



Department of Electronics and Communication Engineering	LP: EC22601
B.E/B.Tech/M.E/M.Tech : B.E-ECE Regulation:2022	Rev. No: 00
PG Specialisation : Not Applicable	Date: 10-01-2025
Sub. Code / Sub. Name : EC22601-Antennas and Microwave Engineering	
Unit : I	

Unit Syllabus:

Microwave frequency bands-Review of low frequency parameters, S-Parameters-Properties of S Parameters, Physical concept of radiation-Near and far field regions-Fields and Power Radiated by an Antenna-Antenna Parameters-Antenna Noise Temperature-Friis transmission equation

Objective: To enable the student to understand the basic concepts in antenna parameters.

Session No.	Topics to be covered	Ref	Teaching Aids
1	Microwave frequency bands-Significance	1,4,6	PPT/BB
2	Review of low frequency parameters-Motivation to high frequency parameters	1,4,6	PPT/BB
3	S-Parameters-Properties of S Parameters	1,4,6	PPT/BB
4	Physical concept of radiation	1,4,6	PPT/BB
5	Near and far field regions	1,4,6	PPT/BB
6	Fields and Power Radiated by an Antenna	1,4,6	PPT/BB
7	Antenna Parameters-Gain,Directivity,Beamwidth	1,4,6	PPT/BB
8	Antenna Parameters-Bandwidth,FBR,Radiation pattern	1,4,6	PPT/BB
9	Antenna Noise Temperature	1,4,6	PPT/BB
10	Friis transmission equation	1,4,6	PPT/BB
11	Tutorial	1,4,6	BB
12	Tutorial	1,4,6	BB
Content beyond syllabus covered (if any): Retarded potential concept			



Sub. Code / Sub. Name: EC22601-Antennas and Microwave Engineering

Unit : II

Unit Syllabus: Radiation Mechanisms of Linear wire antenna-Aperture antennas-Reflector antennas-Microstrip antennas-Frequency independent antennas-Design considerations-Applications.

Objective: To familiarize the students in the area of various antenna designs.

Session No *	Topics to be covered	Ref	Teaching Aids
13	Radiation Mechanisms of antenna	1,4,6	PPT/BB
14	Radiation Mechanisms of Linear wire antenna	1,4,6	PPT/BB
15	Aperture antennas	1,4,5,6	PPT/BB
16	Design considerations-Applications	1,4,5,6	PPT/BB
17	Reflector antennas	1,4,5,6	PPT/BB
18	Design considerations-Applications	1,4,5,6	PPT/BB
19	Microstrip antennas	1,4,6	PPT/BB
20	Design considerations-Applications	1,4,6	PPT/BB
21	Frequency independent antennas	1,4,6	PPT/BB
22	Design considerations-Applications	1,4,6	PPT/BB
23	Tutorial	1,4,6	BB
24	Tutorial	1,4,6	BB

Content beyond syllabus covered (if any): Radiation mechanism of monopole antenna

* Session duration: 50 mins



Sub. Code / Sub. Name: EC22601-Antennas and Microwave Engineering

Unit : III

Unit Syllabus: Two-element array, Array factor, Pattern multiplication, Uniformly spaced arrays with uniform excitation amplitudes, Non-uniform excitation amplitudes, Binomial Array, Smart antennas, Antenna for 5G applications.

Objective: To analyze antenna arrays and explore smart antenna concepts.

Session No *	Topics to be covered	Ref	Teaching Aids
25	Introduction to antenna arrays	1,3,4,5	BB,PPT
26	Two-element array- Broadside array	1,3,4,5	BB,PPT
27	Two-element array- Endfire array	1,3,4,5	BB,PPT
28	Array factor	1,3,4,5	BB
29	Pattern multiplication	1,3,4,5	PPT
30	Uniformly spaced arrays with uniform excitation amplitudes	1,3,4,5	BB
31	Uniformly spaced arrays with non-uniform excitation amplitudes	1,3,4,5	PPT
32	Binomial Array	1,3,4,5	PPT
33	Antenna for 5G applications	1,3,4,5	PPT
34	Tutorial	1,3,4,5	BB
35	Tutorial	1,3,4,5	BB
36	Tutorial	1,3,4,5	BB

Content beyond syllabus covered (if any):



Sub. Code / Sub. Name: EC22601-Antennas and Microwave Engineering

Unit : IV

Unit Syllabus:

Microwave Passive Devices: Directional Coupler, Isolator, Magic Tee, Attenuator, Microwave Active Devices: Gunn Diode Microwave tubes: Klystron and Travelling Wave Tube (TWT).

