Hall Ticket Number :										

R-19

Code: 19A433T

II B.Tech. I Semester Regular Examinations March 2021

Digital Design

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

****

			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Explain about even and odd parity check with an example, what is the drawback	7M	1	L2
	b)	Express the following numbers in decimal:$(10110.0101)_2$, $(16.5)_{16}$, $(26.24)_8$.	7M	1	L2
		OR			
2.	a)	Perform subtraction with the following unsigned decimal numbers by taking 10's complement of the subtrahend. Verify the result. i. 5250 – 1321 ii. 1753 – 8640 iii. 20 – 100 iv. 1200 - 250	7M	2	L5
	b)	Convert the following to require form i) $(163.789)_{10}$ = $()_8$ ii) $(101101110001.00101)_2$ = $()_8$ iii) $(292)_{16}$ = $()_2$ iv) What is meant by self-complementing codes.	7M	2	L5
		UNIT–II			
3.	a)	Obtain the simplified expression in sum of products for the following Boolean function. i) F(A,B,C,D) = Σ(2,3,12,13,14,15). ii) BDE+B′C′D+CDE+A′B′CE+A′B′C+B′C′D′E′	7M	1	L2
	b)	Implement the function f(a,b,c)=π(0,1,3,4) using NAND-NAND two level gate structure.	7M	2	L5
		OR			
4.	a)	Obtain the minimal sum of products expression for the following function and implement the same using only NAND gates $f\ A, B, C, D = \Sigma\ (1,4,7,8,9,11) + \Sigma d(0,3,5)$	7M	2	L5
	b)	Obtain minimal POS expression for the given Boolean function f (A,B,C,D) = Σ (0, 1, 2, 3, 4, 8, 9, 12) And draw the circuits with two Level NOR-NOR form and AND - OR form.	7M		
		UNIT–III			
5.	a)	Realize a full subtractor using decoder.	7M	4	L2
	b)	Draw the logic diagram of 2:4 Decoder with an ENABLE input using: i) NAND gates ii) AND gates. Show that the realization using NAND gates is more convenient to distinguish the selected output with a value of 0.	7M	2	L5
		OR			
6.	a)	Tabulate the truth table for 8*4 ROM to input the following functions: A= Σ (1,2,4,6) B=Σ(0,1,6,7) c= Σ (2,6) D=Σ(1,2,3,5,7)	7M	1	L2
	b)	Design a 4 bit BCD adder using Full adder circuits	7M	3	L6

UNIT–IV

7.	a)	Design and explain Johnson counter.	6M	3	L6
	b)	Design mod-10 synchronous counter using D-FlipFlops.	8M	1	L2

OR

8.	a)	Write the differences between asynchronous and synchronous sequential circuits.	7M	2	L5
	b)	Give the implementation procedure for a SR Latch using NOR gates.	7M	2	L5

UNIT–V

9.	a)	Discuss Moore Machine models of sequential circuits.	7M	2	L5
	b)	What are the capabilities and limitations of finite state machines? Explain.	7M	4	L2

OR

10. a) Reduce the number of states in the following state table and tabulate the reduced state table.

PS	NS, O/P	
	X=0	X=1
a	f, 0	b, 0
b	d, 0	c, 0
c	f, 0	e, 0
d	g, 1	a, 0
e	d, 0	c, 0
f	f, 1	b, 1
g	g, 0	h, 1
h	g, 1	a, 0

7M 3 L6

b) Obtain the state table and state diagram for a sequence detector to recognize the occurrence of sequence bits 110 & 001. 7M 2 L5

****

Hall Ticket Number :										

R-19

Code: 19A237T

II B.Tech. I Semester Regular Examinations March 2021

Electrical Circuits and Technology

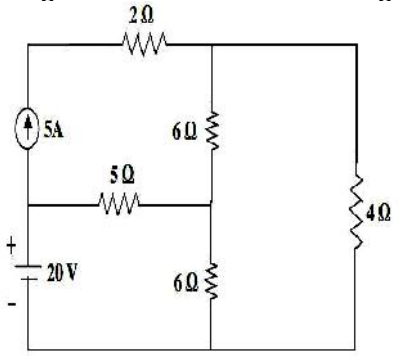
(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

