MOHAMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN

Department of Electronics and Communication Engineering

Name of the Subject	Transmission lines and RF systems	Name of the handling Faculty	Dr.M.SIVAKUMAR
Subject Code	EC8651	Year / Sem	III/VI
Acad Year	2021-2022	Batch	2019-2023

Course Objective

1) To introduce the various types of transmission lines and its characteristics
2) To impart technical knowledge in impedance matching using smith chart
3) To introduce passive filters and basic knowledge of active RF components
4) To introduce passive filters and basic knowledge of active RF components
5) To get acquaintance with RF system transceiver design

Course Outcome

CO1: Explain the characteristics of transmission lines and its losses
CO2: Write about the standing wave ratio and input impedance in high frequency transmission lines
CO3: Analyze impedance matching by stubs using smith charts
CO4: Analyze the characteristics of TE and TM waves
CO5: Design a RF transceiver system for wireless communication

Lesson Plan

Sl. No.	Topic(s)	T / R* Book	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc)	Blooms Level (L1-L6)	CO	PO
	UNIT I-TRANSMISSION LINE THEORY						
1	General theory of Transmission lines	T1	1	BB	L1	CO1	PO1,PO2
2	The transmission line- General solution	T1,T2	1	BB	L2	CO1	PO1,PO2,PO3
3	The infinite length- wavelength, velocity of	T1,T2	1	BB	L2	CO1	PO1,PO2,PO3
4	Waveform distortion-the distortion less line	T1,T2	1	BB	L3	CO1	PO1,PO2,PO3
5	Loading and different methods of loading	T1,T2	1	BB	L1	CO1	PO1,PO2,PO3
6	Line not terminated in z0 -Reflection coefficient	T1,T2	1	BB	L2	CO1	PO1,PO2,PO3
7	Calculation of current, voltage, power delivered and efficiency of transmission	T1,T2	1	BB	L2	CO1	O4,PO5,PO6,PO 11,P012
8	Input and transfer impedance	T1,T2	1	BB	L2	CO1	PO1,PO2,PO3
9	open and short circuited lines-reflection factor and reflection loss	T1	1	BB	L2	CO1	PO1,PO2,PO3,P O4
Suggested Activity: Assignment / Case Studies / Tutorials/ Quiz / Mini Projects / Model Developed/others Planned if any							
Evaluation method :MARKS WILL BE GIVEN FOR THEIR SOLUTION							
	UNIT II- HIGH FREQUENCY TRANSMISSION LINES						
10	Transmission lines equation at radio frequencies	T1	1	BB	L2	CO2	PO1,PO2,PO3
11	Line of radio dissipation	T1	1	BB	L2	CO2	PO1,PO2,PO3
12	Voltage and current on the dissipation less line	T1	1	BB	L2	CO2	PO1,PO2,PO3
13	Standing waves, Nodes, standing wave ratio	T1,T2	1	BB	L3	CO2	PO1,PO2,PO3,P O4
14	Input impedance of the dissipation less line	T1,T2	1	BB	L3	CO2	PO1,PO2,PO3
15	Open and short circuited lines	T1,T2	1	BB	L2	CO2	PO1,PO2,PO3
16	Power and impedance measurment on line	T1,T2	1	BB	L3	CO2	PO1,PO2,PO3,P O4,PO5,PO6,PO 11,P012
17	Reflection loss	T1,T2	1	BB	L2	CO2	PO1,PO2,PO3
18	Measurement of VSWR and wavelength	T1	1	BB	L3	CO2	PO1,PO2,PO3,P O4,PO5,PO6,PO 11,P012
Suggested Activity: Assignment / Case Studies / Tutorials/ Quiz / Mini Projects / Model Developed/others Planned if any							
Evaluation method :MARKS WILL BE GIVEN FOR THEIR REPORT							
	UNIT III-IMPEDANCE MATCHING IN HIGH FRQUENCY LINES						
19	Impedance matching	T1	1	BB	L2	CO3	PO1,PO2,PO3
20	Quarter wave transformer	T1,T2	1	BB	L2	CO3	PO1,PO2,PO3
21	impedance matching by stubs	T1,T2	1	BB	L3	CO3	PO1,PO2,PO3

22	Single stub matching	**T1,T2**	**1**	**BB**	**L3**	CO3	PO1,PO2,PO3
23	Double stub matching	**T1,T2**	**1**	**BB**	**L3**	CO3	PO1,PO2,PO3
24	Smithchart	**T1,T2**	**1**	**BB**	**L3**	CO3	PO1,PO2,PO3
25	Solutions of problems using smithchart	**T1,T2**	**1**	**BB**	**L4**	CO3	PO1,PO2,PO3,PO4,PO5,PO6,PO11,P012

