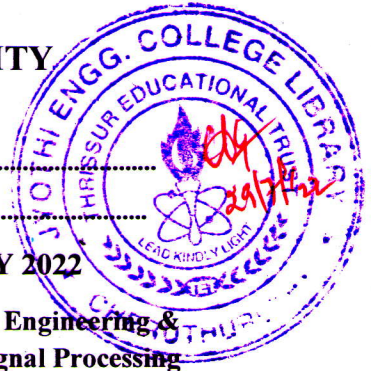


**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER**



Q. P. Code: CESP0822222-I

(Pages: 2)

Name:

Reg. No:

SECOND SEMESTER M.TECH. DEGREE EXAMINATION JULY 2022

Branch: Electronics and Communication Engineering

Specialization: Communication Engineering & Signal Processing

08EC6222 ESTIMATION AND DETECTION

Time: 3 Hours

Max. Marks: 60

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q. No.	Module 1	Marks
1. a	Explain the concept of binary decision.	3
	Answer b or c	
b	Obtain the decision region for the given conditional pdf using Neyman-Pearson criterion $P(z/m_1) = \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}}$ $P(z/m_2) = \frac{1}{\sqrt{2\pi}} e^{-\frac{(z-1)^2}{2}}$ Let $P(d2/m1) = 0.25$, $Q(0.674) = 0.25$	6
c	Derive the expression for decision rule using Probability of Error criterion	6

Q. No.	Module 2	Marks
2. a	Explain about the errors in binary decision problems.	3
	Answer b or c	
b	Solve the decision problem with the following conditional probabilities using Bayes decision rule $P(z/m_1) = \frac{1}{2} e^{- z }$ $P(z/m_2) = e^{-2 z }$ for $z > 0$ and use the following costs $C_{11}=C_{22}=0$, $C_{12}=2$, $C_{21}=2$	6
c	Derive the expression for decision rules to detect a binary observation with different probability density functions using Min-Max criterion.	6

Q. No.	Module 3	Marks
3. a	Explain vector observation concept	3

Answer b or c

- b With neat sketches explain match filter receiver. 6
- c Discuss about the General Gaussian problem. 6

Q. No.	Module 4	Marks
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|------|--|---|
| 4. a | Differentiate between Estimation and Decision. | 3 |
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Answer b or c

- b Discuss about the Linear minimum-variance method. 6
- c Discuss about maximum likelihood estimation with an example. 6

Q. No.	Module 5	Marks
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|------|--|---|
| 5. a | Briefly explain the concept of sequential estimation | 4 |
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Answer b or c

- b Let θ be a three-dimensional Gaussian vector with mean $\mu = 0$ and variance 8

$V_0 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 1 \\ 0 & 1 & 1 \end{bmatrix}$ The observation is given by $z = H\theta + n$, where $H = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$ and the noise is white and Gaussian with unit variance. Find the MAP estimate of θ .

- c Explain about Nonlinear estimation. 8

Q. No.	Module 6	Marks
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- | | | |
|-----|-----------------------|---|
| 6.a | Explain Kalman filter | 4 |
|-----|-----------------------|---|

Answer b or c

- b Explain the concept of unbiased estimators with an example 8
- c Explain Asymptotic properties 8