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SASURIE COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi. Affiliated to Anna University, Chennai

Near NH544, Coimbatore Bypass, Near Vijayamangalam Tollgate,Tirupur 638056

NAAC DOCUMENTS

QUALITY INDICATOR FRAME WORK

CRITERION - 1

CURRICULAR ASPECTS

SUBMITTED BY

IQAC

INTERNAL QUALITY ASSURANCE CELL

SASURIE COLLEGE OF ENGINEERING

Criterion 1	Curricular Aspects	100

1.1 Curricular Planning and Implementation (20)

1.1.1The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

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SASURIE INSTITUTIONS

SASURIE
College of Engineering

Department : ECE
Subject Code & Name : EC8651 - Transmission Lines & RF Systems
Class & Batch : III - 2019-2023
Semester : 06

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	Prepared By	Approved By
Sign		
Name	N. Siva	Mr.T. Nanicham
	Faculty	HOD

Head of ECE Department
SASURIE College of Engineering

Dr.M.VIJAYAKUMAR ME., Ph.D.
PRINCIPAL
SASURIE COLLEGE OF ENGINEERING

SASURIE

SASURIE
College of Engineering

CLASS TIME TABLE Academic Year 2021-22 EVEN Semester

Faculty Name: Mr.M.GOKULNATH
Department : ECE
Class : I III YEAR

HOUR / DAY		I 9.30am-10.15am	II 10.15am-11.00am	11.00am-11.30am	III 11.30am-12.15pm	IV 12.15pm-1.00pm	12.40pm-1.20pm	V 01.20pm-2.00pm	VI 02.00pm-02.40pm	02.40pm-02.50pm 02.50pm-03.30pm
DAY 1	PRAYER	TLRF		BREAK			LUNCH			BREAK
DAY 2					TLRF					
DAY 3								TLRF		
DAY 4					TLRF					
DAY 5			TLRF							

S.No	Subject Code	Acronym	Name of the Subject	Name of the Staff & Department	No. of hours
1	EC8651	TLRF	Transmission Lines and RF Systems	Mr.M.GOKULNATH, AP/ECE	

	Prepared By	Verified By	Authorized By
Sign	V.Sur		
Name	Mrs.V.SUREGA	Mr.I.MANICKAM	Dr.E.NANDAKUMAR
	TIME TABLE I/C	HOD / ECE	Principal

Head of ECE Department
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College of Engineering

Academic Year 2021 - 2022 EVEN Semester

STUDENTS NAME LIST

Department : Electronics and Communication Engineering
Year/Sem III / VI

Sl. No	Register Number	Student's Name	H/D
1	732419106001	EMILY S	D
2	732419106003	MOWNELSHEN	D
3	732419106004	SARANYA DEVI V	D
4	732419106005	UMESHKUMAR S	D
5	732419106006	YOGESH S	D
6	732419106301	KAVIYA PRIYA G	D
7	732419106302	VIVEK S M	D

SIGN		
NAME	Mrs.V.SURLGA	Mr.T.MANICKAM
	CLASS ADVISOR	HOD

Head of ECE Department
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SUBJECT INFORMATION RECORD

Department	: ECE
Subject	: EC 6651 – Transmission lines & RF systems
Year	: III
Semester	: 06
Last year handled by	:
Percentage of Result (last year)	: 100%
Quality Objectives	: To produce more than 90% in AU Exam.

Reference Book

1. John D Ryder, – Networks, lines and fields, 2nd Edition, Prentice hall India, 2015.
2. Mathew M. Radmanesh - Radio frequency & Microwave Electronics. Pearson Education Asia, Second Edition 2009

	Prepared By	Approved By
Sign		
Name	N. Siva	Mr. T. Manickam
	Faculty	HOD

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EC8651 TRANSMISSION LINES AND RF SYSTEMS L T P C
3 0 0 3

OBJECTIVES:

- To introduce the various types of transmission lines and its characteristics
- To give thorough understanding about high frequency line, power and impedance measurements
- To impart technical knowledge in impedance matching using smith chart
- To introduce passive filters and basic knowledge of active RF components
- To get acquaintance with RF system transceiver design

UNIT I TRANSMISSION LINE THEORY 9

General theory of Transmission lines - the transmission line - general solution - The infinite line - Wavelength, velocity of propagation - Waveform distortion - the distortion-less line - Loading and different methods of loading - Line not terminated in Z0 - Reflection coefficient - calculation of current, voltage, power delivered and efficiency of transmission - Input and transfer impedance - Open and short circuited lines - reflection factor and reflection loss

