

Bhoj Reddy Engineering College for Women: Hyderabad  
Department of Electronics and Communication Engineering  
Lesson plan of faculty member for the academic year 2017–18

Class: IV B Tech

Branch-Section: ECE-B

Semester: I

Subject: Microwave Engineering

Lectures per week: 4+1 (Tutorial)

Lecture Number	Topics to be covered	Date (s)
<b>UNIT – I: Microwave Transmission Line- I and Rectangular Waveguides</b>		
1	Introduction, Microwave Spectrum Bands	12 July 2017
2	Applications of Microwaves, Rectangular Waveguides	13 July 2017
3	Solution of wave equation in Rectangular Coordinates	14 July 2017
4	Rectangular Waveguides – TM mode analysis	15 July 2017
5	Tutorial (G1, G3, G2) - Problems related to Mode Characteristics	12, 13, 15 July 2017
6	Expression for fields for TM	20 July 2017
7	Expression for fields for TE	21 July 2017
8	Characteristic Equation and Cut – off Frequencies	22 July 2017
9	Tutorial (G1, G3, G2) – TE mode analysis	19, 20, 22 July 2017
10	Filter Characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross – section	24 July 2017
11	Phase and Group Mode Characteristics velocities, wavelengths and Impedance Relations	27 July 2017
12	Phase and Group Mode Characteristics velocities, wavelengths and Impedance Relations	28 July 2017
13	Power Transmission and Power losses in Rectangular Guide, Impossibility of TEM mode	29 July 2017
14	Tutorial (G1, G3, G2) - Problems related to Mode Characteristics	26, 27, 29 July 2017
15	Micro strip Lines: Introduction, $Z_0$ Relations	31 July 2017
16	Effective Dielectric constant, Losses, Q-factor	3 August 2017
17	Effective Dielectric constant, Losses, Q-factor	4 August 2017
18	Losses in Microstriplines	5 August 2017
19	Tutorial (G1,G3,G2) - Problems related to $Z_0$ and Q-factor	2,3,5 August 2017
<b>UNIT-II: Cavity Resonators, Waveguide components and Applications</b>		
20	Cavity Resonators: Introduction, Dominant and Degenerate Modes Tutorial ( $Z_0$ , Q-factor problems)	7 August 2017
21	Cavity Resonators: Introduction, Dominant and Degenerate Modes Tutorial ( $Z_0$ , Q-factor problems)	10 August 2017
22	Resonant frequencies ,Q- factor and Coupling Coefficients	11 August 2017
23	Coupling Mechanisms – probe, loop, Aperture types	12 August 2017
24	Tutorial (G1, G3, G2) - Problems related to $Z_0$ and Q-factor	9,10,12 August 2017
25	Waveguide Discontinuities – waveguide irises, Tuning screws and posts, Matched loads	17 August 2017
26	Waveguide Attenuators –Different types, Resistive card and Rotary vane phase attenuators	18 August 2017
27	Waveguide Phase Shifters –types, Dielectric, Rotary vane phase shifters	19 August 2017
28	Tutorial (G1, G3, G2) - Problems related to $Z_0$ and Q-factor	16,17,19 August 2017
29	Waveguide Multiport Junctions – E-plane and H- plane Tees, Magic TEE	21 August 2017
30	Waveguide Multiport Junctions – E-plane and H- plane Tees, Magic TEE	24 August 2017
31	Directional Coupler performance characteristics-2 Hole, Bethe hole types	26 August 2017
32	Tutorial (G1, G3, G2) - Problems related to $Z_0$ and Q-factor	23,24,26 August 2017
33	Ferrites – composition and characteristics, Faraday rotation	28 August 2017
34	Ferrite components – Gyrator, Isolator, Circulator	31 August 2017
35	Ferrite components – Gyrator, Isolator, Circulator	01 September 2017
36	Tutorial (G1, G3, G2) - Problems related to $Z_0$ and Q-factor	30,31 August 2017
<b>UNIT-III: Microwave tubes and Helix TTS</b>		
37	Limitations and Losses of conventional tubes at microwave frequencies, Microwave tubes – O type and M type classifications	4 September 2017
38	O – type tubes: 2 cavity klystrons – structures	9 September 2017
39	Tutorial ( G2) - Problems related to $Z_0$ and Q-factor	9 September 2017
40	Re-entrant cavities	11 September 2017
41	Velocity Modulation Process and Applegate Diagram	14 September 2017

42	Bunching process and small signal theory-Expression for output and efficiency	15 September 2017
43	Reflex Klystrons – Structure, Applegate Diagram and principle of working	16 September 2017
44	Tutorial (G1, G3, G2) - Mathematical Theory of bunching	13, 14, 16 September 2017
45	Mathematical Theory of bunching, Power output, Efficiency ,	18 September 2017
46	Mathematical Theory of bunching, Power output, Efficiency ,	21 September 2017
47	Oscillating modes and O/P characteristics, effects of Repeller voltage on O/P power	22 September 2017
48	Significance, Types and characteristics of slow wave structures	23 September 2017
49	Tutorial (G1, G3, G2) – problems on Reflex Klystron	21, 23 September 2017
50	Structure of TWT and amplification process.	5 October 2017
51	Suppression of oscillations and gain considerations.	6 October 2017
<b>UNIT-IV: M-Type Tubes</b>		
52	M – type Introduction, cross field effects, Magnetrons – Different types, cavity cylindrical magnetron	7 October 2017
53	Tutorial (G1, G3, G2) – problems on Magnetron	4,5,7 October 2017
54	Hull Cut -off and Hatree conditions, Modes of resonance and resonance operation	9 October 2017
55	Separation of PI – mode, output characteristics	12 October 2017
56	M – type Introduction, cross field effects, Magnetrons – Different types, cavity cylindrical magnetron	13 October 2017
57	Microwave Solid State Devices: Introduction, classification, Applications, TEDs – introduction,	14 October 2017
58	Tutorial (G1, G3, G2) –Hull Cut off and Hartree conditions	11,12,14 October 2017
59	Gunn Diode – principle , RWH theory, characteristics	16 October 2017
60	Basic Modes of Operation, Oscillation Modes, LSA modes	19 October 2017
61	Avalanche Transit Time Devices	20 October 2017
62	Avalanche Transit Time Devices	21 October 2017
63	Tutorial (G1, G3, G2) – problems on Gunn diode and avalanche devices	19, 21 October 2017
<b>UNIT-V: Microwave Measurements</b>		
64	Scattering Matrix – significance , Formulation and properties	23 October 2017
65	S- Matrix calculations for – E and H plane Tee	26 October 2017
66	S- Matrix calculations for – Magic TEE, Directional Coupler	27 October 2017
67	S- Matrix calculations for – Circular And Isolator	28 October 2017
68	Tutorial (G1, G3, G2) –problems on E-plane and H-plane tee	25,26,28 October 2017
69	Description of Microwave Bench, Different blocks and their features, Errors and precautions	30 October 2017
70	Microwave power Measurement – Bolometer Method	2 November 2017
71	Measurement of Attenuation and frequency, Cavity Q and Impedance Measurements	3 November 2017
72	Tutorial (G1, G3, G2) –problems on measurement	1,2, November 2017
73	Standing Wave Measurements, Measurement of low and high VSWR	6 November 2017

**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

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

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