****

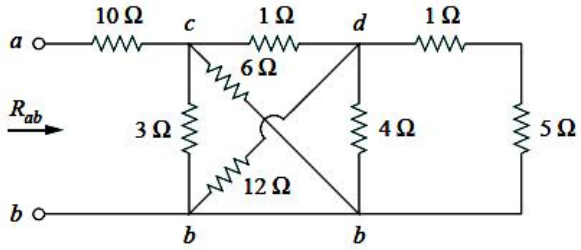
			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Derive the expression for star and delta transformation	7M	CO1	L1
	b)	Find current (I) flowing through the 4 ohm resistor using nodal analysis			



7M CO1 L2

OR

2. a) Calculate the equivalent resistance R_{ab} in the below circuit

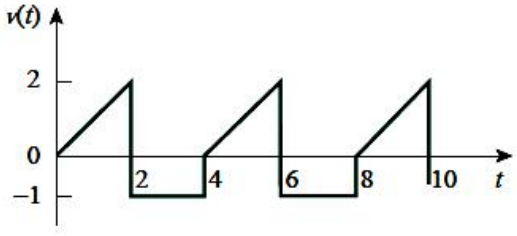


7M CO1 L1

b) Explain the step response of an RL circuit using differential approach for DC excitation. 7M CO1 L3

UNIT–II

3. a) Determine the Average value & RMS value, peak factor and form factor of the below waveform.



7M CO2 L2

b) Explain the importance of sinusoidal waveforms and list out the Advantages of AC supply. 7M CO2 L3

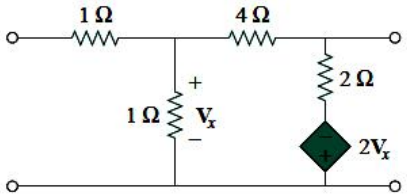
OR

4. a) Define the following terms:
i) Resonant frequency ii) Band Width iii) Quality factor 6M CO2 L3

b) Explain the parallel resonance of RLC circuit with suitable wave form and equations. 8M CO2 L2

UNIT–III

5.	a)	Derive the condition of reciprocity and symmetry for y-parameters	7M	CO3	L1
	b)	Find the impedance-parameter equivalent of the circuit.			



			7M	CO3	L2

OR

6.	a)	Find the relationship between impedance parameters and h-parameters.	7M	CO3	L2
	b)	The Z parameters are Z11=4Ω, Z12 =6, Z21=3, Z22=8, find A.B.C,D parameters.	7M	CO3	L3

UNIT–IV

7.	a)	Explain the constructional features and operation of a DC generator with diagram.	10M	CO4	L3
	b)	Draw magnetization characteristics and application of DC generator.	4M	CO4	L1

OR

8.	a)	Derive an expression for torque developed in the armature of DC motor.	7M	CO4	L3
	b)	Derive the EMF equation of DC generator	7M	CO4	L2

UNIT–V

9.	a)	Explain how efficiency of a static machine can be predetermined by suggesting suitable method.	7M	CO5	L3
	b)	Derive the EMF equation of a transformer	7M	CO5	L2

OR

10.	a)	Discuss about the slip torque characteristics of a three phase induction motor.	7M	CO5	L3
	b)	Explain the brake test on three phase induction motor.	7M	CO5	L1

*****

Hall Ticket Number :										