UNIT II HIGH FREQUENCY TRANSMISSION LINES 9

Transmission line equations at radio frequencies - Line of Zero dissipation - Voltage and current on the dissipation-less line, Standing Waves, Nodes, Standing Wave Ratio - Input impedance of the dissipation-less line - Open and short circuited lines - Power and impedance measurement on lines - Reflection losses - Measurement of VSWR and wavelength

UNIT III IMPEDANCE MATCHING IN HIGH FREQUENCY LINES 9

Impedance matching: Quarter wave transformer - Impedance matching by stubs - Single stub and double stub matching - Smith chart - Solutions of problems using Smith chart - Single and double stub matching using Smith chart.

UNIT IV WAVEGUIDES 9

General Wave behavior along uniform guiding structures – Transverse Electromagnetic Waves, Transverse Magnetic Waves, Transverse Electric Waves – TM and TE Waves between parallel plates. Field Equations in rectangular waveguides. TM and TE waves in rectangular waveguides. Bessel Functions, TM and TE waves in Circular waveguides

UNIT V RF SYSTEM DESIGN CONCEPTS 9

Active RF components: Semiconductor basics in RF, bipolar junction transistors, RF field effect transistors, High electron mobility transistors Basic concepts of RF design, Mixers, Low noise amplifiers, voltage control oscillators, Power amplifiers, transducer power gain and stability considerations

TOTAL:45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Explain the characteristics of transmission lines and its losses
- Write about the standing wave ratio and input impedance in high frequency transmission lines
- Analyze impedance matching by stubs using smith charts
- Analyze the characteristics of TE and TM waves
- Design a RF transceiver system for wireless communication

TEXT BOOKS:

1. John D Ryder, —Networks, lines and fields||, 2nd Edition, Prentice Hall India, 2015 (UNIT IIV)
2. Mathew M. Radmanesh, —Radio Frequency &Microwave Electronics||, Pearson Education Asia, Second Edition,2002. (UNIT V)

REFERENCES:

1. Reinhold Ludwig and Powel Bretchko,|| RF Circuit Design – Theory and Applications|| Pearson Education Asia, First Edition,2001.
2. D. K. Misra, —Radio Frequency and Microwave Communication Circuits- Analysis and Design||, John Wiley & Sons, 2004
3. E C Jordan and K.G. Balmain, —Electromagnetic Waves and Radiating Systems Prentice Hall of India, 2006.
4. G.S N Raju, "Electromagnetic Field Theory and Transmission Lines Pearson Education First edition 2005.

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LESSON PLAN

Faculty Name : Mr.M.GOKULNATH
Designation : Assistant Professor
Department : ELECTRONICS AND COMMUNICATION ENGINEERING
Semester/ Year : III / VI
Subject / Code : TRANSMISSION LINES AND RF SYSTEMS / EC8651
Academic Year : 2021-2022

S No.	Proposed Date	Proposed Period	Details of Topic Covered	TA	Ref.	Actual Date	Actual Period	HOD
UNIT-I TRANSMISSION LINE THEORY								
1	3/7/2022	I	General Theory of Transmission lines	1	1	16/3/22	2	
2	3/8/2022	III	The transmission line General solution	1	1	17/3/22	2	
3	3/9/2022	V	The infinite line Wavelength, velocity propagation	1	1	18/3/22	1	
4	3/10/2022	III	Waveform distortion the distortion less line	1	1	21/3/22	3	
5	3/11/2022	II	Loading and different methods of loading	1	1	22/3/22	5	
6	3/12/2022	III	Line not terminated in Z0 Reflection coefficient	1	1	23/3/22	3	
7	3/14/2022	III	Calculation of current, voltage, power delivered and efficiency of transmission	1	1	24/3/22	2	
8	3/15/2022	V	Input and transfer impedance	1	1	25/3/22	1	
9	3/16/2022	III	Open and short circuited lines reflection factor and reflection loss	1	1	26/3/22	2	
UNIT-II HIGH FREQUENCY TRANSMISSION LINES								
10	3/17/2022	II	Transmission line equations at radio frequencies	1	1	28/3/22	5	
11	3/18/2022	I	Line of zero dissipation	1	1	29/3/22	3	
12	3/21/2022	III	Voltage and current on the dissipation less line	1	1	30/3/22	2	
13	3/22/2022	V	Standing waves, Nodes, Standing wave Ratio	1	1	31/3/22	1	
14	3/23/2022	III	Input impedance of the dissipation less line	1	1	1/4/22	3	
15	3/24/2022	II	Open and short circuited lines	1	1	4/4/22	5	
16	3/25/2022	I	Power and impedance measurement on lines	1	1	5/4/22	3	
17	3/26/2022	II	Reflection loss	1	1	6/4/22	2	
18	3/28/2022	V	Measurement of VSWR and Wavelength	1	1	8/4/22	1	
UNIT-III IMPEDANCE MATCHING IN HIGH FREQUENCY LINES								
19	3/29/2022	III	Impedance matching	1	1	9/4/22	3	
20	3/30/2022	II	Quarter wave transformer	1	1	11/4/22	5	
21	3/31/2022	I	Impedance matching by stubs	1	1	12/4/22	3	
22	4/1/2022	III	Single stub matching	1	1	13/4/22	2	
23	4/11/2022	V	Double stub matching	1	1	25/4/22	1	
24	4/12/2022	III	Smith chart	1	1	26/4/22	1	
25	4/13/2022	II	Solutions of problems using smith chart	1	1	27/4/22	5	
26	4/18/2022	I	Single stub matching using smith chart	1	1	28/4/22	3	
27	4/19/2022	III	Double stub matching using smith chart	1	1	29/4/22	1	

