Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
Manipal University

FIRST SEMESTER M. Tech. (DEAC) DEGREE END SEMESTER EXAMINATION - NOV/DEC 2016

SUBJECT: DETECTION AND ESTIMATION THEORY (ECE -5104)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates

- Answer **ALL** questions.
- Missing data may be suitably assumed.

1A. Derive the likelihood ratio test (LRT), under the criterion for a binary hypothesis problem.

1B. What is the Variance of the sum of Two Random Variables is Var [X+Y] For two Independent Random Variables what is the Variance and Covariance. What is the correlation Coefficient?

1C. What is ML estimation Explain

(5+3+2)

2A. With probability p a digital communication system transmits a 0. It transmits a 1 with probability 1-p The received signal is either X= -v+N volts, if the transmitted bit is 0; or v+N volts if the transmitted bit is 1. The voltage v is the received component of the signal and N is the Gaussian random variable for noise Given the received signal X, what is the minimum probability of error rule for deciding whether 0 or 1 was transmitted.

2B. What is linear estimation of X given Y/ What is correlation between X and Y under different condition? Explain.

2C. Explain Kalman Filter with necessary diagram.

(5+3+2)

3A. What is Maximum Likelihood Detection? With necessary equation? What is the difference between MAP and ML detection? Explain.

3B. Explain a Stochastic Process. What do you mean by stationary process? What is poisson process define its properties.

3C. Discuss difference between Markov and Chebyshev inequality.

(5+3+2)

4A. Describe consistent estimator , unbiased Estimator , biased Estimator

4B. What is Type 1 error and Type 11 error in detection Explain with necessary equation

4C. Explain Wiener filter with necessary equation and block diagram.

(5+3+2)

5A. Let X and Y be Gaussian Random Variables with E[X]=E[Y]=0 and Var[X]=1 and VAR[Y]=4

a)Sketch pdfs $f_x(x)$ and $f_Y(y)$ on the same axes.

b) What is P[-1<X<=1]

c)What is P[Y>3.5]

d) What is P[X>3.5]

e)What is P[-1<Y<=1]

5B. Explain different application of estimation and detection in detail.

5C. What are the advantages of Blind estimation over other estimators?

(5+3+2)