Bhoj Reddy Engineering College for Women: Hyderabad
Department of Electronics and Communication Engineering
Lesson plan of faculty member for the academic year 2020–21

Class: IV B Tech Branch-Section: ECE-A Semester: I

Subject: Microwave Engineering Lectures per week: 4

Lecture Number	Topics to be covered	Date (s)
UNIT – I: Microwave Transmission Line- I and Rectangular Waveguides		
1	Introduction, Microwave Spectrum Bands Applications of Microwaves, advantages of Microwaves	01 Sep 2020
2	Review of electromagnetics and some definitions	02 Sep 2020
3	Rectangular waveguides and propagation of signal in waveguides	03 Sep 2020
4	Solution of wave equation in Rectangular Coordinates	04 Sep 2020
5	Rectangular Waveguides – TM mode analysis, Expression for fields for TM	08 Sep 2020
6	Rectangular Waveguides – TE mode analysis, Expression for fields for TE	09 Sep 2020
7	Expression for fields for TM	10 Sep 2020
8	Expression for fields for TE	11 Sep 2020
9	Characteristic Equation and Cut – off Frequencies, Problems related to Mode Characteristics, TE mode analysis	15 Sep 2020
10	Filter Characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross – section	16 Sep 2020
11	Phase and Group Mode Characteristics velocities, wavelengths and Impedance Relations	17 Sep 2020
12	Phase and Group Mode Characteristics velocities, wavelengths and Impedance Relations	18 Sep 2020
13	Power Transmission and Power losses in Rectangular Guide, Impossibility of TEM mode, problems related to mode characteristics	22 Sep 2020
14	Problems on rectangular wave guides	23 Sep 2020
15	Micro strip Lines: Introduction, Z_o Relations	24 Sep 2020
16	Effective Dielectric constant, Losses, Q-factor	25 Sep 2020
17	Effective Dielectric constant, Losses, Q-factor	29 Sep 2020
18	Losses in Microstriplines	30 Sep 2020
19	Problems related to Z_o and Q-factor in microstrip lines	01 Oct 2020
UNIT-II: Cavity Resonators, Waveguide components and Applications		
20	Cavity Resonators: Introduction, Dominant and Degenerate Modes Tutorial (Z_o, Q-factor problems), Resonant frequencies and coupling coefficients and Q-factor	06 Oct 2020
21	Coupling Mechanisms – probe, loop, Aperture types	07 Oct 2020
22	Waveguide Discontinuities – waveguide irises, Tuning screws and posts, Matched loads	08 Oct 2020
23	Waveguide Attenuators –Different types, Resistive card and Rotary vane phase attenuators, Waveguide Phase Shifters –types, Dielectric, Rotary vane phase shifters	09 Oct 2020
24	Waveguide Multiport Junctions – E-plane and H- plane Tees, Magic TEE	13 Oct 2020
25	Directional Coupler performance characteristics-2 Hole, Bethe hole types	14 Oct 2020
26	Ferrites – composition and characteristics, Faraday rotation, Gyrator, Isolator, Circulator	15 Oct 2020
27	Types of attenuators and problems	16 Oct 2020
	UNIT-III: Microwave tubes and Helix TTS	
28	Limitations and Losses of conventional tubes at microwave frequencies, Microwave tubes – O type and M type classifications	27 Oct 2020
29	O – type tubes: 2 cavity klystrons – structures	28 Oct 2020
30	Velocity Modulation Process and Applegate Diagram	29 Oct 2020
31	Bunching process and small signal theory-Expression for output and efficiency	10 Nov 2020
32	Reflex Klystrons – Structure, Applegate Diagram and principle of working	11 Nov 2020
33	Mathematical Theory of bunching, Power output, Efficiency ,	12 Nov 2020
34	Mathematical Theory of bunching, Power output, Efficiency ,	13 Nov 2020

35	Oscillating modes and O/P characteristics, effects of Repeller voltage on O/P power	17 Nov 2020
36	Significance, Types and characteristics of slow wave structures	18 Nov 2020
37	Structure of TWT and amplification process.	19 Nov 2020
38	Suppression of oscillations and gain considerations.	20 Nov 2020
UNIT-IV: **M-Type Tubes**		
39	M – type Introduction, cross field effects, Magnetrons – Different types, cavity cylindrical magnetron	24 Nov 2020
40	M – type Introduction, cross field effects, Magnetrons – Different types, cavity cylindrical magnetron	25 Nov 2020
41	Hull Cut -off and Hartree conditions, Modes of resonance and resonance operation	26 Nov 2020
42	Separation of PI – mode, output characteristics	27 Nov 2020
43	Microwave Solid State Devices: Introduction, classification, Applications, TEDs – introduction,	01 Dec 2020
44	Microwave Solid State Devices: Introduction, classification, Applications, TEDs – introduction,	02 Dec 2020
45	Gunn Diode – principle , RWH theory, characteristics	03 Dec 2020
46	Gunn Diode	04 Dec 2020
47	Avalanche Transit Time Devices	08 Dec 2020
UNIT-V: **Microwave Measurements**		
48	Scattering Matrix – significance , Formulation and properties	09 Dec 2020
49	S- Matrix calculations for – E and H plane Tee	10 Dec 2020
50	S- Matrix calculations for – Magic TEE, Directional Coupler	11 Dec 2020
51	S- Matrix calculations for – Circular And Isolator	15 Dec 2020
52	Description of Microwave Bench, Different blocks and their features, Errors and precautions, ,	16 Dec 2020
53	Cavity Q and Impedance Measurements	17 Dec 2020
54	Microwave power Measurement – Bolometer Method, Standing Wave Measurements, Measurement of low and high VSWR	18 Dec 2020
55	Measurement of Attenuation and frequency	22 Dec 2020
56	Measurement of Low power and high power	23 Dec 2020
57	Measurement of VSWR	24 Dec 2020
58	Revision	29 Dec 2020
59	Old papers discussion	30 Dec 2020
60	Old papers discussion	31 Dec 2020

Text books:

1. Samuel Y. Liao, “Microwave Devices and Circuits”, 3/e, Pearson, 2003

2. Herbert J Reich,J G Skalnik, P F Ordung and H L Krauss, “Microwave Principles ”, CBS Publishers and Distributors,New Delhi, 2004.

Name and signature of the faculty: Ms B Jyothsna ----

Name and signature of Head of the Department: Ms N Shribala ----