R-19

Code: 19A431T

II B.Tech. I Semester Regular Examinations March 2021

Electronic Circuits

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

****

			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	List out the different coupling schemes in amplifiers and explain them.	10M	CO1	L1
	b)	State and prove Miller's and dual of Miller's theorem.	4M	CO1	L2
		OR			
2.	a)	Draw and explain small signal equivalent of BJT common emitter circuit.	7M	CO1	L3
	b)	Give analysis about CB and CC configuration in terms of h- parameters using simplified model.	7M	CO1	L1
		UNIT–II			
3.	a)	Draw the circuit diagram and equivalent circuit for current shunt feedback amplifier and derive the expression for total voltage gain	7M	CO1	L3
	b)	What are the different characteristics of negative feedback amplifiers? Discuss in brief	7M	CO2	L1
		OR			
4.	a)	Draw the block diagrams of the four possible feedback topologies and explain.	7M	CO2	L3
	b)	Prove that the bandwidth of the amplifier increases with negative feedback.	7M	CO2	L5
		UNIT–III			
5.	a)	Explain working of Hartley oscillator. Derive an Expression for frequency of oscillation and condition for oscillation	7M	CO2	L1
	b)	Classify the different oscillators and draw their diagrams.	7M	CO2	L6
		OR			
6.	a)	Draw circuit diagram of RC phase shift oscillator and explain its operation by deriving expression for frequency of oscillation.	10M	CO2	L3
	b)	Describe operation of crystal oscillators.	4M	CO3	L2
		UNIT–IV			
7.	a)	Explain the working of Series fed, directly coupled Class-A power amplifier with the help of a neat circuit diagram.	7M	CO3	L1
	b)	Give the expression for dc power input, ac power output and its efficiency of directly coupled Class-A amplifier?	7M	CO3	L1
		OR			
8.	a)	Explain the push-pull Class-B power amplifier with neat sketches of load line.	10M	CO3	L1
	b)	Mention some of the important applications of Class-B amplifier.	4M	CO4	L3
		UNIT–V			
9.	a)	Explain the operation of high pass RC circuits for a square wave input with the circuit diagram and waveforms.	7M	CO4	L1
	b)	Derive the expression for high pass RC circuit with Ramp input.	7M	CO4	L2
		OR			
10.	a)	Design any three different positive and negative clipper circuits with and without biasing and also draw the corresponding input and output waveforms and transfer characteristics	7M	CO4	L3
	b)	State and prove Clamping circuit theorem.	7M	CO4	L1

****

Hall Ticket Number :										

R-19

Code: 19AC31T

II B.Tech. I Semester Regular Examinations March 2021

Partial Differential Equations and Complex Variables

(Common to CE, EEE, ME & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

****

			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Find the Laplace Transform of $f(t)=\begin{cases}\cos t\ , 0<t<\pi \\ \sin t, \quad t>\pi\end{cases}$	7M	CO1	L1
	b)	Find $L\left(\frac{\cos 2t-\cos 3t}{t}\right)$	7M	CO1	L1
		OR			
2.	a)	Find the Laplace transform of $e^{4t}(\sin 2t \cos t)$	7M	CO1	L1
	b)	Find the Laplace transform of $f(t)=\begin{cases}1 & , 0\le t<1 \\ -1 & , 1\le t<2\end{cases}$ having period 2	7M	CO1	L1
		UNIT–II			
3.	a)	Find the inverse Laplace Transform of $\frac{1}{(s^2+1)s}$	7M	CO2	L1
	b)	Apply Convolution theorem to evaluate $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}$	7M	CO2	L3
		OR			
4.		Solve $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+2y=5\sin t$, *if* $y(0)=y'(0)=0$	14M	CO2	L3
		UNIT–III			
5.		Expand $f(x)=x-x^2$ as Fourier series in the interval $(-\pi,\pi)$ and hence obtain $\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+....=\frac{\pi^2}{12}$	14M	CO3	L3
		OR			
6.	a)	Find a Fourier series to represent $f(x)=x\ \sin x, \quad -\pi<x<\pi$ and hence deduce that $\frac{1}{1.3}-\frac{1}{3.5}+\frac{1}{5.7}-....=\frac{1}{4}(\pi-2)$	7M	CO3	L1
	b)	Express $f(x)=x^2$ as half –range sine series in $0<x<4$	7M	CO3	L2
		UNIT–IV			
7.		If a string of length ℓ is initially at rest in the equilibrium position and each of its points is given , the velocity $V_0\sin^3\frac{\pi x}{\ell}$ find the displacement $y(x,t)$.	14M	CO4	L2
		OR			
8.		An insulated rod of length ℓ has its ends A and B maintained at 0°C and 100°C respectively until steady state condition prevails. If B is suddenly reduced to 0°C and maintained at 0°C, Find the temperature at a distance x from A at time t.	14M	CO4	L3
		UNIT–V			
9.		Show that the function $f(z)=\begin{cases}\frac{x^3(1+i)-y^3(1-i)}{x^2+y^2} & , if \quad z\neq 0 \\ 0 & , if \quad z=0\end{cases}$ is not analytic at origin, even though C-R equations are satisfied at origin.	14M	CO5	L2
		OR			
10.	a)	Show that the function $v(x,y)=\sin x\cosh y+2\cos x\sinh y+x^2-y^2+4xy$ satisfies Laplace equation and find the corresponding analytic function $u+iv$	7M	CO5	L1
	b)	Verify Cauchy's theorem for the function $f(z)=3z^2+iz-4$ taken over the boundary of the square with vertices $1\pm i$ *and* $-1\pm i$	7M	CO5	L4

