Ref No:

< Sri Krishna Institute of Technology, Bangalore>

COURSE PLAN

Academic Year 2019

Program:	B E – Electrical and Electronics Engineering
Semester :	5
Course Code:	17EE54
Course Title:	SIGNALS AND SYSTEMS
Credit / L-T-P:	4 / 4-0-0
Total Contact Hours:	50
Course Plan Author:	Vinutha S

Academic Evaluation and Monitoring Cell

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Note : Remove “Table of Content” before including in CP Book
Each Course Plan shall be printed and made into a book with cover page
Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. COURSE INFORMATION

1. Course Overview

Degree:	BE	Program:	EE
Semester:	5	Academic Year:	2019
Course Title:	SIGNALS AND SYSTEMS	Course Code:	17EE54
Credit / L-T-P:	4-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	50 Hours	SEE Marks:	60 Marks
CIA Marks:	40 Marks	Assignment	1 / Module
Course Plan Author:	Vinutha S	Sign ..	Dt:
Checked By:		Sign ..	Dt:
CO Targets	CIA Target : ..... %	SEE Target:	..... %

Note: Define CIA and SEE % targets based on previous performance.

2. Course Content

Content / Syllabus of the course as prescribed by University or designed by institute. Identify 2 concepts per module as in G.

Module	Content	Teaching Hours	Identified Module Concepts	Blooms Learning Levels
1	Introduction: Definitions of signals and a system, classification of signals, basic operations on signals. Elementary signals viewed as interconnections of operations, properties of systems.	10	Signal construction	L2,L3
2	Time – Domain Representations For LTI Systems: Convolution, impulse response, properties, solution of differential and difference equations, block diagram representation.	10	Signal Representation	L3,L4
3	The Continuous-Time Fourier Transform: Representation of a non -periodic signals: continuous-time Fourier transform (FT), Properties of continuous-time Fourier transform, Applications. Frequency response of LTI systems, Solutions of differential equations∎	10	CT signal Representation	L4,L5
4	The Discrete-Time Fourier Transform: Representations of non-periodic signals: The discrete-time Fourier transform (DTFT), Properties of DTFT and applications. Frequency response of LTI system,Solutions of differential equations.	10	DT signal Representation	L4,L5
5	Z- Transforms: Introduction, Z-transform, properties of ROC, properties of Z-transforms, inversion of Z-transform methods-power series and partial expansion, Transforms analysis of LTI systems, transfer function, stability and causality, unilateral Z-transform and its application to solve difference equations .	10	System stability	L4,L5
-	**Total**	**50**	-	-

3. Course Material

Books & other material as recommended by university (A, B) and additional resources used by course teacher (C).

1. Understanding: Concept simulation / video ; one per concept ; to understand the concepts ; 15 – 30 minutes
2. Design: Simulation and design tools used – software tools used ; Free / open source
3. Research: Recent developments on the concepts – publications in journals; conferences etc.

Modules	Details	Chapters in book	Availability
A	**Text books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1, 2, 3, 4, 5	Signals and Systems:Simon Haykin,Berry Van Veen, Wiley 2 nd Edition,2002	1 to 10	In Lib
B	**Reference books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1, 2	Fundamentals of Signals and Systems,Michael J. Roberts, Govind K Sharma,McGraw Hill,2 nd Edition 2010		In Lib
2,3	Signals and Systems,NagoorKani,McGraw Hill,1 st Edition 2010		In Lib
2,3	Signals and Systems A Primer with MATLAB,Matthew N.O. Sadiku Warsame H. Ali,CRC Press, 1 st Edition, 2016		In Lib
3,4	Signals and Systems:Anand Kumar,PHI,3 rd Edition, 2015		In Lib
C	**Concept Videos or Simulation for Understanding**	**-**	**-**
C1	https://nptel.ac.in/courses/108104100/		
C2	https://www.youtube.com/watch?v=npsZ2S		
C3	https://www.youtube.com/watch?v=_HATc2zAhcY		
C4			
C5			
C6			
C7			
C8			
C9			
C10			
D	**Software Tools for Design**	**-**	**-**
1	MATlab simulink		
E	**Recent Developments for Research**	**-**	**-**
	https://ieeexplore.ieee.org/document/7836860		
F	**Others (Web, Video, Simulation, Notes etc.)**	**-**	**-**
1			
?			

4. Course Prerequisites

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.
Students must have learnt the following Courses / Topics with described Content . . .

Modules	Course Code	Course Name	Topic / Description	Sem	Remarks	Blooms Level
1	15EE32	Electrical circuit Analysis	Laplace transform	4	Basics of laplace transform	L3

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.

Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Modules	Topic / Description	Area	Remarks	Blooms Level
1	Multi stage signal processing	Advanced topic		L4
2	Adaptive signal processing	Advanced topic		L3

B. OBE PARAMETERS

1. Course Outcomes

Expected learning outcomes of the course, which will be mapped to POs. Identify a max of 2 Concepts per Module. Write 1 CO per Concept.

Modules	Course Code.#	Course Outcome **At the end of the course, student should be able to . . .**	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
1	17EE54.1	Understand the basic elementary signals and their classification by mathematical description.	05	Signal basics	Lecture	assignment	L2 Understand
1	17EE54.2	Represent the interconnection of signals and their construction.	05	Signal construction	Lecture and tutorial	Unit test and assignment	L3 Represent
2	17EE54.3	Develop input output relationship for LTI system and understand the convolution operation for continuous time and Discrete signals.	05	Signal representation	Lecture	assignment	L5 Develop
2	17EE54.4	Represent the linear time invariant system by block diagram	05	Differential form of representation	Lecture	Unit test and assignment	L4 Diagram
3	17EE54.5	Resolve the signals in frequency domain using Fourier transform of continuous time signals	05	continuous time signal representation	Lecture	assignment	L3 Solve
3	17EE54.6	Determine the solution for differential equation using frequency response of continuous time signals	05	Frequency response	Lecture	Unit test and assignment	L4 Determine
4	17EE54.7	Apply discrete time Fourier transform representation to study and resolve the signal and system	05	Discrete time signal representation	Lecture	Assignment	L3 Apply
4	17EE54.8	Determine the solution for differential equation using frequency response of Discrete signals.	05	Frequency response for Discrete time signals	Lecture	Unit test and assignment	L4 Determine
5	17EE54.9	Apply z-transform and its properties for the analysis of discrete time system using partial fraction expansion method.	05	System stability	Lecture	Assignment	L3 Apply
5	17EE54.10	Apply the unilateral z-transform to solve difference equation.	05	System stability for right sided sequence		Unit test and assignment	L3 Apply

-	-	Total	54	-	-	-	L2-L4

2. Course Applications

Write 1 or 2 applications per CO.
Students should be able to employ / apply the course learnings to . . .

Modules	Application Area Compiled from Module Applications.	CO	Level
1	Speech and audio processing,biological signal analysis	CO1	L2
1	Remote sensing system	CO2	L3
2	Radars, Digital filter design	CO3	L5
2	Distance phone calls, Digital recording, image processing	CO4	L4
3	Speech recognition,image filtering	CO5	L3
3	Image reconstruction, image construction	CO6	L4
4	Amplitude modulation, frequency multiplexing	CO7	L3
4	Circuit analysis,sampling theorem.	CO8	L4
5	Analysis of digital system,system design,automatic controls in telecommunication.	CO9	L3
5	Simulate the continuous system, Analysis of digital filters	CO10	L3

3. Mapping And Justification

CO – PO Mapping with mapping Level along with justification for each CO-PO pair.
To attain competency required (as defined in POs) in a specified area and the knowledge & ability required to accomplish it.

