Ref No: Ex/EE/5/T/512D/2018 (Old)

B.E. ELECTRICAL ENGINEERING (PART TIME) 5TH YEAR FIRST SEMESTER EXAM 2018 (OLD)

SUBJECT: - ADVANCED INSTRUMENTATION-I

Time: Three hours

Full Marks 100 (50 marks for each part)

Use a separate Answer-Script for each part

No. of Questions	PART-I							Marks
<u>Curpuous</u>			Alexander (Alexander)	Answer any	y two			2X25=50
1. a)	How is the limitation of Fourier Transform overcome by Short Time Fourier Transform (STFT)?					3		
b)	What are the shortcomings of STFT? Justify the application of Continuous Wavelet Transform (CWT) to overcome them.					4		
					let Transform?)		2
c)		is/are "Continuous" in Continuous Wavelet Transform? in the terms "scale" and "translation" in CWT.					6	
d)	What are th	What are the properties of a mother-wavelet?					4	
e)	How can ye	How can you use Wavelet Transform for denoising a signal?						6
2. a)	What is SC	What is SCADA? Compare between different SCADA architectures.						10
b)	Discuss relative advantages and disadvantages of various modes for deploying SCADA							10
0)	systems.				- William Grade and the			
c)	A digital frequency synthesizer employs a 4MHz crystal oscillator and gives a 256 step-sinusoid. Determine the maximum and minimum output frequency if the number of fractional bit is 2. Also find out the frequency control word for these cases.							5
	nactional o	710 10 2. 1 1100 .						
3. a)	What is a lo	ock-in-ampli	fier? Explai	n with a bas	ic scheme.			8
3. a) b)	What is a lo	ock-in-ampli you employ o	fier? Explai	n with a bas hesis technic	ic scheme. que in such a	lock-in-amplifi	er for better	8 7
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	What is a lo How can y performanc A Rough S	ock-in-ampli you employ c ce? et based deci	fier? Explaidigital syntlesion rule ge	hesis technic eneration sys	que in such a :	lock-in-amplificatable as giver		
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b)	What is a lo How can y performanc A Rough S	ock-in-ampli you employ oce? et based decine set of decis Objects U1 U2 U3 U4	fier? Explaidigital synthesion rule gesion rules from the field of the	eneration system this table Condition Attri B 1 1 1 0	tem uses a date. C 0 1 1 1	Decision Attribute 1 1 0 0		7
b)	What is a lo How can y performanc A Rough S	ock-in-amplityou employ oce? et based decine set of decis Objects U1 U2 U3 U4 U5	fier? Explaidigital synthesion rule gesion rules from the field of the	eneration system this table Condition Attri B 1 1 1 0 0	tem uses a date. C 0 1 1 1 2	Decision Attribute 1 1 0 0 1		7
b)	What is a lo How can y performanc A Rough S	ock-in-amplityou employ oce? et based decine set of decis Objects U1 U2 U3 U4 U5 U6	fier? Explaidigital synthesion rule gesion rules from the field of the	eneration system this table Condition Attri B 1 1 0 0 0	tem uses a date. C 0 1 1 1 2 2	Decision Attribute 1 1 0 0 1 0 0		7
b)	What is a lo How can y performanc A Rough S	ock-in-amplityou employ oce? et based decine set of decis Objects U1 U2 U3 U4 U5 U6 U7	fier? Explaidigital synthesion rule gesion rules from the field of the	eneration system this table Condition Attri B 1 1 1 0 0 0 0 0	ctem uses a date. C 0 1 1 1 2 2 0	Decision Attribute 1 1 0 0 1 0 0 0 0 0		7
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b) c) 4. a)	What is a let How can yperformance A Rough St. Generate the Write notes	ock-in-amplityou employ of the ce? et based decirate set of d	fier? Explaidigital synthesion rule gesion rules from the field of the	hesis technic eneration sys com this table Condition Attri	ctem uses a date. C 0 1 1 1 2 2 0	Decision Attribute 1 1 0 0 1 0 0 0 0 0		7 10 $(2\times12\frac{1}{2}$
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B.E. ELECTRICAL ENGINEERING (PART TIME) - FIFITH YEAR -FIRST SEMESTER (OLD) - 2018

SUBJECT: - ADVANCED INSTRUMENTATION -I

Time: Three hours

Full Marks 100 (50 marks for each part)

Use a separate Answer-Script for each part No. of PARTIL Marks Questions ANSWWER ANY TWO QUESTIONS 1. (a) Distinguish between "Strict-sense stationary" and "Wide-sense stationary" (WSS) random processes. When can a WSS random process be described as ergodic? Explain. (b) Prove the following, for WSS random processes: (i) $|R_X(\tau)| \leq R_X(0)$, for all τ . (ii) If X(t) has a periodic component, then $R_X(\tau)$ will have a component with same time period. 3×4 (iii) $|R_{XY}(\tau)| \leq [R_X(0) R_Y(0)]^{1/2}$ (iv) If $Y(t) = KX(t-t_0)$, then, $R_{XY}(\tau) = KR_X(t-t_0)$. The symbols have their usual meaning. (c) The expression for the autocorrelation function of an ergodic random process is $R_X(\tau) = e^{-|\tau|} + 0.25$. Determine the mean-5 square value and the mean value of the process. Explain the sources of errors in a full-flash ADC and point out 2. (a) how these errors increase with increase in the number of bits. 15 Explain the bit-switching problem in absolute type shaft (b) encoders and point out the remedial measure. 10 Explain the meaning of the terms - "White Noise", "Lowpass 3. (a) White Noise" and "Bandlimited White Noise". 6+6 Discuss how white noise can be utilized for determining the

impulse response of an LTI system.

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No. of Questions	PART IL	Mark
(b)	With the help of a neat sketch, explain the working principle of an ultrasonic cross-correlation flowmeter.	13
4.	 Write short notes on any two of the following. (a) Measurement of linear velocity of sheet metal by noncontact method. (b) Quadrature decoder circuit for incremental motion encoders. (c) Subranging ADC. 	12½ +12½
	(c) Subranging ADC.	
		7