****

Hall Ticket Number :										

R-19

Code: 19A432T

II B.Tech. I Semester Regular Examinations March 2021

Random Variables Theory

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer any *five full* questions by choosing one question from each unit (5 x 14 = 70 Marks)

****

			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Write short notes on the following: i. Sample Space ii. Experiments iii. Joint Probability	7M	CO1	L2
	b)	An experiment consists of observing the sum of the numbers showing up when two dice are thrown. If only three events are of interest represented by A= {sum=7}, B = {8<sum<=11} and C={10<sum}. Calculate the probabilities of the events by developing the model for the given experiment.	7M	CO1	L2
		OR			
2.	a)	Define and explain the following with an example: i. Equally likely events ii. Exhaustive events iii. Mutually exclusive events	7M	CO1	L2
	b)	State and prove Bayes' theorem.	7M	CO1	L2
		UNIT–II			
3.	a)	For real constants b>0, c>0 and any a , find condition on constant a and relationship between a and c (for given b) such that the function is a valid probability density $fx(x) = \begin{cases} a(1-(x/b)) & 0 \le x \le c \\ 0 & else\ where \end{cases}$	7M	CO2	L2
	b)	State and prove the properties of probability distribution function (PDF) of a random variable x.	7M	CO2	L2
		OR			
4.	a)	Assume that the height of the clouds above the ground at some location is a Guassian Random variable X with a_X=1830m and σ_X=460m.Find the probability that clouds will be higher than 2750m.	7M	CO2	L2
	b)	Explain the Gaussian random variable.	7M	CO2	L2
		UNIT–III			
5.	a)	Find the mean & variance of Exponential random variable.	7M	CO3	L3
	b)	A random variable X has pdf $f_X(x) = (1/b)e^{-(x-a)/b}$. Find its moment generating function and use it to generate first order moment about origin.	7M	CO3	L3
		OR			
6.	a)	Write a short note on Chebychev's inequality.	7M	CO3	L3
	b)	Show that Var[aX] = a^2Var[X]	7M	CO3	L3
		UNIT–IV			
7.	a)	State and explain the properties of joint density function	10M	CO4	L2
	b)	State and explain joint characteristic function.	4M	CO4	L3
		OR			
8.	a)	State and prove the central limit theorem.	10M	CO4	L3
	b)	If X and Y are independent, show that E[XY]=E[X] E[Y].	4M	CO4	L3
		UNIT–V			
9.	a)	State and prove the properties of auto-correlation function.	7M	CO5	L4
	b)	A random process is given as $X(t) = ACos(\omega_0 t + \theta)$ where θ is a uniformly distributed random variable on (0, $\frac{\pi}{2}$). Find whether X(t) is wide sense stationary or not.	7M	CO5	L3
		OR			
10.	a)	State some useful classifications of Random Processes.	7M	CO5	L2
	b)	Autocorrelation function of an ergodic stationary random process with no periodic component is given as 25+ 4/(1+6τ^2). Find the mean and variance of the process.	7M	CO5	L4

*****

Hall Ticket Number :										

