Printed Pages:01 **Sub Code:MTEC202**

Paper Id: 231211 **Roll No.** | | | | | | | | | | |

MTECH

(SEM-II) THEORY EXAMINATION 2018-19

DETECTION AND ESTIMATIONTHEORY

Time: 3 Hours ***Total Marks: 70***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a. What do you understand by GLRT?
b. Define factorization theorem?
c. Distinguish between Weiner and Kalman filter.
d. Describe hypothesis testing and their types.
e. Write the application of orthogonality principle in communication engineering
f. Define sufficiency and completeness.
g. What is CLRB?

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a. Discuss the performance Evaluation of signal Detection procedures with direct performance computation.
b. Discuss about the procedure in detection of random signals in Noise.
c. What is the significance of nonparametric estimators of probability distribution? Explain.
d. What do you mean by information Inequality? And discuss the Information Inequality for Exponential Families.
e. With necessary block diagram explain the operation of Discrete Time Kalman Buchy filter.

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7

(a) Derive the likelihood ratio test (LRT), under the Neyman Pearson (NP) criterion for a binary hypothesis problem.
(b) Derive the decision metric used in Bayes detector for the binary hypothesis testing problem.

4. Attempt any *one* part of the following: 7 x 1 = 7

(a) Explain the basic principle of matched filter in the detection of signals in additive white Gaussian noise environment.
(b) Define Probability distribution and density functions. List out their properties.

5. Attempt any *one* part of the following: 7 x 1 = 7

(a) What is a minimum mean square error criterion? Differentiate between linear and nonlinear Minimum Mean Squared Error estimators.
(b) Write short notes on a) ML estimator. b) Filtering of signal in noise.

6. Attempt any *one* part of the following: 7 x 1 = 7

(a) Comparison between MMSE, MMAE and MAP with suitable example.
(b) Explain the designing steps of Non causal Wiener-Kolmogorov filtering.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a) Prove that for simple binary hypothesis test the slop of curve in a ROC at particular point is equal to the value of threshold & required to achieve the PD and PF of the point.
(b) Describe the Coherent detection in White Gaussian Noise with their suitable block diagram and also perform their derivations.