Modules	Mapping		Mapping Level	Justification for each CO-PO pair	Level
-	**CO**	**PO**	-	**'Area': 'Competency' and 'Knowledge' for specified 'Accomplishment'**	-
1	CO1	PO1	3	Fundamental of signals and systems	L2
1	CO1	PO2	3	Analyse the classification of types of signals	L4
1	CO2	PO1	3	Knowledge of construction of signals	L2
1	CO2	PO2	3	Analyse different types of siganls and their interconnection	L4
2	CO3	PO1	3	Basic knowledge of convolution	L2
2	CO3	PO2	3	Formulate the solutions for discrete and continous time sysems using convolution	L4
2	CO4	PO1	3	Knowledge of Linear time invariant system	L2
2	CO4	PO2	3	Develop block diagrams for linear time invariant systems	L4
3	CO5	PO1	3	Basic knowledge about frequency domain signals	L2
3	CO5	PO2	3	Analyse the complex frequency domian signals	L4
3	CO5	PO5	3	Apply modern tool like fourier transform to solve the complex frequency domain signals	L5
3	CO6	PO1	3	Apply knowledge of mathematics to the differential equation	L2
3	CO6	PO2	3	Formulate the differential equations using principles of mathematics	L4
3	CO6	PO5	3	Design the solutions for complex differential equations using Fourier transform	L5
4	CO7	PO1	3	Basic knowledge about frequency domain signals	L2
4	CO7	PO2	3	Analyse the complex frequency domian signals	L4
4	CO7	PO5	3	Apply modern tool like disceet time fourier transform to solve the complex frequency domain signals	L5
4	CO8	PO1	3	Apply knowledge of mathematics to the difference equation	L2
4	CO8	PO2	3	Formulate the difference equations using principles of mathematics	L4
4	CO8	PO5	3	Design the solutions for complex difference equations using disceet time Fourier transform	L5
5	CO9	PO1	3	Knowledge of solving partial fraction	L2
5	CO9	PO2	3	Analyse the discrete time system using Partial fraction	L4
5	CO9	PO5	3	Apply proper techniques to solve the problems on z transform	L5
5	CO10	PO1	3	Knowledge of solving difference equation	L2
5	CO10	PO2	3	Analyse the diffrence equation using unilateral z transform	L4
5	CO10	PO5	3	Apply proper techniques to solve the difference equation	L5

4. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

-	-	Course Outcomes	Program Outcomes															-
Modules	CO.#	**At the end of the course student should be able to . . .**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	Level
1	17EE54.1	Understand the basic elementary signals and their classification by mathematical description.	x	x														L2
1	17EE54.2	Represent the interconnection of signals and their construction.	x	x														L2
2	17EE54.3	Develop input output relationship for LTI system and understand the convolution operation for continuous time and Discrete signals.	x	x														L3
2	17EE54.4	Represent the linear time invariant system by block diagram	x		x													L3
3	17EE54.5	Resolve the signals in frequency domain using Fourier transform of continuous time signals	x	x			x											L4
3	17EE54.6	Determine the solution for differential equation using frequency response of continuous time signals	x	x			x											L4
4	17EE54.7	Apply discrete time Fourier transform representation to study and resolve the signal and system	x	x			x											L2
4	17EE54.8	Determine the solution for differenence equation using frequency response of Discrete signals.	x	x			x											L4
5	17EE54.9	Apply z-transform and its properties for the analysis of discrete time system using partial fraction expansion method.	x	x			x											L4
5	17EE54.10	Apply the unilateral z-transform to solve difference equation.	x	x			x											L2
-	**17EE81**	**Average attainment (1, 2, or 3)**																**-**
-	*PO, PSO*	*1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design*																

5. Curricular Gap and Content

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Modules	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1	1	Fundamentals of signals and systems	workshop	17/08/18	

6. Content Beyond Syllabus

Topics & contents required (from A.5) not addressed, but help students for Placement, GATE, Higher Education, Entrepreneurship, etc.

Modules	Gap Topic	Area	Actions Planned	Schedule Planned	Resources Person	PO Mapping

C. COURSE ASSESSMENT

1. Course Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

Modules	Title	Teach. Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	Introduction to signals and systems	10	2	-	-	1	0	2	CO1, CO2	L2, L3
2	Time – Domain Representations For LTI Systems	10	2	-	-	1	0	2	CO3, CO4	L2, L3
3	The Continuous-Time Fourier Transform	10	-	2	-	1	0	2	CO5, CO6	L4, L5
4	The Discrete-Time Fourier Transform	10	-	2	-	1	0	2	CO7, C08	L3, L4
5	Z- Transforms	10	-	-	4	1	0	2	CO9, CO10	L3, L4
-	**Total**	**50**	**4**	**4**	**4**	**5**	**5**	**10**	**-**	**-**

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Modules	Evaluation	Weightage in Marks	CO	Levels
1, 2	CIA Exam – 1	30	CO1, CO2, CO3, CO4	l3, l4
3, 4	CIA Exam – 2	30	CO5, CO6, CO7, C08	L4, L5
5	CIA Exam – 3	30	CO9, CO10	L3, L4
1, 2	Assignment - 1	10	CO1, CO2, CO3, CO4	l3, l4
3, 4	Assignment - 2	10	CO5, CO6, CO7, C08	L4, L5
5	Assignment - 3	10	CO9, CO10	L3, L4
1, 2	Seminar - 1			
3, 4	Seminar - 2			
5	Seminar - 3			
	OtherActivities :			
	Final CIA Marks	**20**		**-**

D1. TEACHING PLAN - 1

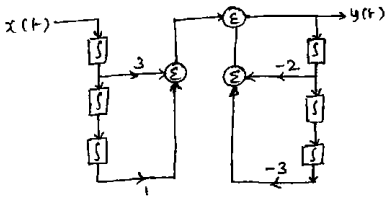
Module - 1

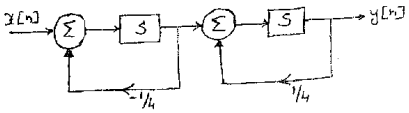
Title:	Introduction to power systems, Overhead transmission lines and insulators	Appr Time:	12 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Understand the basic elementary signals and their classification by mathematical description.	CO1	L2

2	Represent the interconnection of signals and their construction.	CO2	L3
b	***Course Schedule***	-	-
Class No	**Module Content Covered**	**CO**	**Level**
1	Introduction: Definitions of signals and a system	CO1	L1
2	Classification of signals.	CO1	L2
3	Basic operations on signals: Amplitude and time operations	CO1	L2
4	Folding, Time shifting, time scaling operations	CO1	L2,L3
5	Problems	CO1	L3,L4
6	Problems	CO1	L3,L4
7	Elementary signals and their representation	CO1	L1
8	Elementary signals viewed as interconnections of operations,	CO2	L1
9	properties of systems.	CO2	L2
10	problems	CO1	L3,L4
c	**Application Areas**	**CO**	**Level**
1	Speech and audio processing, biological signal analysis	CO1	L2
2	Remote sensing system.	CO2	L3
d	**Review Questions**	-	-
1	Define Signals and systems?	CO1	L1
2	What are the major classifications of the signal?	CO1	L3
3	Explain the basic elementary signals with their mathematical equation?	CO2	L2
4	Define periodic signal and non-periodic signal?	CO2	L3
5	Define Energy and power signal ?	CO2	L2
6	Define even and odd signal ?	CO2	L3
7	Determine whether the following systems are linear,time invariant,causal ,stable. y(n)=log(x(n)).	CO2	L2
8	Determine whether the following systems are linear or not dy(t) / dt + 3ty(t) = t2 x(t) & y(n)=2x(n)+ 1 / x(n-1)	CO2	L3
9	Determine whether the following systems are Time-Invarient or not Y(t) = t x(t) & y(n) = x(2n)	CO2	L4
10	Find whether the signal x(t) = 2 cos (10 t+1) – sin(4t-1) is periodic or not. (6) Evaluate Σ n=(-∞ to ∞) e 2n δ (n-2)	CO2	L4
11	b) Determine whether the following signals are energy or power and calculate their energy and power. i) x(n)=(1/2)n u(n) ii) x(t)= rect(t/To) iii) x(t)=cos2 (Ωt)	CO1	L5
12	Define unit step, ramp, pulse, impulse and exponential signals. Obtain the relationship between the unit step and unit ramp function.	CO1	L5
13	Find the fundamental period T of the signal , x(n)=cos(nπ/2)-sin(nπ/8)+3cos(nπ/4 + π/3)	CO1	L5
14	Determine the power of the following signals. i) $x_1(t)$=5cos(50t+π/3) ii) $x_2(t)$= 20cos50tcos15t	CO2	L5
15	Determine whether the following systems are time variant or time -invariant. i) y(t)=tx(t) ii)y(n)=x(2n)	CO1	L5
16	Determine whether the following signal is periodic. If periodic , determine the fundamental period: X(t)=3cost+4cos(t/2) X(t)=cos60πt+sin50πt	CO1	L5
17	Determine whether the following system is linear, time invariant, causal, stable and static 1. y(n) = x2 (n) 2. y(n) = x(-n)	CO2	L5
18	A discrete time signal is given by x(n)=[1,1,1,1,2] Sketch the following signals a)x(n-2) b)x(n+1) c)x(3-n) d)x(n)u(n-1) e)x(n-1)δ(n-1) f)Even samples of x(n) g)odd samples of x(n)	CO2	L5
e	**Experiences**	-	-