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LESSON PLAN

Designation: Assistant Professor
Semester/ Year: III / VI

Faculty Name : Mr.M.GOKULNATH
Department : ELECTRONICS AND COMMUNICATION ENGINEERING
Subject / Code : TRANSMISSION LINES AND RF SYSTEMS / EC8651
Academic Year : 2021-2022

S.No	Proposed Date	Proposed Period	Details of Topic Covered	TA	Ref.	Actual Date	Actual Period	HOD
			UNIT-IV WAVEGUIDES					
28	4/20/2022	V	General wave behavior along uniform guiding structures	1	1	30/4/22	2	
29	4/21/2022	III	Transverse Electromagnetic waves	1	1	2/5/22	1	
30	4/22/2022	II	Transverse magnetic waves	1	1	4/5/22	3	
31	4/23/2022	I	Transverse Electric waves	1	1	6/5/22	5	
32	4/25/2022	I	TM and TE waves between parallel plates	1	1	9/5/22	3	
33	4/26/2022	III	Field equations in rectangular waveguides	1	1	10/5/22	2	
34	4/27/2022	V	TM and TE waves in rectangular waveguides	1	1	11/5/22	1	
35	4/28/2022	III	Bessel Functions	1	1	12/5/22	3	
36	4/29/2022	II	TM and TE waves in circular waveguides	1	1	12/5/22	5	
			UNIT-V RF SYSTEM DESIGN CONCEPTS					
37	4/30/2022	I	Active RF Components, Semiconductor basics in RF	1	2	13/5/22	5	
38	5/2/2022	I	Bipolar junction transistors	1	2	14/5/22	3	
39	5/4/2022	III	RF field effect transistors	1	2	24/5/22	2	
40	5/5/2022	V	High electron mobility transistors	1	2	25/5/22	1	
41	5/6/2022	III	Basic concepts of RF design	1	2	26/5/22	3	
42	5/16/2022	II	Mixers Low noise amplifiers	1	2	28/5/22	5	
43	5/17/2022	I	Voltage control oscillators	1	2	29/5/22	3	
44	5/18/2022	III	Power amplifiers	1	2	30/5/22	2	
45	5/19/2022	V	Transducer power gain and stability considerations	1	2	30/5/22	1	

Reference books (Ref):

1. John D Ryder, —Networks, lines and fields , 2nd Edition, Prentice Hall India, 2015. (UNIT I-IV)
2. Mathew M Radmanesh, —Radio Frequency &Microwave Electronics , Pearson Education Asia, Second Edition 2002. (UNIT V)

Teaching Aids (TA):

1. Black Board with Chalk
2. Overhead Projector
3. LCD Projector
4. Others (Field visit, Charts, Cutsies Models)

	Prepared by	Verified by	Authorized by
Sign			
Name	Mr. M.GOKULNATH	Mr. E.MANICKAM	Dr.E.NANDAKUMAR
	Faculty	HOD	Principal

Head of ECE Department
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Vijayamangalam, Tiruppur

TEST PLAN FOR SUBJECT

Subject : EC8651 - Transmission Lines & RF Systems

Semester : 06

Department : ECE

S. No.	Description	Planned Date/Month	Actual Conducted Date / Month	Remarks
1.	Internal Test-I	23.04.22	23.04.22	
2.	Internal Test-II	20.05.22.	20.05.22.	
3.	Model Examination	14.06.22.	14.06.22.	

