PVP 17

Code: **17ECMC1T1**

I M.Tech-I Semester-Regular Examinations-February-2018

DETECTION AND ESTIMATION THEORY
(MICROWAVE & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 60

Answer the following questions.

1.a) Define the terms: i) Unbiased ii) Minimum variance and iii) Efficient w.r.t. an estimator. 7 M

b) Derive the estimator for DC level in additive white Gaussian noise using scalar CRLB theorem. 8 M

(OR)

2.a) Describe the applications of estimation in signal processing and define the mathematical estimation problem. 7 M

b) Define the Scalar parameter - Cramer Rao Lower Bound theorem and explain its significance. 8 M

3.a) Distinguish between classical and least squares methods for parameter estimation with an example. 7 M

b) Define the best linear unbiased estimator and derive the BLUE for DC level estimation in white noise. 8 M

(OR)

4.a) Describe the Bayesian philosophy for random parameter estimation with an example. 7 M

b) Describe the least squares approach to parameter estimation with an example. 8 M

5.a) Define the Neyman Pearson Test for hypothesis testing. 7 M

b) Derive the Neyman-Pearson detector for the signal detection problem 8 M

$$H_0: x[n] = w[n], n = 0,1,2, \ldots\ldots N-1$$

$$H_1: x[n] = A + w[n], n = 0,1,2, \ldots\ldots N-1$$

where $A > 0$ and w[n] is WGN with variance σ^2

(OR)

6.a) Explain the philosophy of detector design based on minimization of Bayesian Risk. 7 M

b) What is an ROC curve? Explain the importance of ROC curve in composite hypothesis testing. 8 M

7.a) Describe the detection of known binary signals in white Gaussian noise. 7 M

b) Derive the energy detector for detecting zero-mean white random process with variance σ_S^2 in white Gaussian noise. 8 M

(OR)

8.a) Describe the detection of known M-ary signals in white Gaussian noise. 7 M

b) Write short notes on detection of signals with random parameters. 8 M