Module – 2

Title:	Line Parameters	Appr Time:	7 Hrs

a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Develop input output relationship for LTI system and understand the convolution operation for continuous time and Discrete signals.	CO3	L4
2	Represent the linear time invariant system by block diagram.	CO4	L3
b	***Course Schedule***	-	-
Class No	**Module Content Covered**	**CO**	**Level**
11	Introduction to convolution	CO3	L2
12	Convolution sum and convolution integral	CO3	L3
13	Problems on convolution sum and covolution integral	CO3	L4
14	Impulse response	CO3	L4
15	Properties of LTI system	CO3	L3
16	Solution of difference equations	CO4	L4
17	Problems on difference equation	CO4	L4
18	Solution of differential equation	CO4	L4
19	Problems on difference equation	CO4	L4
20	Block diagram Representation with problems.	CO4	L4
c	**Application Areas**	**CO**	**Level**
1	Radars, Digital filter design.	CO3	L3
2	Distance phone calls, Digital recording, image processing.	CO4	L4
d	**Review Questions**	-	-
19	The impulse response of a continuous time LTI system is given by $h(t)=e^{2t}u(t-1)$ check whether the system is stable causal and memoryless.	CO3	L3
20	A continuous time LTI system with unit impulse response $h(t)=u(t)$ and input $x(t)=e^{-at}$ $u(t)$ $a>0$ find the output $y(t)$ of the system.	CO4	L3
21	Find the step response for the LTI system represented by the impulse response $h(n)=(1/2)^n$ $u(n)$.	CO3	L3
22	consider a continuous time LTI system is represented by the impulse response $h(t)=e^{-3t}$ $u(t-1)$ determine whether it is i)stable ii) causal	CO4	L4
23	Solve the differential equation, $d^2y(t)/dt^2 + 3\ dy(t)/dt + 2y(t) = 2x(t)$ with $y(0)=-1$ $dy(t)/dt$ with $t=0$ and $x(t)=cost\ u(t)$	CO4	L2
24	The impulse response of a continuous time LTI system is given by $h(t)=e^{2t}u(t-1)$ check whether the system is stable,causal and memoryless.	CO3	L53
25	Find the response of the system described by difference equations $y(n)-1/9\ y(n-2)=x(n-1)$ with $y(-1)=1$, $y(-2)=0$ and $x(n)=u(n)$	CO3	L3
26	find the difference equation representation for the block diagram representation of continuous time LTI system shown in figure 3c,  Fig.Q3(c)	CO4	L4
27	Determine the conditions so that the continuous time system with impulse response $h(t)=e^{at}u(-t)$ is stable. Also find out whether the system is i)causal ii) memoryless	CO4	L3
28	Represent the differential equation given below in direct form I and II $d^2y(t)/dt^2 + 3\ dy(t)/dt + 2y(t) = d^2y(t)/dt^2 + dx(t)/dt^2$	CO4	L3
29	Find the zero input response and forced response for the system described by the difference equation $y(n)-1/4\ y(n-2)=2x(n)+x(n-1)$ given $x(n)=u(n)$; $y(-2)=8$,$y(-1)=0$.	CO4	L4
30	For the given impulse response determine whether system is memory less, stable and causal justify your answer $h(n)=2^n$ $u(-n)$	CO4	L3
31	Given impulse response of the system $h(n)=(1/2)^n$ $u(n-2)$ find out step response	CO4	L4

	of the system.		
32	Draw direct form-I and direct form- II implementation for the following difference equation y(n)-1/4 y(n-1)-1/8y(n-2)=2x(n)+3x(n-1)	CO4	L3
33	Find the step response of a LTI system if impulse response $h(t)=t^2\ u(t)$	CO4	L4
34	Obtain the response of the system given by $d^2y(t)/dt^2\ y(t) + y(t) = 3\ dx(t)/dt$ with $y(0)=-1$, $dy(t)/dt = d^2y(t)/dt^2=1$ and $2e^{-t}\ u(t)$	CO4	L3
35	Find the difference equation for the system shown in fig.  Fig.Q.3(c)	CO4	L4

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code:	17EE54	Sem:	I	Marks:	30	Time:	75 minutes		
Course:	Design and Analysis of Algorithms								
-	**-**	**Note: Answer any 3 questions, each carry equal marks.**					**Marks**	**CO**	**Level**
1	a	Distinguish between: i) Energy signal and Power signal ii)Continuous and Discrete time signals iii) Even and Odd signal iv)Periodic and non periodic signals					8	CO1	L3
	b	Determine the even and Odd components of the signal i) $x(t)=1+t^2+t\ \tan+\tan^2t\ \cot\ t + \cot^3t$ ii) $x(t)=[\sin t+\cos t]^3$					7	CO1	L4
		OR							
2	a	Determine whether the following signals are periodic, if periodic determine the fundamental period i) $x(t)=[2\cos^2(\pi t/2)-1]\sin\pi t\ \cos\pi t$ ii) $x(n)=\cos(\pi n/7)\ \sin(\pi n/3)$					8	CO1	L4
	b	Determine the following signal is Energy or Power signal i) $x(t)=e^{-a\|t\|}$ $a>0$ ii) $x(t) =$ $5+t$ for $(-5,-4)$; 1 for $(-4, 4)$; $5-t$ for $(4, 5)$; 0 otherwise					7	CO2	L4
3	a	Draw the signal i)x(t)=3r(t-1)-4r(t-2)-6r(t-3)+r(t) ii)Y(t)={[x(t)+x(2-t)]u(1-t)}u(t)					7	CO3	L4
	b	b) Express x(t) interms of g(t) using shifting and scaling of 3stepped staircase signal					8	CO3	L5
		OR							
4	a	Determine whether the system is i) Linear ii) Time Invariant iii) memoryless iv) causal v) stable i) $y(t)=d/dt[e^{-t}\ x(t)]$ ii) $y(n)=x(k+2)$					8	CO4	L3
	b	Determine the relationship between the signals.					7	CO4	L2

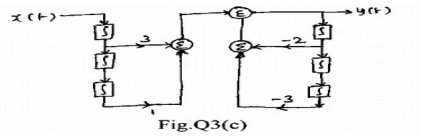
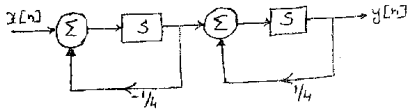
b. Assignment -1

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	17EE54	Sem:	I	Marks:	5 / 10	Time:	90 – 120 minutes
Course:	Design and Analysis of Algorithms						
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo	USN	Assignment Description	Marks	CO	Level
1	1KT17EE002	Define signals and systems, with appropriate examples?	10	CO1	L2
2	1KT17EE003	Write a note on classification of signals with suitable examples?	10	CO2	L3
3	1KT17EE004	Find the even and odd components of the signal $x(t) = (1+t^3)\cos^3(10t)$.	10	CO2	L4
4	1KT17EE006	Find the overall operator of the system	10	CO1	L3