	Prepared By	Approved By
Sign:		
Name:	N. Siva	Mr. T. Manickam
	Faculty	HOD

Head of ECE Department
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SASURIE INSTITUTIONS

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Vijayamangalam, Tirupur

RESULT ANALYSIS OF TEST

Subject : EC8651 - Transmission Lines & RF Systems Date

Class : IV Department : ECE

Semester : 06

Exam details & date : Internal Test-I @ 23.04.23

Faculty :

Number of students : 07

No. of students attended : 07

No. of students absent : Nil

No. of students passed : 07

No. of students failed : Nil

Percentage of failures :

RESULT DATA:

Marks	0-25	26-50	51-75	76-90	91-100
No. of Students	–	–	03	04	–

	Prepared By
Sign:	
Name:	N. Siva
	Faculty

Approved By

Mr. T. Manickam
HOD

Head of ECE Department
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Vijayamangalam, Tirupur

RESULT ANALYSIS OF TEST

Subject : EC8651 - Transmission Lines & RF Systems Date :

Class : III Department : ECE

Semester : 06.

Exam details & date : Internal Test - II & 20.05.22.

Faculty :

Number of students : 07

No. of students attended : 07

No. of students absent : Nil

No. of students passed : 07

No. of students failed : Nil

Percentage of failures :

RESULT DATA:

Marks	0-25	26-50	51-75	76-90	91-100
No. of Students	—	—	04	02	01

	Prepared By
Sign:	
Name:	N. Siva.
	Faculty

Approved By

Mr. T. Manickam
HD

Head of ECE Department
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RESULT ANALYSIS OF TEST

Subject : EC 8651 - Transmission Lines & RF Systems Date :

Class : III Department : ECE

Semester : 06

Exam details & date : Model Exam

Faculty :

Number of students : 07

No. of students attended : 07

No. of students absent : Nil

No. of students passed : 07

No. of students failed : Nil

Percentage of failures : —

RESULT DATA:

Marks	0-25	26-50	51-75	76-90	91-100
No. of Students	—	01	06	—	—

	Prepared By
Sign:	
Name:	N. Siva
	Faculty

Approved By

Mr. T. Manickam.
HOD

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CORRECTIVE ACTION REPORT

Dept : ECE

Year : II

Semester : 04

Subject : EC8651 - Transmission Lines & RF Systems

S.No	Internal Test	Percentage of marks	Root Cause (Metries)	Corrective Action	Deadline date	Remarks
1.	I	100%	-	-	-	-
2.	II	100%	-	-	-	-
3.	Model Exam	100%	-	-	-	-

	Prepared By
Sign:	
Name:	N. Siva
	Faculty

Approved By

Mr. T. Hamsavam
HOD

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QUALITY OBJECTIVE MONITORING RECORD

Department : ECE

Year : III

Semester : 06

Subject : EC 8651 – Transmission Lines & RF Systems.

S.No	Quality Objective	Internal Test-I		Internal Test-II		Model Test-I	
		Expecting result	Obtained result	Expecting result	Obtained result	Expecting Result	Obtained result
1.	> 90%	> 90%	100%	> 90%	100%		

	Prepared By	Approved By
Sign:		
Name:	N. Siva	M.r. T. Manickam.
	Faculty	HOD

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Register Number:												

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Internal Test-II			Date/Session	20.05.2022	Marks	50
Course code	EC8651	Course Title	Transmission Lines and RF Systems			
Regulation	2017	Duration	1.30 Hours	Academic Year	2021-2022	
Year	III	Semester	IV	Department	ECE	

COURSE OUTCOMES

CO1:	To introduce the various types of transmission lines and its characteristics.
CO2:	To give thorough understanding about high frequency line, power and impedance measurements.
CO3:	To impart technical knowledge in impedance matching using smith chart.
CO4:	To introduce passive filters and basic knowledge of active RF components.
CO5:	To get acquaintance with RF system transceiver design.

