

M.TECH.
(SEM-II) THEORY EXAMINATION 2017-18
DETECTION AND ESTIMATION THEORY

*Time: 3 Hours**Total Marks: 70***Note:** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A**

- 1. Attempt all questions in brief.** **2 x 7 = 14**
- Discuss nonlinear minimum mean squared error estimators.
 - What is an estimator? List important properties of estimators.
 - Explain the power spectral density functions.
 - Draw & explain hypothesis testing in brief.
 - Distinguish between Point Processes and Gaussian processes.
 - What do you understand by “linear model “ in estimation.
 - Write the application of orthogonality principles in communication engineering.

SECTION B

- 2. Attempt any three of the following:** **7 x 3 = 21**
- List important properties of estimators. What do you understand by “Discrete linear model” in estimation?
 - What is the significance of nonparametric estimators of probability distribution? Explain.
 - What are the applications of Kalman Filters?
 - List the properties of Probability Distribution Functions
 - Explain the Neyman-Pearson criterion for radar detection of constant amplitude signal

SECTION C

- 3. Attempt any one part of the following:** **7 x 1 = 7**
- Discuss briefly what you understand by composite Hypothesis testing.
 - Derive the likelihood ratio test (LRT), under the Neyman Pearson (NP) criterion for a binary hypothesis problem.
- 4. Attempt any one part of the following:** **7 x 1 = 7**
- Explain model-based estimation of autocorrelation functions.
 - Write the procedures for the detection of signals with random parameters.
- 5. Attempt any one part of the following:** **7 x 1 = 7**
- Discuss the performance evaluation of signal detection procedures.
 - With neat sketch explain kalman filters and its mathematical analysis.
- 6. Attempt any one part of the following:** **7 x 1 = 7**
- Prove that for simple binary hypothesis tests the slope of a curve in a ROC at a particular point is equal to the value of threshold η required to achieve the PD and PF of the point.
 - What are the applications of Digital Wiener Filters?
- 7. Attempt any one part of the following:** **7 x 1 = 7**
- Define the likelihood function and explain the method of Maximum Likelihood(ML) estimation.
 - Explain joint MAP estimates in additive white Gaussian noise channel.