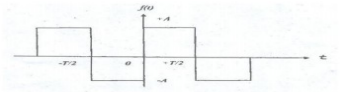
		y(n)= 1/3[x(n+1)+x(n)+x(n-1)].			
5	1KT17EE007	Determine whether the system y(t) = x(t/2) is i) linear ii)Time invarient iii)memory iv)causal v)stable	10	CO2	L3
6	1KT17EE008	Sketch the following signal, hence find the even and odd component of signal, draw even and odd part of x(t)= u(t)- r(t-1)+2r(t-2)-r(t-3)	10	CO1	L4
7	1KT17EE011	State whether the following signals is periodic or not, if periodic find the fundamental period: i)x(n) = cos(πn/2)+sin(πn/2) ii)x(t)=cos(2πt). sin(2πt))	10	CO2	L4
8	1KT17EE014	Consider the system whose output is y(t)=cosω_c+x(t) determine where it is , i)memoryless ii)causal iii)linear iv)time invarient v)stable	10	CO2	L4
9	1KT17EE015	Sketch the signal for the following function, x(t) = 2t for t varies from 0 to 1 and x(t)=4-2t for t varies from 1 to 2. determine the odd component of x(t).	10	CO1	L3
10	1KT16EE010	Given x(n)=[3 2 1 0 1 2 3] and y(n)= [-1 -1 -1 -1 0 1 1 1 1] plot x(n-2)+y(n+2)	10	CO1	L4
11	1KT18EE401	Determine whether the following systems are time variant or time -invariant. i) y(t)=tx(t) ii)y(n)=x(2n)	10	CO1	L4
12	1KT14EE004	Determine whether the following signal is periodic. If periodic , determine the fundamental period: X(t)=3cost+4cos(t/2) X(t)=cos60πt+sin50πt	10	CO	L3
13	1KT14EE008	Determine the power and RMS value of the following signals. i) $x_1(t)$=5cos(50t+π/3) ii) $x_2(t)$= 20cos50tcos15t	10	CO1	L4
14	1KT15EE002	Determine whether the following systems are linear,time invariant,causal ,stable. y(n)=log(x(n)).	10	CO1	L4
15	1KT15EE003	Determine whether the following systems are linear or not dy(t) / dt + 3ty(t) = t2 x(t) & y(n)=2x(n)+ 1 / x(n-1)	10	CO4	L4
16	1KT15EE010	Determine whether the following system is linear, time invariant, causal, stable and static 1. y(n) = x2 (n) 2. y(n) = x(-n)	10	CO2	L4
17	1KT17EE002	A discrete time signal is given by x(n)={1,1,1,1,2} Sketch the following signals a)x(n-2) b)x(n+1) c)x(3-n) d)x(n)u(n-1) e)x(n-1)δ(n-1) f)Even samples of x(n) g)odd samples of x(n)	10	CO1	L4
18	1KT17EE003	Determine whether the system is i) Linear ii) Time Invariant iii) memoryless iv) causal v) stable i) y(t)=d/dt{e^{-t} x(t)} ii) y(n)=x(k+2)	10	CO2	L3
19	1KT17EE004	Draw the signal i)x(t)=3r(t-1)-4r(t-2)-6r(t-3)+r(t) ii)Y(t)={[x(t)+x(2-t)]u(1-t)}u(t)	10	CO1	L4
20	1KT17EE006	Define signals and systems, with appropriate examples?	10	CO1	L2
21	1KT17EE007	Write a note on classification of signals with suitable examples?	10	CO1	L2
22	1KT17EE008	Distinguish between: i) Energy signal and Power signal ii)Continuous and Discrete time signals iii) Even and Odd signal iv)Periodic and non periodic signals	10	CO1	L3
23	1KT17EE011	Determine the even and Odd components of the signal i) x(t)=1+t^2+t tant+$\tan^2$t cot t + $\cot^3$t ii) x(t)=[sint+cost]^3	10	CO1	L3
24	1KT17EE014	Define signals ?	10	CO1	L4
25	1KT17EE015	The impulse response of a continuous time LTI system is given by h(t)=e^{2t}u(t-1) check whether the system is stable causal and memoryless.	10	CO2	L2
26	1KT16EE010	A continuous time LTI system with unit impulse response h(t)=u(t) and input x(t)=e^{-at} u(t) a>0 find the output y(t) of the system.	10	CO3	L3
27	1KT18EE401	Find the step response for the LTI system represented by the impulse response h(n)=$(1/2)^n$ u(n).	10	CO4	L3
28	1KT14EE004	consider a continuous time LTI system is represented by the impulse response h(t)=e^{-3t} u(t-1) determine whether it is	10	CO2	L3

		i)stable ii) causal			
29	1KT14EE008	Solve the differential equation, $d^2y(t)/dt^2 + 3\,dy(t)/dt + 2y(t) = 2x(t)$ with $y(0)=-1$ $dy(t)/dt$ with $t=0$ and $x(t)=\cos t\,u(t)$	10	CO2	L3
30	1KT15EE002	The impulse response of a continuous time LTI system is given by $h(t)=e^{2t}u(t-1)$ check whether the system is stable,causal and memoryless.	10	CO2	L3
31	1KT15EE003	Find the response of the system described by difference equations $y(n)-1/9\,y(n-2)=x(n-1)$ with $y(-1)=1$, $y(-2)=0$ and $x(n)=u(n)$	10	CO3	L4
32	1KT15EE010	find the difference equation representation for the block diagram representation of continuous time LTI system shown in figure 3c,  Fig.Q3(c)	10	CO4	L3
33	1KT17EE002	Determine the conditions so that the continuous time system with impulse response $h(t)=e^{at}u(-t)$ is stable. Also find out whether the system is i)causal ii) memoryless	10	CO3	L4
34	1KT17EE003	Represent the differential equation given below in direct form I and II $d^2y(t)/dt^2 + 3\,dy(t)/dt + 2y(t) = d^2y(t)/dt^2 + dx(t)/dt^2$	10	CO3	L4
35	1KT17EE004	Find the zero input response and forced response for the system described by the difference equation $y(n)-1/4\,y(n-2)=2x(n)+x(n-1)$ given $x(n)=u(n)$; $y(-2)=8$,$y(-1)=0$.	10	CO3	L4
36	1KT17EE006	For the given impulse response determine whether system is memory less, stable and causal justify your answer $h(n)=2^n\,u(-n)$	10	CO4	L3
37	1KT17EE007	Given impulse response of the system $h(n)=(1/2)^n\,u(n-2)$ find out step response of the system.	10	CO4	L3
38	1KT17EE008	Draw direct form-I and direct form- II implementation for the following difference equation $y(n)-1/4\,y(n-1)-1/8y(n-2)=2x(n)+3x(n-1)$	10	CO4	L3
39	1KT17EE011	Find the step response of a LTI system if impulse response $h(t)=t^2\,u(t)$	10	CO4	L3
40	1KT17EE014	Obtain the response of the system given by $d^2y(t)/dt^2\,y(t) + y(t) = 3\,dx(t)/dt$ with $y(0)=-1$, $dy(t)/dt = d^2y(t)/dt^2=1$ and $2e^{-t}\,u(t)$	10	CO3	L4
41	1KT17EE015	Find the difference equation for the system shown in fig.  Fig.Q.3(c)	10	CO4	L4

D2. TEACHING PLAN - 2

Module – 3

Title:	Performance of transmission lines	Appr Time:	12 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Resolve the signals in frequency domain using Fourier transform of continuous time signals.	CO5	L3
2	Determine the solution for differential equation using frequency response of continuous time signals.	CO6	L4
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	Introduction to Continuous-Time Fourier Transform	CO5	L2
2	Representation of a non -periodic signals: continuous-time	CO5	L3