Q.No.	Question	CO	BTS
	PART A		
	(Answer all the Questions 10 x 2 = 20 Marks)		
1	List the assumptions made while analyzing a transmission line at radio frequencies.	CO3	AN
2	Define standing wave ratio. Also express standing wave ratio in terms of a reflection coefficient.	CO3	R
3	Give the maximum and minimum input impedance of the dissipation less line.	CO3	AP
4	A loss less line has a characteristic impedance of 400 ohm. Determine the standing wave ratio if the receiving end impedance is 800 + j 0.0 ohm.	CO3	E
5	Define surge impedance.	CO3	R
6	Why the point of voltage minimum is measured rather than voltage maximum?	CO4	R
7	State the application of half line .	CO4	R
8	Define skin effect.	CO4	R
9	Write the expression for input impedance with open circuited, short circuited and matched load for dissipation less line.	CO4	R
10	Define node and anti node.	CO4	R
	PART B		
	(Answer all the Questions 2 x 15 = 30 Marks)		

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11a	Discuss the various parameters of open wire and co-axial line at radio frequency.	CO3	C
	OR		
11b	Derive the expression that permit easy measurement of power flow on a line of negligible losses.	CO3	C
12a	Discuss in detail about the voltage and current on the dissipation less line.	CO4	C
	OR		
12b	Discuss in details about the variation of input impedance along open and short circuit lines with relevant graphs.	CO4	C

18/5/22

Course Faculty

(Name /Sign / Date)

N. Siva.

18/5/2022

HOD

(Name /Sign / Date)

T. MANICKAM

Principal

(Name /Sign / Date)

Dr. E. NANDAKUMA

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Internal Assessment Test Answer Book

Name	Kaviya priya. G.			Year/ Semester/Section	III/VI
Register Number	732419106301	Date/Session	20.5.22/FN	Department	ECE
Course code	EC8651	Course Title	Transmission Lines and RF systems.		
Internal Assessment Test	IAT 1 ☐	IAT 2 ☑	IAT 3 ☐	Model ☐	
Name and Signature of the Invigilator with date	20/5/22 N. SIVA				

Instruction to the Student: Put tick mark to the question attended in the column against question.

Part A			Part B/ Part C						Total Marks
Q. No.	✓	Marks	Q. NO.	✓	a Marks	✓	b Marks		
1	✓	2	11	✓	15				15
2	✓	2	12	✓	12				12
3	✓	1	13						
4	✓	2	14						
5	✓	1	15						
6	✓	2	16						
7	✓	1					Grand Total		27
8	✓	2							
9	✓	2							
10	✓	1	45 Grand Total				NSIVA Name and Signature of the Examiner with date		
Total		18							

To be filled by the examiner

Course Outcomes	1	2	3	4	5	6	Total
Marks allotted	~~25~~	–	25	25	–	–	50
Marks Obtained	–	–	24	21	–	–	45

IQAC Audit - Remarks

Marks verified

22/5/2022
(T. MATTICKAM)
Name and Signature of the IQAC member

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DEPARTMENT OF Electronics and Communication Engineering

Assignment Question Paper

Assignment – 01			Date of Issue:	16.03.2022	Marks	10
Course code	EC8651	Course Title	Transmission Lines and RF Systems			
Year	III	Semester	VI	Date of Submission:	25.03.2022	

Q.No	Questions	CO
1	Explanation of secondary constants.	CO1
2	Determination of propagation constant.	CO1

16/3/22

Name and Signature of the Faculty Incharge

N.Siva.

16/3/2022

HoD/ECE

(T.MANICKAM)

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PRINCIPAL
SASURIE COLLEGE OF ENGINEERING,
Vijayamangalam - 638 056, Tirupur (Dt).

SASURIE
College of Engineering
Vijayamangalam, Tirupur

DEPARTMENT OF Electronics and Communication Engineering

Assignment Answer Sheet

Name of the Student: V. Saranya devi.

AU Register Number: 732419106004

Assignment – 01			Date of Issue:	16.03.2022	Marks	10
Course code	EC8651	Course Title	Transmission Lines and RF Systems			
Year	III	Semester	VI	Date of Submission:	25.03.2022	

Q.No	Questions	CO
1	Explanation of secondary constants.	CO1
2	Determination of propagation constant.	CO1

Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Content Quality	6	6
Presentation Quality	2	2
Timely submission	2	2
Total marks	10	10

28/03/22

Name and Signature of the Faculty In charge

N. Siva.

28/3/2022

HoD/ ~~ECE~~

(T. MANICKAM)

Dr.M.VIJAYAKUMAR ME., Ph.D.,
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