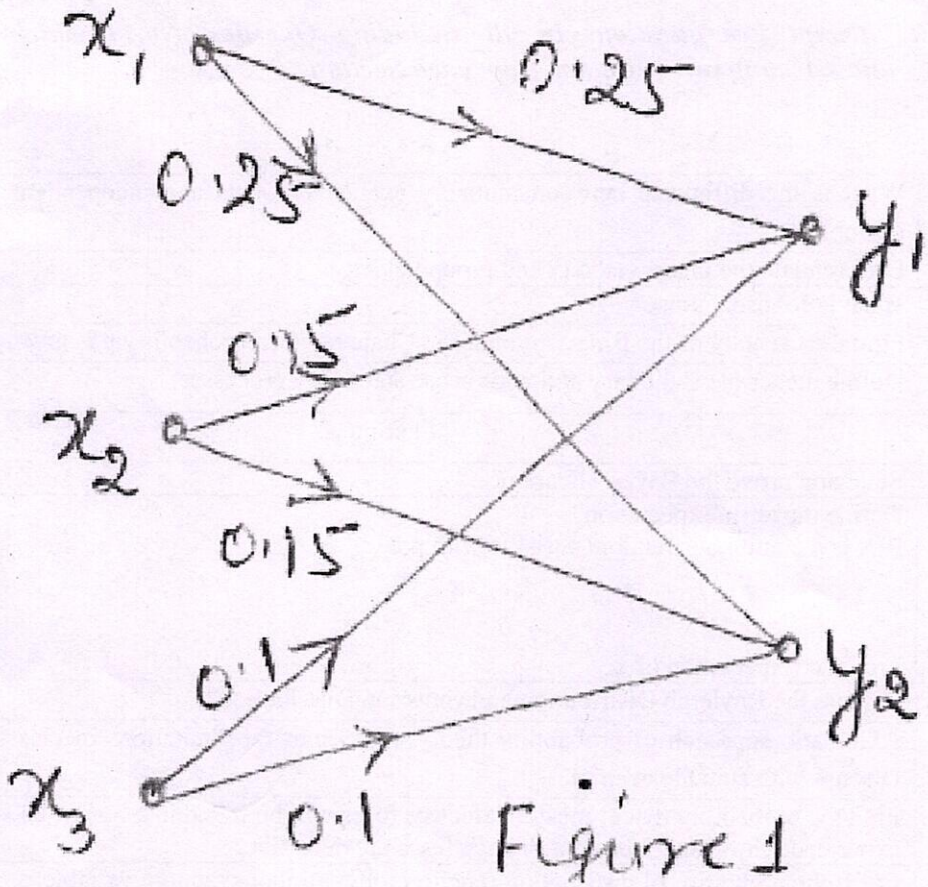
Q.6a)	In a cascade amplifier, show that the contribution to overall noise-figure is primarily by the first stage and contribution by succeeding stages becomes smaller and smaller.	(5)
b)	Find the mutual information for the channel shown in Figure 1:  Figure 1	(5)
Q.7	Compare the Shannon Fano and Huffman coding. Apply the Huffman Coding to find the efficiency of the following message ensemble: [X] = [x1, x2, x3, x4, x5, x6, x7] [P] = [0.4, 0.2, 0.12, 0.08, 0.08, 0.08, 0.04]	(10)

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