	Fourier transform (FT),		
3	Properties of continuous-time Fourier transform	CO5	L3
4	Problems on properties	CO5	L4
5	Problems on properties	CO5	L4
6	Applications of Fourier transform.	CO6	L3
7	Problems	CO6	L4
8	Frequency response of LTI systems.	CO6	L3
9	Problems	CO6	L4
10	Solutions of differential equations with problems	CO6	L4
c	**Application Areas**	**CO**	**Level**
1	Radars, Digital filter design	CO5	L5
2	Distance phone calls, Digital recording, image processing	CO6	L5
d	**Review Questions**	-	
1.	State & prove the following properties of FT. i) Time shifting property ii) parseval's theorem.	CO5	L3
2	Obtain the fourier transform of x(t) = $te^{-at}u(t)$	CO5	L4
3	Find the fourier transform of rectangular pulse shown below $x(\omega) = 1/(a+j\omega)^2$	CO5	L3
4	Find the frequency response & impulse response of the system described by differential equation dy(t)/dt + 8y(t) =x(t)	CO5	L4
5	Find the Fourier transform of i) x(t)= t2 u(t) u(1-t) and ii) x(t)= t exp(- t) u(t) , >0	CO6	L4
6	Find the fourier transform of triangular pulse (10) x(t) = _(t/m) =[102|t|/m |t| 0 otherwise	CO6	L4
7	Obtain the exponential fourier series of the waveform 	CO6	L4
8	Find the Fourier transform of rectangular pulse. Sketch the signal and its Fourier transform	CO5	L3
9	Find the Fourier transform of a triangular pulse.	CO6	L3
10	State and prove following properties of Fourier Transformation. i) Frequency shift ii) Convolution theorem.	CO5	L4
11	Determine Fourier transformation of following signals. i) x(t) = e-at u(t) ii) x(t) = cost Wot.	CO5	L4
12	Find the frequency response and the impulse response of the system described by the differential equation. d^2 y/dt^2 +5d y/dt +6y =-d /dt x(t).	CO6	L4
13	State and explain parsavel's theorem	CO6	L3
14	Obtain the fourier transform of the following signal i)x(t)=e^{-at} u(t);a>0 ii)x(t)=delta(t)	CO6	L4
15	The impulse response of continuous time signal is given by h(t)=1/Re e-t/RC u(t) find the frequency response and plot the magnitude	CO5	L4
e	**Experiences**	-	-

Module – 4

Title:	Corona and underground cable	Appr Time:	13 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Apply discrete time Fourier transform representation to study and resolve the signal and system.	CO7	L5
2	Determine the solution for differential equation using frequency response of Discrete signals.	CO8	L4
b	***Course Schedule***		

Class No	Module Content Covered	CO	Level
1	Introduction to Discrete-Time Fourier Transform	CO7	L3
2	Representations of non-periodic signals: The discrete-time Fourier transform (DTFT),	CO7	L3
3	Problems	CO7	L4
4	Applications of DTFT	CO8	L4
5	Problems	CO8	L4
6	problems	CO8	L4
7	Frequency response of LTI system,	CO8	L3
8	Problems	CO8	L4
9	Solutions of differential equations	CO8	L4
10	Problems	CO8	L4
c	**Application Areas**	**CO**	**Level**
1	Amplitude modulation, frequency multiplexing	CO8	L3
2	Circuit analysis, sampling	CO7	L4
d	**Review Questions**	-	-
1	State and explain following DTFT properties I) Time shift ii) Linearity	CO7	L3
2	Determine the DTFT of the following signal, i)x(n)=u(n) ii) x(n)=2^n u(-n)	CO7	L3
3	Obtain the frequency response of the impulse response of the system described by the difference equation y(n)-1/4 y(n-1)=3x(n)-3/4 x(n-1)	CO8	L4
4	Define Transfer function of the DT system and Define impulse response of a DT system	CO7	L4
5	State the significance of difference equations and Write the differece equation for Discrete time system	CO8	L3
6	Define frequency response of the DT system and explainWhat is the condition for stable system	CO8	L3
7	Obtain the DTFT of the signal x[n] =2n u(-n)	CO7	L4
8	State & prove the following properties of DTFT. i) Convolution property ii) Frequency differentiation	CO7	L3
9	Using DTFT find the total solution to the difference equation for discrete time signal. 5y(n+2) – 6y(n+1) +y(n) = 0.8 u(n)	CO8	L4
10	Find the fourier transform of the following. x(n) = 1 ; -2 ≤ n≤ 2 = 0 ; Otherwise	CO8	L4
11	Find the fourier transform of x[n] = an u[n] for -13. Determine the fourier transform of the discrete time rectangular pulse of amplitude A and length L i.e x[n] = A for 0= n=L-1 0 otherwise	CO7	L4
12	Determine the discrete time sequence where DTFT is given as X(w) = 1 for –wc = w = wc 0 for wc < | w | ?	CO7	L4
13	Find the DTFT of the signal x(n)= $a^{\|n\|}$; |a|<1	CO7	L4
14	Find the inverse DTFT of the signal X($e^{j\Omega}$)=3-(1/4 $e^{-j\Omega}$)/-1/16 $e^{-2j\Omega}$ +1	CO8	L4
15	Find the impulse response of the system having output y(n)-1/4(1/2)^n u(n) +(1/4)^n u(n)	CO8	L4
16	Obtain the difference equation for the system with frequency response h($e^{j\Omega}$)=1+$e^{-j\Omega}$/(1-(1/2 $e^{-j\Omega}$))(1=(1/24$e^{-j\Omega}$))	CO8	L4
e	**Experiences**	-	-

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	17EE54	Sem:	5	Marks:	30	Time:	75 minutes
Course:	Signals and systems						

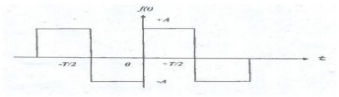
-	-	**Note: Answer any 2 questions, each carry equal marks.**	**Marks**	**CO**	**Level**
1	a	Determine Fourier transformation of following signals. i) x(t) = e^{-at} u(t) ii) x(t) = cost Wot.	5	CO5	L4

	b	Find the frequency response and the impulse response of the system described by the differential equation. $d^2 y/dt^2 + 5d y/dt + 6y = -d /dt x(t)$.	4	CO6	L4
	c	Find the DTFT of the signal $x(n)= a^{\|n\|}$; $\|a\|<1$	3	CO5	L3
	d	Find the fourier transform of the following. $x(n) = 3$; $-4 \le n \le 24$ $= 0$; Otherwise	3	CO8	L4
		OR			
2	a	State and explain parsavel's theorem	3	CO6	L3
	b	Obtain the fourier transform of the following signal i)$x(t)=e^{-at}$ u(t);a>0 ii)x(t)=delta(t)	4	CO5	L4
	c	The impulse response of continuous time signal is given by $h(t)=1/Re\ e^{-t/RC}$ u(t) find the frequency response and plot the magnitude	3	CO6	L4
	d	Find the inverse DTFT of the signal $X(e^{j\Omega})=3-(1/4\ e^{-j\Omega})/-1/16\ e^{-2j\Omega} +1$	5	CO7	L4
3	a	State and explain following DTFT properties I) Time shift ii) Linearity	3	CO7	L3
	b	Determine the DTFT of the following signal, i)x(n)=u(n) ii) $x(n)=2^n$ u(-n)	4	CO8	L4
	c	Obtain the frequency response of the impulse response of the system described by the difference equation $y(n)-1/4\ y(n-1)=3x(n)-3/4\ x(n-1)$	5	CO7	L4
	d	Find the fourier transform of the following. $x(n) = 1$; $-2 \le n \le 2$ $= 0$; Otherwise	3	CO8	L4
		OR			
4	a	Obtain the DTFT of the signal x[n] =2n u(-n)	3	CO7	L4
	b	State & prove the following properties of DTFT. i) Convolution property ii) Frequency differentiation	4	CO8	L3
	c	Using DTFT find the total solution to the difference equation for discrete time signal. $5y(n+2) - 6y(n+1) + y(n) = 0.8\ u(n)$	4	CO7	L4
	d	Obtain the difference equation for the system with frequency response $h(e^{j\Omega})=1+e^{-j\Omega}/(1-(1/2\ e^{-j\Omega}))(1=(1/24e^{-j\Omega}))$	5	CO8	L4

b. Assignment – 2

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	17EE54	Sem:	5	Marks:	10	Time:	90 – 120 minutes
Course:	Signals and systems						
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo	USN	Assignment Description	Marks	CO	Level
1	1KT17EE002	State & prove the following properties of FT. i) Time shifting property ii) parseval's theorem.	10	CO5	L3
2	1KT17EE003	Obtain the fourier transform of x(t) = te-atu(t)	10	CO6	L4
3	1KT17EE004	Find the fourier transform of rectangular pulse shown below $x(\omega) = 1/(a+j\omega)^2$	10	CO6	L4
4	1KT17EE006	Find the frequency response & impulse response of the system described by differential equation $dy(t)/dt + 8y(t) = x(t)$	10	CO6	L4
5	1KT17EE007	Find the Fourier transform of i) x(t)= t2 u(t) u(1-t) and ii) x(t)= t exp(- t) u(t) , >0	10	CO5	L4
6	1KT17EE008	Find the fourier transform of triangular pulse (10) x(t) = _(t/m) ={102|t|/m |t| 0 otherwise	10	CO5	L4
7	1KT17EE011	Obtain the exponential fourier series of the waveform 	10	CO6	L3
8	1KT17EE014	Find the Fourier transform of rectangular pulse. Sketch the signal and its Fourier transform	10	CO5	L3
9	1KT17EE015	Find the Fourier transform of a triangular pulse.	10	CO5	L3
10	1KT16EE010	Obtain the DTFT of the signal x[n] =2n u(-n)	10	CO7	L4