Objective: To design various microwave devices and understand their operational concepts

Session No *	Topics to be covered	Ref	Teaching Aids
37	Introduction to Microwave components and active and passive devices	2,3,7	BB/PPT
38	Directional coupler - construction and working	2,3,7	BB/PPT
39	Directional coupler - S parameter derivation	2,3,7	BB/PPT
40	Faraday rotation and Isolator - Construction and working and S-parameter derivation	2,3,7	BB/PPT
41	Magic tee - Construction and working and S parameter derivation	2,3,7	BB/PPT
42	Attenuator	2,3,7	BB/PPT
43	Microwave wave active devices - Gunn diode	2,3,7	BB/PPT
44	Gunn diode	2,3,7	BB/PPT
45	Microwave wave tubes - Klystron oscillator construction, working and derivation.	2,3,7	BB/PPT
46	Tutorial problems in klystron tubes	2,3,7	BB/PPT
47	Travelling wave tube structure - construction and working	2,3,7	BB/PPT
48	Tutorial problems in TWT	2,3,7	BB/PPT

Content beyond syllabus covered (if any): nil



* Session duration: 50 mins

Sub. Code / Sub. Name: EC22601-Antennas and Microwave Engineering

Unit- V

Unit Syllabus:

Amplifier power relation, Stability considerations, Microwave Filter design, Radio Frequency (RF) Microwave amplifier design and Low Noise amplifier design

Objective: To give insight to design and analyze RF microwave circuits.

Session No *	Topics to be covered	Ref	Teaching Aids
49	Introduction to Microwave Amplifier	2,3,7	PPT/BB
50	Amplifier power gain derivation	2,3,7	PPT/BB
51	Amplifier power gain derivation	2,3,7	PPT/BB
52	Tutorial problems in power gain	2,3,7	PPT/BB
53	Stability circles	2,3,7	PPT/BB
54	Tutorial problems on stability using smith chart	2,3,7	PPT/BB
55	Microwave filter design	2,3,7	PPT/BB
56	Microwave filter design	2,3,7	PPT/BB
57	RF Microwave amplifier design	2,3,7	PPT/BB
58	LNA design	2,3,7	PPT/BB
59	Tutorial problems	2,3,7	PPT/BB
60	Tutorial problems	2,3,7	PPT/BB
Content beyond syllabus covered (if any): nil			

* Session duration: 50 minutes

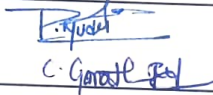
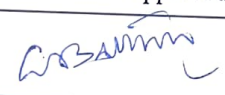


TEXT BOOKS

1. John D Krauss, Ronald J Marhefka and Ahmad S. Khan, "Antennas and Wave Propagation: Fourth Edition, Tata McGraw-Hill, 2006.
2. David M. Pozar, "Microwave Engineering", Fourth Edition, Wiley India, 2012.
3. Samuel Y Liao , "Microwave Devices and Circuits" Prentice Hall of India 2012.

REFERENCES

4. Constantine A.Balanis, "Antenna Theory Analysis and Design", Third edition, John Wiley India Pvt Ltd., 2005.
5. E.C.Jordan and K.G.Balmain,-Electromagnetic Waves and Radiating System, Prentice Hall of India, 2006.
6. A.R. Harish, M. Sachidananda, "Antenna and Wave Propagation", Standard Edition, Oxford University Press,2007.
7. R.E.Collin, "Foundations for Microwave Engineering", Second edition, IEEE Press, 2001.

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Designation	ASSISTANT PROFESSOR	PROFESSOR & HOD
Date	10-01-2025	
Remarks *:		
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD