M. Tech I Semester Supplementary Examinations, February 2018 DETECTION AND ESTIMATION OF SIGNALS (Digital Electronics and Communication Systems) Time: 3 Hours Max. Marks: 60 Note: Answer any FIVE questions. All Questions carry equal Marks. 5 × 12 = 60M 1. a) Describe the Bayesian decision rule for probabilistic detection with an example. (6M)

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	b)	Define Likelihood ratio. Derive the likelihood ratio for DC level detection in white noise.	
		(6N	1)
2.	a)	What is a Matched Filter? Explain its characteristics.(6N)	1)
	b)	Describe the detection of sinusoid with unknown phase. (6N	1)
3.	a)	Derive the energy detector for detecting Gaussian random process in white Gaussian nois	e
		(6N)	1)
	b)	Explain the general Gaussian detection problem with an example. (6N	1)
4.	a)	What is a minimum variance unbiased estimator? Explain with examples. (6N	1)
	b)	Consider the multiple observations x (n) = \mathbf{A} + w (n), n=0, 1,, N-1 where w(n) is WG	N
		with variance σ^2 . Derive the CRLB for A . (6N)	1)
5.	a)	Describe the weiner filtering problem and explain its relation to linear Bayesian estimation	n
		(6N	1)
	b)	Explain Kalman filtering with neat block diagram. (6N	1)
6.	a)	Explain the multiple hypothesis testing problem with an example. (6N	1)
	b)	Distinguish between matched filter in WGN noise and generalized matched filter. (6N	1)
7.	a)	Derive the estimator-correlator when the signal can be modeled as a Bayesian linear modeled	el
		(6N	1)
	b)	What is a maximum likelihood estimator? Explain the procedure for finding the M	L
		estimator. (6N	1)
8.	a)	Describe the philosophy of Bayesian estimation. (6N	1)
	b)	What is a receiver operating characteristic? Further describe how to maximize probability	1
		of detection and minimize probability of false alarm. (6N	1)

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