11	1KT18EE401	State & prove the following properties of DTFT. i) Convolution property ii) Frequency differentiation	10	CO8	L4
12	1KT14EE004	Using DTFT find the total solution to the difference equation for discrete time signal. 5y(n+2) – 6y(n+1) +y(n) = 0.8 u(n)	10	CO8	L4
13	1KT14EE008	Obtain the difference equation for the system with frequency response $h(e^{j\Omega})=1+e^{-j\Omega}/(1-(1/2\ e^{-j\Omega}))(1=(1/24e^{-j\Omega}))$	10	CO7	L4
14	1KT15EE002	State and explain following DTFT properties I) Time shift ii) Linearity	10	CO7	L4
15	1KT15EE003	Determine the DTFT of the following signal, i)x(n)=u(n) ii) $x(n)=2^n$ u(-n)	10	CO8	L4
16	1KT15EE010	Obtain the frequency response of the impulse response of the system described by the difference equation y(n)-1/4 y(n-1)=3x(n)-3/4 x(n-1)	10	CO7	L4
17	1KT17EE002	Find the fourier transform of the following. x(n) = 1 ; -2 ≤ n≤ 2 = 0 ; Otherwise	10	CO7	L4
18	1KT17EE003	State and explain parsavel's theorem	10	CO5	L3
19	1KT17EE004	Obtain the fourier transform of the following signal i)$x(t)=e^{-at}$ u(t);a>0 ii)x(t)=delta(t)	10	CO6	L4
20	1KT17EE006	The impulse response of continuous time signal is given by $h(t)=1/Re\ e^{-t/RC}$ u(t) find the frequency response and plot the magnitude	10	CO5	L4
21	1KT17EE007	Find the inverse DTFT of the signal $X(e^{j\Omega})=3-(1/4\ e^{-j\Omega})/-1/16\ e^{-2j\Omega}+1$	10	CO6	L4
22	1KT17EE008	Determine Fourier transformation of following signals. i) x(t) = e-at u(t) ii) x(t) = cost Wot.	10	CO6	L4
23	1KT17EE011	Find the frequency response and the impulse response of the system described by the differential equation. $d^2 y/dt^2 +5d\ y/dt +6y =-d /dt\ x(t)$.	10	CO6	L4
24	1KT17EE014	Find the DTFT of the signal $x(n)= a^{\|n\|}$; |a|<1	10	CO7	L4
25	1KT17EE015	Find the fourier transform of the following. x(n) = 1 ; -2 ≤ n≤ 2 = 0 ; Otherwise	10	CO8	L4
26	1KT16EE010	Determine the DTFT of the following signal, i)x(n)=u(n) ii) $x(n)=2^n$ u(-n)	10	CO8	L4
27	1KT18EE401	Obtain the frequency response of the impulse response of the system described by the difference equation y(n)-1/4 y(n-1)=3x(n)-3/4 x(n-1)	10	CO8	L3
28	1KT14EE004	Find the fourier transform of the following. x(n) = 4 ; -3 ≤ n≤ 3 = 0 ; Otherwise	10	CO8	L4
29	1KT14EE008	State and explain parsavel's theorem	10	CO5	L3
30	1KT15EE002	Obtain the fourier transform of the following signal i)$x(t)=e^{-at}$ u(t);a>0 ii)x(t)=delta(t)	10	CO6	L4
31	1KT15EE003	Using DTFT find the total solution to the difference equation for discrete time signal. 5y(n+2) – 6y(n+1) +y(n) = 0.8 u(n)	10	CO7	L4
32	1KT15EE010	Obtain the difference equation for the system with frequency response $h(e^{j\Omega})=1+e^{-j\Omega}/(1-(1/2\ e^{-j\Omega}))(1=(1/24e^{-j\Omega}))$	10	CO7	L4
33	1KT17EE002	State and explain following DTFT properties I) Time shift ii) Linearity	10	CO7	L4
34	1KT17EE003	Obtain the fourier transform of x(t) = te-atu(t)	10	CO6	L4
35	1KT17EE004	Find the fourier transform of rectangular pulse shown below $x(\omega) = 1/(a+j\omega)^2$	10	CO6	L4
36	1KT17EE006	Find the frequency response & impulse response of the system described by differential equation dy(t)/dt + 8y(t) =x(t)	10	CO6	L4
37	1KT17EE007	Find the Fourier transform of i) x(t)= t2 u(t) u(1-t) and ii) x(t)= t exp(- t) u(t) , >0	10	CO6	L4
38	1KT17EE008	Find the fourier transform of triangular pulse x(t) =(t/m) ={102| t|/m |t| 0 otherwise	10	CO	L3

D3. TEACHING PLAN - 3

Module – 5

Title:	Distribution and Reliability and Quality of distribution system	Appr Time:	10 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Apply z-transform and its properties for the analysis of discrete time system using partial fraction expansion method.	CO9	L4
2	Apply the unilateral z-transform to solve difference equation.	CO10	L4
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
1	Introduction to Z-transform	CO9	L2
2	Z-transform and properties of ROC,	CO9	L2
3	Properties of Z-transforms,	CO9	L2
4	Problems on Z-transform	CO9	L4
5	inversion of Z-transform by power series method	CO10	L4
6	Inverse Z-transform by partial fraction expansion method	CO10	L4
7	Problems	CO10	L4
8	Transforms analysis of LTI systems, Transfer function, stability and causality,	CO10	L3
9	unilateral Z-transform and its application to solve difference equations .	CO10	L4
10	Problems.	CO10	L4
c	**Application Areas**	**CO**	**Level**
1	Analysis of digital system,system design,automatic controls in telecommunication.	CO10	L3
2	Simulate the continuous system, Analysis of digital filters	CO9	L4
d	**Review Questions**	-	-
1	Define Z-Transform for a general discrete time signal x[n].	CO9	L2
2	What is ROC w.r.t. Z-Transform?	CO9	L2
3	What are the properties of ROC?	CO9	L2
4	What are the properties of Z-Transforms?	CO9	L3
5	State and prove the properties of Unilateral Z-Transform and ROC.	CO9	L3
6	Find the Z-Transform of x[n] = $-u(n-1)+(1/2)^n u(n)$	CO9	L4
7	Determine the Z-Transform, ROC, pole and zero locations for the following signals: a) $x(n) = (1/2)^n u(n) + (-1/3)^n u(n)$ b)$x(n) = e^{j\Omega 0^n} u(n)$	CO10	L4
8	Find the inverse Z-Transform of ,$H(Z) = (1+Z^{-1})/ (1-0.9e^{j\pi/4} Z^{-1})(1-0.9e^{-j\pi/4} Z^{-1})$	CO10	L4
9	Find the inverse Z-Transform assuming a) Signal is causal; b) Signal has DTFT $1/(1-1/2\ Z^{-1}) + 2/(1-2Z^{-1})$	CO10	L4
10	A system is described by the difference equation y[n] – y[n-1] + 1/4 y[n-2] = x[n] + 1/4 x[n-1] – 1/8 x[n-2] a) Find the Transfer Function of the Inverse System. b) Does a stable and causal inverse system exist?	CO10	L4
11	Define Z transform?What are the two types of Z transform? Define unilateral Z transform.	CO9	L2
12	What is region of Convergence and What are the Properties of ROC.	CO9	L2
13	What is the time shifting property of Z transform, differentiation property in Z domain, convolution property of Z transform..	CO9	L3
14	State the methods to find inverse Z transform.	CO10	L3
15	State and prove parseval's relation for Z transform	CO10	L3
e	**Experiences**	-	-

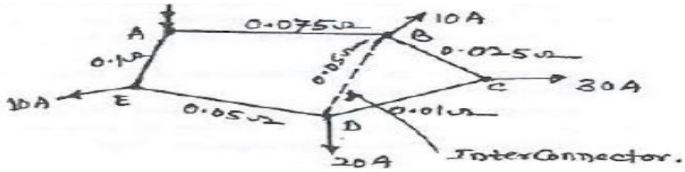
E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code:	17EE54	Sem:	5	Marks:	30	Time:	75 minutes		
Course:	Signals and Systems								
-	**-**	**Note: Answer any 2 questions, each carry equal marks.**					**Marks**	**CO**	**Level**
1	a	Find the Z-transform of the sequence, and sketch the ROC and pole zero location i) $x(n)=(1/3)^n \sin(\Pi/4\ n)\ u(n)$ ii)$x(n)=a^n u(n)+b^n u(-n-1)$					8	CO9	L4
	b	What is ROC with respect to Z-transform? What are its properties					7	CO9	L3
2	a	Find the inverse z transform of the following by partial fraction method $X(z)=(z^4 + z^2) / (z^2-3/4\ z+1/8)$ $\lvert z\rvert>1/2$					8	CO10	L4
	b	Find the inverse Z transform of X(Z) by power series expansion method $X(Z)= 1/ 1-1.5Z^{-1}+0.5Z^{-2}$ ROC: $\lvert Z\rvert<1$					7	CO9	L4
3	a	A difference equation of the system is given as below determine the transfer function of the inverse system. Check whether the inverse system is causal and stable. $y(n)-y(n-1)+1/4\ y(n-2)=x(n)+1/4\ x(n-1)-1/8x(n-2)$					8	CO10	L3
	b	Determine the forced response for the following system $y(n)-5/6\ y(n-1)+1/6\ y(n-2)=x(n)$ if input $x(n)=2^n u(n)$					7	CO10	L2
4	a	Solve the following difference equation $y(n)-1/9\ y(n-2)=x(n-1)$ with $y(-1)=0$, $y(-2)=1$ & $x(n)=3u(n)$					8	CO10	L4
	b	Explain the following properties i) Convolution property ii) Initial value theorem					7	CO10	L4

b. Assignment – 3

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions									
Crs Code:	17EE54	Sem:	5	Marks:	10	Time:	90 – 120 minutes		
Course:	Design and Analysis of Algorithms								
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.									
SNo	**USN**	**Assignment Description**					**Marks**	**CO**	**Level**
1	1KT17EE002	Determine the transfer function and impulse response for the causal LTI system described by the equation using Z transform $Y(n) – 1/4y(n-1)-3/8y(n-2) = -x(n) + 2x(n-1)$					5	CO9	L4
2	1KT17EE003	Find the inverse Z Transform of $X(z) = 1/(1-0.5Z^{-2}–1 + 0.5Z^{-1}–2)$ for ROC $\lvert Z\rvert >1$					5	CO9	L3
3	1KT17EE004	Find the Z-transform of the following i) $x(n) = 2n\ u(-n-1)$ ii) $x(n) = (3)2n\ u(-n)$					5	CO10	L4
4	1KT17EE006	Solve the following difference equation using unilateral Z-transform $Y(n) + 3y(n-1) = x(n)$ with $x(n) = u(n)$ and the initial condition $y(-1) =1$					5	CO10	L4
5	1KT17EE007	Prove the following properties of Z-transform i) Linearity ii) Initial value theorem					5	CO9	L3
6	1KT17EE008	Find Inverse Z-transform of the following using partial fraction expansion method. $X(z) = (1+2z-1+z-2)/(1-1.5z-1+0.5z-2)$					5	CO9	L4
7	1KT17EE011	Check whether the system is causal or not ,the H(z) is given by (z3 + z)/(z+1). ii) H(z) is given by (z/z0a).,|a|<1.					5	CO9	L4
8	1KT17EE014	Determine the transfer function for the system described by					5	CO9	L4
9	1KT17EE015						5	CO10	L4
10	1KT16EE010						5	CO10	L4

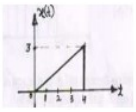
		x(z)=1/(1+z-1) (1-z-1)2 ROC : |Z>1|			
11	1KT18EE401	A single phase distributor one km long has resistance and reactance per conductor Of 0·1 Ω and 0·15 Ω respectively. At the far end, the voltage VB = 200 V and the current is 100 A at a p.f. of 0·8 lagging. At the mid-point M of the distributor, a current of 100 A is tapped at a p.f. of 0·6 lagging with reference to the voltage VM at the mid-point. Calculate : (i) voltage at mid-point (ii) sending end voltage VA (iii) phase angle between VA and VB	10	CO9	L4
12	1KT14EE004	A 3-phase ring main ABCD fed at A at 11 kV supplies balanced loads of 50 A at 0.8 p.f. lagging at B, 120 A at unity p.f. at C and 70 A at 0·866 lagging at D, the load currents being Referred to the supply voltage at A. The impedances of the various sections are : Section AB = (1 + j 0·6) Ω ; Section BC = (1·2 + j 0·9) Ω Section CD = (0·8 + j 0·5) Ω ; Section DA = (3 + j 2) Ω. Calculate the currents in various sections and station bus-bar voltages at B, C and D.	10	CO9	L4
13	1KT14EE008	Distinguish between reliability, availability, adequacy and security.	10	CO10	L2
14	1KT15EE002	Discuss the commonly used distributors for failure	10	CO10	L2
15	1KT15EE003	What are life failure rate curves?	10	CO10	L2
16	1KT15EE010	Why is PQ important?	10	CO10	L2
17	1KT17EE002	Define failure rate.	10	CO10	L2
18	1KT17EE003	Define under voltage, over voltage sag and swell.	10	CO10	L2
19	1KT17EE004	Distinguish between sag and interruption.	10	CO10	L2
20	1KT17EE006	What are transients?	10	CO10	L2
21	1KT17EE007	What are harmonics?	10	CO10	L2
22	1KT17EE008	Define THD.	10	CO10	L2
23	1KT17EE011	What are the properties of Z-Transforms?	5	CO9	L3
24	1KT17EE014	State and prove the properties of Unilateral Z-Transform and ROC.	5	CO9	L3
25	1KT17EE015	Find the Z-Transform of x[n] = -u(n-1)+(1/2)^n u(n)	5	CO9	L4
26	1KT16EE010	Determine the Z-Transform, ROC, pole and zero locations for the following signals: a) x(n) = (1/2)^n u(n) + (-1/3)^n u(n) b)x(n) =$e^{j\Omega}$ 0^n u(n)	5	CO9	L4
27	1KT18EE401	Find the inverse Z-Transform of ,H(Z) = (1+Z^{-1})/ (1-0.9$e^{j\pi/4}$ Z^{-1})(1-0.9$e^{-j\pi/4}$ Z^{-1})	5	CO9	L4
28	1KT14EE004	Find the inverse Z-Transform assuming a) Signal is causal; b) Signal has DTFT 1/(1-1/2 Z^{-1}) + 2/(1-2Z^{-1})	5	CO10	L4
29	1KT14EE008	A system is described by the difference equation y[n] – y[n-1] + 1/4 y[n-2] = x[n] + 1/4 x[n-1] – 1/8 x[n-2] a) Find the Transfer Function of the Inverse System. b) Does a stable and causal inverse system exist?	5	CO10	L4
30	1KT15EE002	Define Z-Transform for a general discrete time signal x[n].	5	CO9	L4

F. EXAM PREPARATION

1. University Model Question Paper

Course:	SIGNALS AND SYSTEMS					Month / Year	May /2019
Crs Code:	17EE54	Sem:	5	Marks:	80	Time:	180 minutes

Module	Note	Answer all FIVE full questions. All questions carry equal marks.	Marks	CO	Level
1	a	Distinguish between i) Even and Odd Signals ii) Periodic and nonperiodic signals	4	CO1	L3
	b	b. Determine whether the following signals are periodic, if periodic determine the fundamental period. i) x(t) = cos2t + sin3t ii)x[n] = sin2n	4	CO1	L3
	c	c. Sketch the following signal for x(t) is shown in figure. i) x(3t+2) ii) x(2(t +2)	8	CO2	L4

		iii) x(-2t-1) iv) x(-2t+3) 			
1	a	a. Find total energy of the following signals i) x(t) = A ; -T/2 < t < T/2 ii) $x(t)=\begin{cases}\frac{1}{2}[\cos(\omega t)+1] & \frac{-\pi}{\omega}\le t\le \pi/\omega \\ 0 & \text{otherwise}\end{cases}$ = 0 ; Otherwise	8	CO2	L4
	b	Determine whether the system y(t) = x(n2) is i) Linear ii) Time-invarient iii) Memory iv) Causal v) Stable	8	CO2	L3
		OR			
2	a	Consider an LTI system with input x(n) & unit impulse response h(n) given below, Compute y(n). x(n) = 2n u(-n); & h(n) = u(n)	8	CO3	L3
	b	Find the step response for the LTI system represented by impulse response i) h(n) = u(n) ii) h(n) = (1/2)n u(n)	4	CO4	L4
	c	Determine stability & causality of the following i) h(n) = (1/2)n u(n) ii) h(t) = e-3tu(t-1)	4	CO4	L4
		OR			
2	a	Find Forced r $\frac{d^3y(t)}{dt^3}+\frac{2dy(t)}{dt}+3y(t)=x(t)+\frac{3dx(t)}{dt}$ n) – 5/6 y(n-1) + 1/6 y(n-2) = x(	10	CO3	L3
	b	Draw direct form-I & II structures for the system described by the differential equation.	6	CO4	L4
3	a	State & prove the following properties of FT. i) Time shifting property ii) parseval's theorem	10	CO6	L3
	b	Obtain the fourier transform of x(t) = $te^{-at}u(t)$	6	CO5	L4
		OR			
3	a	Find the fourier transform of rectangular pulse shown below x(**ω**) = $1/(a+j\omega)^2$	8	CO5	L3
	b	Find the frequency response & impulse response of the system described by differential equation. dy(t)/dt + 8y(t) =x(t)	8	CO6	L4
4	a	Obtain the DTFT of the signal x[n] =2n u(-n)	6	CO7	L4
	b	State & prove the following properties of DTFT. i) Convolution property ii) Frequency differentiation.	10	CO8	L3
		OR			
4	a	Using DTFT find the total solution to the difference equation for discrete time signal. 5y(n+2) – 6y(n+1) +y(n) = 0.8 u(n)	8	CO8	L3
	b	Find the fourier transform of the following. x(n) = 1 ; -2 ≤ n≤ 2 = 0 ; Otherwise	8	CO7	L4
5	a	Find the Z-transform of the following i) x(n) = 2n u(-n-1) ii) x(n) = (3)2n u(-n)	8	CO9	L3
	b	Prove the following properties of Z-transform i) Linearity ii) Initial value theorem	8	CO9	L4
		OR			
5	a	Find Inverse Z-transform of the following using partial fraction expansion method. $X(z) = (1+2z^{-1}+z^{-2})/(1-1.5z^{-1}+0.5z^{-2})$	8	CO9	L4
	b	Solve the following difference equation using unilateral Z-transform Y(n) + 3y(n-1) = x(n) with x(n) = u(n) and the initial condition y(-1) =1	8	CO10	L4

2. SEE Important Questions

Course:	Transmission and Distribution	Month / Year	May /2018

Crs Code:	17EE43	Sem:	IV	Marks:	60	Time:	180 minutes
	Note Answer all FIVE full questions. All questions carry equal marks.					-	-
Module	Qno.	Important Question				**Marks**	**CO**	**Year**
1	1	Distinguish between: i) Energy signal and Power signal ii)Continuous and Discrete time signals iii) Even and Odd signal iv)Periodic and non periodic signals				6	CO1	2016
	2	Determine the even and Odd components of the signal i) $x(t)=1+t^2+t$ $\tan t+\tan^2 t$ $\cot t + \cot^3 t$ ii) $x(t)=[\sin t+\cos t]^3$				6	CO1	2016
	3	Determine whether the following signals are periodic, if periodic determine the fundamental period i) $x(t)=[2\cos^2(\pi t/2)-1]\sin\pi t \cos\pi t$ ii) $x(n)=\cos(\pi n/7) \sin(\pi n/3)$				6	CO1	2017
	4	Determine the following signal is Energy or Power signal i) $x(t)=e^{-a\|t\|}$ $a>0$ ii) $x(t) = \begin{cases} 5+t & \text{for } (-5,-4) \\ 1 & \text{for } (-4, 4) \\ 5-t & \text{for } (4, 5) \\ 0 & \text{otherwise} \end{cases}$				6	CO1	2017
	5	Determine whether the system is i) Linear ii) Time Invariant iii) memoryless iv) causal v) stable i) $y(t)=d/dt\{e^{-t} x(t)\}$ ii) $y(n)=x(k+2)$				6	CO2	2016
2	1	The impulse response of a continuous time LTI system is given by $h(t)=e^{2n}u(n-1)$ and the input $x(n)= 2u(n)+5u(n-1)$				8	CO3	2015
	2	A continuous time LTI system with unit impulse response $h(t)=u(t)$ and input $x(t)=e^{-at} u(t)$ $a>0$ find convolution of the signals				6	CO3	2016
	3	Find the step response for the LTI system represented by the impulse response $h(n)=(1/2)^n u(n)$.				8	CO3	2009
	4	consider a continuous time LTI system is represented by the impulse response $h(t)=e^{-3t} u(t-1)$ determine whether it is i)stable ii) causal				6	CO4	2017
	5	Solve the differential equation, $d^2y(t)/dt^2 + 3 dy(t)/dt + 2y(t) = 2x(t)$ with $y(0)=-1$ $dy(t)/dt$ with $t=0$ and $x(t)=\cos t\, u(t)$				8	CO4	2017
3	1	Determine Fourier transformation of following signals. i) $x(t) = e-at\, u(t)$ ii) $x(t) = \cos t\, wot$.				6	CO5	2016
	2	Find the frequency response and the impulse response of the system described by the differential equation. $d^2 y/dt^2 +5d y/dt +6y =-d /dt\, x(t)$.				8	CO6	2017
	3	State and explain parsavel's theorem				6	CO5	2017
	4	Obtain the fourier transform of the following signal i)$x(t)=e^{-at} u(t)$;$a>0$ ii)$x(t)=$delta(t)				8	CO6	2017
	5	obtain the fourier transform of $x(t) = te^{-at}u(t)$				6	CO5	2015
4	1	State and explain following DTFT properties I) Time shift ii) Linearity				6	CO7	2017
	2	Determine the DTFT of the following signal, i)$x(n)=u(n)$ ii) $x(n)=2^n u(-n)$				6	CO7	2017
	3	Obtain the frequency response of the impulse response of the system described by the difference equation $y(n)-1/4\, y(n-1)=3x(n)-3/4\, x(n-1)$				8	CO7	2016
	4	Find the fourier transform of the following. $x(n) = 1$; $-2 \le n \le 2$ $= 0$; Otherwise				6	CO8	2016
	5	Obtain the DTFT of the signal $x[n] =2n\, u(-n)$				6	CO8	2017
5	1	Find the inverse Z-Transform assuming a) Signal is causal; b) Signal has DTFT $1/(1-1/2\, Z^{-1}) + 2/(1-2Z^{-1})$				5	CO9	2016
	2	What is z-transformation? List the properties of ROC. State and prove following properties i) Convolution ii) Time reversal				8	CO9	2016
	3	Find Inverse Z-transform of the following using partial fraction expansion method. $X(z) = (1+2z^{-1}+z^{-2})/(1-1.5z^{-1}+0.5z^{-2})$				6	CO10	2016

	4	Solve the following difference equation using unilateral Z-transform Y(n) + 3y(n-1) = x(n) with x(n) = u(n) and the initial condition y(-1) =1	6	CO10	2017
	5	Find the z-transformation of i) x(n) = n a nu(-n) ii) x(n) = n sin (∏/2n)u(-n)	8	CO10	2017