26	Single stub matching using smithchart	T1	1	BB	L3	CO3	PO1,PO2,PO3PO4,PO5,PO6,PO11,PO12
27	Double stub matching using smithchart	T1,R2	1	BB	L3	CO3	PO1,PO2,PO3,PO4,PO5,PO6,PO11,P012
Suggested Activity: Assignment / Case Studies / Tutorials/ Quiz / Mini Projects / Model Developed/others Planned if any							
Evaluation method :							
UNIT IV- WAVEGUIDES							
28	General wave behavior along uniform guiding	T1,T2	1	BB	L2	CO4	PO1,PO2,PO3
29	Transverse electromagnetic waves	T1,T2	1	BB	L2	CO4	PO1,PO2,PO3
30	Transverse magnetic waves	T1,T2	1	BB	L2	CO4	PO1,PO2,PO3
31	Transverse elctric waves	T1,T2	1	BB	L2	CO4	PO1,PO2,PO3
32	TM and TE waves between parallel plates	T1,T2	1	BB	L4	CO4	PO1,PO2,PO3
33	Field equations in rectangular waveguides	T1,T2	1	BB	L3	CO4	PO1,PO2,PO3,PO4
34	TM and TE waves in rectangular waveguides	T1,T2	1	BB	L3	CO4	PO1,PO2,PO3,PO4
35	Bessel functions	T1,T2	1	BB	L2	CO4	PO1,PO2,PO3,PO4,PO5,PO6,PO11,P012
36	TM and TE waves in circular waveguides	T1,T2	1	BB	L3	CO4	PO1,PO2,PO3,PO4,,PO6
Suggested Activity: Assignment / Case Studies / Tutorials/ Quiz / Mini Projects / Model Developed/others Planned if any							
Evaluation method :Based on the Test							
UNIT V- RF SYSTEM DESIGN CONCEPTS							
37	Active RF components : semiconductor basics in	T1,T2	1	BB	L2	CO5	PO1,PO2,PO3
38	Bipolar junction transistors	T1,T2	1	BB	L2	CO5	PO1,PO2,PO3
39	RF field effect transistors	T1,T2	1	BB	L1	CO5	PO1,PO2,PO3
40	High electron mobility transistors	T1,T2	1	BB	L2	CO5	PO1,PO2,PO3
41	Basic concepts of RF design	T1,T2	1	BB	L3	CO5	O4,PO6,PO11,PO12
42	Mixers low noise amplifiers	T1,T2	1	BB	L2	CO5	PO1,PO2,PO3
43	Voltage controlled oscillators	T1,T2	1	BB	L2	CO5	PO1,PO2,PO3
44	Power amplifiers	T1,T2	1	BB	L2	CO5	PO1,PO2,PO3
45	Transducer power gain and stability considerations	T2,R2,R3	1	BB	L4	CO5	O4,PO6,PO11,PO12
Suggested Activity: Assignment / Case Studies / Tutorials/ Quiz / Mini Projects / Model Developed/others Planned if any							
Evaluation method :BASED THE CONTENT SUBMISSION, MARKS WILL BE AWARDED.							
Content Beyond the Syllabus Planned							
1	Modern planar transmission line- introduction						
2	Power system and Distribution Sysytem - introduction						
Text Books							
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)						
Reference Books							
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.						
Website / URL References							
1	https://www.tutorialspoint.com/microwave_engineering/microwave_engineering_waveguides.htm						
2	https://www.slideshare.net/sunilrathore77398/transmissionlineandwaveguideppt						
3	https://nptel.ac.in/courses/117101056						

Blooms Level

Level 1 (L1) : Remembering	Lower Order Thinking	Fixed Hour Exams	**Level 4 (L4) : Analysing**	Higher Order Thinking	Projects / Mini Projects
Level 2 (L2) : Understanding			**Level 5 (L5) : Evaluating**		
Level 3 (L3) : Applying			**Level 6 (L6) : Creating**		

Mapping syllabus with Bloom's Taxonomy LOT and HOT

Unit No	Unit Name	L1	L2	L3	L4	L5	L6	LOT	HOT	Total
Unit 1	**Transmission line theory**	2	6	1	0	0	0	9	0	9
Unit 2	**High frequency transmission lines**	0	5	**4**	**0**	**0**	**0**	9	0	9
Unit 3	**Impedance matching in high**	0	2	**6**	**1**	**0**	**0**	8	1	9

Unit 4	**Waveguides**	0	5	**3**	**1**	**0**	**0**	8	1	9
Unit 5	**RF system and design concepts**	1	6	**1**	**1**	**0**	**0**	8	1	9
Total		3	24	15	3	0	0	42	3	45
Total Percentage		6.6666667	53.333333	33.333333	6.666666667	0	0	93.33	6.66667	100

CO PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	1	1	1	0	0	0	0	1	1	2	1
CO2	3	2	2	1	1	1	0	0	0	0	1	1	2	1
CO3	3	2	2	1	1	1	0	0	0	0	1	1	2	1
CO4	3	2	2	1	1	1	0	0	0	0	1	1	2	1
CO5	3	2	2	1	1	1	0	0	0	0	1	1	2	1
Avg	**3**	**2**	**2**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**

Justification for CO-PO mapping

CO1	PO1(3) Graduates will learn the basic knowledge of transmission line ,PO2(2) Graduates will able to analyze the problems in the field of transmission lines ,PO12(1),Graduates will be able to upgrades their knowledge in types of RF channeel by life long learning
CO2	PO1(3) Graduates will be able to understand theAnalyze impedance matching by stubs using smith charts, PO2(2) Graduates will able to compare the different impedance matching tehcniques
CO3	PO2(2) Graduates will learn the high frequency line, power and impedance measurements. PO6(1) Graduates will able to Analyze the characteristics of TE and TM waves PO4(1) Graduates will be able to discuss about error performance of all signalling schemes..PO5(1) Graduates will be able to use recent tools in these signalling schemes in microwave and RF communication systems.
CO4	PO2(2) Graduates will be able investigate at research level about equalization in wireless communication systems.PO4(1) Graduates will be able to get passive filters and basic knowledge of active RF components
CO5	PO2(2) Graduates will be able Design a RF transceiver system for wireless communication PO3(2) Graduates will able to To get acquaintance with RF system transceiver design

3	**High level**	**2**	**Moderate level**	**1**	Low level

Name & Sign of Faculty Incharge :Dr. M.SIVAKUMAR, ASSOCIATE PROFESSOR

Name & Sign of Subject Expert :

Head of the Department :

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