Roll No: | | | | | | | | | | | | |

MTECH
(SEM II) THEORY EXAMINATION 2021-22
DETECTION AND ESTIMATIONTHEORY

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*7 = 14

a.	What is Detection
b.	Write different components of Decision theory.
c.	Write down the KLE to represent a random process?
d.	When is Bayes' criterion applied?
e.	What is Estimation?
f.	What are the different levels of detection?
g.	Write any two properties of Optimum processors.

SECTION B

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

a.	Derive LRT when a priori probabilities are known, and cost assignment can be done.
b.	Explain Cramer-Rao bound on error variance?
c.	Explain Sequential detection?
d.	Design LRT for General Gaussian Problem?
e.	What is multiple parameter estimation?

SECTION C

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

a.	If $p(r/H_0)$ = rect (r-0.5) & $p(r/H_1)$ =0.5(r-1). Find the decision rule when P_f=0.6. Calculate P_d for given P_f
b.	Explain MAP estimation.

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

a.	Write down Receiver Operating characteristics.
b.	Explain Optimum realizable filter.

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

a.	If $H_1:Y_K=S_K+N_K$, K=1,2 And $H_0:Y_K =N_K$,K=1,2 Noise components have zero mean and variance σ_n^2 and signal components have zero mean and variance σ_s^2 .obtain the optimum decision rule, P_d & P_f.
b.	Derive the lower bound on the mean square estimation error of continuous waveform.

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

a.	Design the LRT for composite hypothesis.
b.	Explain Kalman-Bucky filter.

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

a.	Explain coherent detection in presence of white noise.
b.	Discuss Nonrandom parameter estimation.