R-19

Code: 19A434T

II B.Tech. I Semester Regular Examinations March 2021

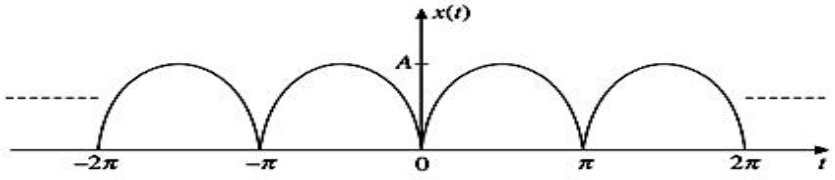
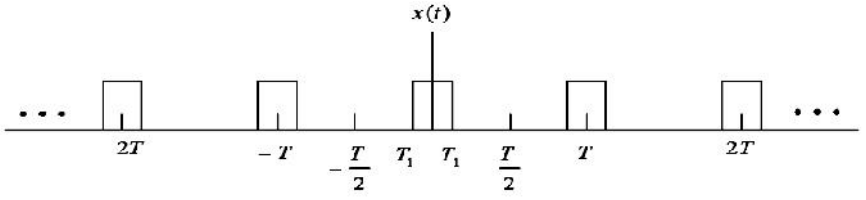
Signals and Systems

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

****

			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	Draw the signal $x(t)=\begin{cases}1 & ;\ 0<t<1\\ 2 & ;\ 1<t<2\\ 0 & ;elsewhere\end{cases}$ and Determine i) x(2t) ii) x(3t-1) iii) x(t/2)	8M	1	L3
	b)	List out the classification of signals. Explain with an example of any two	6M	1	L1
		OR			
2.	a)	What are the conditions for existence of Fourier series? Define Gibbs phenomenon with neat sketch and explain how would you eliminate it?	6M	1	L1
	b)	Find the exponential Fourier series and plot the frequency spectrum for full wave rectified sine wave shown 	8M	2	L4
		UNIT–II			
3.	a)	Find the Fourier Transform of the signal $x(t)=\begin{cases}1 & ;1<t<2\\ 2 & ;2<t<3\\ 1 & ;3<t<4\end{cases}$	7M	2	L4
	b)	State and prove the duality property of Fourier Transform	7M	1	L2
		OR			
4.	a)	Determine the inverse Fourier Transform for the signal $X(j\mu)=\frac{2}{1+t^2}$ Using Duality Property of the Fourier Transform	7M	2	L3
	b)	Determine the Fourier Transform of the following periodic signal 	7M	2	L2

UNIT–III

5.	a)	What are the characteristics of ideal LPF and HPF	6M	1	L1
	b)	The response of a continuous time LTI system is $2e^{-3t}$ when the input x(t) is u(t) find the Transfer function	8M	3	L4

OR

6.	a)	What is the different classification of Sampling? Explain each with neat sketch.	8M	1	L1
	b)	What is mean by aliasing? How would you eliminate it? Explain.		1	L2

UNIT–IV

7.	a)	State the condition for Stability of any system and derive an expression for same.	6M	2	L3
	b)	Find the convolution of the following signals i) $x_1(t) = e^{-3t}u(t) \quad and \quad x_2(t) = u(t+3)$ ii) $x_1(t) = e^{-at}u(t)\ x_2(t) = e^{-bt}u(t)$	8M	3	L4

OR

8.	a)	State and prove the relation between auto correlation function and energy / power spectral density function	7M	2	L2
	b)	Write the properties of cross Correlation for periodic signal	7M	4	L1

UNIT–V

9.	a)	Explain the Linearity and time shifting properties of Laplace transform.	7M	5	L2
	b)	Find the Laplace transform of t u (t). List properties of ROC for Laplace transforms	7M	5	L4

OR

10.	a)	Find the Z-transform of the given signal x(n) and find ROC: X(n) = [sin(w_0n] u(n)	7M	5	L3
	b)	Find the inverse Z- transform of $X(z) = \dfrac{1+3z^{-1}}{1+3z^{-1}+2z^{-2}}$	7M	4	L4

*****