Course Number and Name

BEC503 - TRANSMISSION LINES, NETWORKS AND WAVEGUIDES

Credits and Contact Hours

3 and 45

Course Coordinator's Name

Ms Raji Pandurangan

Text Books and References

Text Book:

1. John D Ryder, "Networks lines and fields", Prentice Hall of India, New Delhi, 2005

References:

1.William H Hayt and Jr John A Buck, "Engineering Electro magnetic "Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008

2 David KCheng, "Field and Wave Electro magnetics", Pearson Education Inc,Delhi,2004

3. John D Krausand Daniel A Fleisch,"Electromagnetic swith Applications",Mc Graw Hill BookCo,2005

4. GSN Raju, "Electromagnetic Field Theory and Transmission Lines",Pearson Education, 2005

5. Bhag Singh Guru and HR Hiziroglu, "Electromagnetic Field Theory Fundamentals", Vikas Publishing House, New Delhi,2001.

6.N.Narayana Rao, " Elements of Engineering Electromagnetics"6thedition PrenticeHall,2004

7.mit.edu/.../Microwave_Engineering_David_M_Pozar_4ed_Wiley_2011

Course Description

- To introduce the various types of transmission lines and to discuss the losses associated.
- To give thorough understanding about impedance transformation and matching.
- To impart knowledge on filter theories and waveguide theories

Prerequisites	Co-requisites
Electromagnetic Fields and waves.	Nil

required, elective, or selected elective (as per Table 5-1)

Selected Elective

Course Outcomes (COs)

CO1: Discuss the fundamental concepts of wave propagation in Transmission Lines and Wave Guides

CO2 : Analyze the line parameters and various losses in transmission lines.

CO3 : Apply smith chart for line parameter and impedance calculations

CO4 : Evaluate the characteristics of parallel plane and rectangular wave guides.

CO5: Evaluate the characteristics of Circular waveguides.

CO6 : Evaluate the characteristics of resonators.

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	a	b	c	d	e	f	g	h	i	j	k
CO1	H		M	H		M	M			M	
CO2	M	L					M		M		
CO3	M	M		H	M				M	L	
CO4	M	M	M		H		M				
CO5		M								M	
CO6				M					L		

List of Topics Covered

UNITI TIME VARRYINGFIELDSAND MAXWELL'S EQUTIONS 9

Motional Electromotive Force, General Expression for motional EMF, Faraday‟s Law of Induction, Displacement current, Maxwell's equation in the point or differential form, Maxwell‟s equations in Integral form, Maxwell's equations from Gauss‟s Law, Maxwell‟s equations and Boundary conditions, Poynting‟s theorem, Time harmonic (sinusoidal) fields, Maxwell‟s equations in phasor form.

UNITII TRANSMISSION LINES 9

Need for Transmission Lines, Types of Transmission lines, Characterization in terms of primary and secondary constants, Characteristic impedance, General wave equation, Loss less propagation, Propagation constant, Wave reflection at discontinuities, Voltage standing wave ratio, Transmission line of finite length, The Smith Chart, Smith Chart calculations for lossy lines, Impedance matching by Quarter wave transformer, Single and double stub matching.

UNIT III THE UNIFORM PLANE WAVE 9

Wave propagation in free space, Wave propagation in dielectrics, Forward and Backward Travelling Wave, Poynting Theorem and Wave Power, Energy of the Radiated wave, Propagation in good conductors and good dielectrics, Skin effect, Wave polarization, Linearly, Elliptically and Circularly polarized waves,

UNIT IV TRANSMISSION AND REFLECTION OF PLANE WAVES AT BOUNDARIES 9

Normal incidence of Uniform Plane waves: Conductor-Conductor interface, Dielectric-Dielectric interface, Dielectric-perfect Conductor interface, Dielectric-Conductor interface. Oblique incidence on a plane boundary for perpendicular polarization, Dielectric-Dielectric interface, Dielectric-Conductor interface.

UNIT V WAVE GUIDES AND CAVITY RESONATORS 9

General Wave behaviours along uniform Guiding structures, Transverse Electromagnetic waves, Transverse Magnetic waves, Transverse Electric waves, TM and TE waves between parallel plates, TM and TE waves in Rectangular wave guides, Bessel‟s differential equation and Bessel function, TM and TE waves in Circular wave guides, Rectangular and circular cavity Resonators.