KL UNIVERISTY
FIRST SEMESTER 2010-11
Course Handout
Academic Division

Dated: 07-07-2010

Course No. : EE C203
Course Title : Network Analysis
Course Structure : 3-0-0
Course coordinator : Mr RBR Prakash
Instructors : Mr Subba Rao, Bhanu Raghava Prakash,

1. Course Description:

In this course analysis is carried for non linear systems and different problem-solving techniques, which are required in most of the live systems. The subject matter is divided into 5 chapters covering key areas of theory and study.

The chapters begin with coupled circuits and faraday's laws. Non-Linear Circuit elements are introduced and defined in terms of the circuit equations, the terminal relations describing inductive elements to circuit problems. This is followed by sets of solved and supplementary problems on mesh and nodal analysis. Introduction to three phase alternating quantities, different powers and measurement of powers was studied which are necessary to analyze abnormal conditions in power networks. Three-phase systems are used for the generation and transmission of bulk electrical power. To reduce the difficulty in solving nonlinear circuits, Network Topology is introduced, which is the application Kirchhoff's laws. Transients do not last very long, typically only a fraction of a second. However, they are important to us for a number of reasons, some of which will learn in this course.

2. Scope and Objective of the Course:

At the end of the course, the student should analyze any non-linear circuit. We can represent any system using simple electrical circuit. The behavior of three phase system can be studied by analyzing a circuit which represents the system; hence at the end of the course, the student should analyze any system. The student should be able to apply different techniques to analyze a practical system and be able to employ their knowledge to solve more complicated problems and study the effect of problem parameters.

3. Books:

(i) Textbook:

a. W. H. Hayt & J. E. Kimmerly, "Engineering Circuit Analysis", 6th Edition, TMH, 2008.ISBN-13: 978-0-07-061105-4 ISBN-10: 0-07-061105-X.
b. Van Valkenberg, "Network analysis", PHI, 3rd Edition. ISBN 81-317-0158-1

(ii) Reference Book:

a. N C. Jagan & C. Lakshminarayana, "Network Analysis", BSP, 2nd Ed. ISBN 81-7800-193-4
b. Sudhakar & Shyammohan S. Palli "Circuits & Network: Analysis and Synthesis" TMH, 2008. ISBN-13:978-0-07-068123-1, ISBN-10:0-07-068123-6

c. Mahmood Nahvi, Joseph A. Edminister, Nahvi Mahmood "Schaum's Outline of Theory and Problems of Electric Circuits" McGraw-hill, 2002. ISBN: 9780071393072

4. Syllabus:

UNIT-I

COUPLED CIRCUITS: Defining self and mutual inductance, coefficient of coupling, dot convention, solution of coupled circuits, series and parallel connections of two coupled coils, tuned circuit analysis (single and double tuned) development of circuit equations in time domain and frequency domain.

UNIT-II

POLYPHASE SYSTEMS: Advantages of 3-phase systems, generation of 3-phase voltages; phase sequence; star & delta connections; interconnection of 3-phase sources and loads; voltage, current & power in star & delta connected systems, analysis of 3-phase balanced circuits, measurement of 3-phase power- 2 wattmeter method; Analysis of 3-phase unbalanced systems – star / delta transformation method, application of KVL and Mill man's method.

UNIT-III

NETWORK TOPOLOGY: **Definitions-graph, planar and non planar, connected and oriented graph, sub graph, path, tree & tree branches, co - tree and links, formation of linearly independent loops, basic tie set and cut set matrices, loop and nodal analysis.**

UNIT-IV

TRANSIENTS: Initial value and final value theorems in Laplace Transforms; response of simple R - L, R - C and R - L - C series and parallel circuits subjected to dc and sinusoidal excitations using differential equation approach and Laplace Transform method with initial conditions; time constant of R - L, R - C, series and parallel R – L - C circuits.

UNIT-V

TRANSFORMED NETWORK ANALYSIS: Definition of operational/ transformed impedances and admittances of L, C with initial conditions; development of transformed networks incorporating initial conditions as sources and solution of transformed networks; definition of poles and zeros from the network functions.

5.Course Plan:

Course plan is meant as a guideline. There may probably be changes.

Lecture No.	Learning objective	Topics to be covered	Reference
1	Students came to know importance & necessity of course	Introduction	
2	To learn different parameters of L	self and mutual inductance	T1 (424-426)
3	Which gives the relation between coils	coefficient of coupling	T1 (432-433)
4	To know the	dot convention	T1 (425)

	polarities		
5	To learn different methodology to analyze coupled circuits.	solution of coupled circuits, series and parallel connections of two coupled coils	T2 (425-430)
6	To learn different methodology to analyze coupled circuits.	solution of coupled circuits, series and parallel connections of two coupled coils	T2 (425-430)
7	To study tuning circuits	Single tuned circuit analysis	R2 (10.20-10.23)
8	To study tuning circuits	Double tuned circuit analysis	R2 (10.20-10.23)
9	To analyze circuits in different domains	Time domain & Frequency Domain analysis	T1 (251, 254 & 255)
10	To analyze circuits in different domains	Time domain & Frequency Domain analysis	T1 (251, 254 & 255)
11	To know advantages of polyphase supply	Introduction To Polyphase Systems: Advantages of 3-phase systems	T1 (389-391)
12	Know how to generate supply	3-phase voltages generation; phase sequence	T1 (405)
13	To study the conversions between star & delta connected systems	star & delta connections; interconnection of 3-phase sources and loads; voltage, current & power in star & delta connected systems,	T1 (396-397)
14	To study the conversions between star & delta connected systems	Delta to star connections	T1 (401-404)
15	To find the powers	power in star & delta connected systems	T1 (406-407)
16	To analyze 3phase circuits	analysis of 3-phase balanced circuits	T1 (407-411)
17	To analyze 3phase circuits	analysis of 3-phase balanced circuits	T1 (407-411)
18	To study power measurements	measurement of 3-phase power- 2 wattmeter method	T1 (411-413)
19	To analyze 3phase unbalanced circuits	Analysis of 3-phase unbalanced systems – star / delta transformation method	T1 (408-409)
20	To analyze 3phase unbalanced circuits using KVL	application of KVL	T1 (408-409)
21	To analyze 3phase unbalanced circuits using	Millman’s method	R2 (9.39-9.42)

	Millman's method		
22	To know the different terminologies used to apply topology technique	graph, planar and non planar	T1 (697-699)
23	To know the different terminologies used to apply topology technique	connected and oriented graph, sub graph, path, tree & tree branches, co - tree and links	T1 (697-699)
24	To understand the applications of KVL & KCL equations	formation of linearly independent loops	R2 (2.8-2.9)
25	Understands application of KVL to graphology	basic tie set matrices	R2 (2.9-2.14)
26	Finds the response of given circuit	Loop analysis	T1 (704-708)
27	Finds the response of given circuit	Loop analysis	R2 (2.9-2.14)
28	Understands application of KCL to graphology	Basic cut set matrices	R2 (2.14-2.20)
29	Finds the response of given circuit	Nodal analysis	T1 (704-708)
30	Finds the response of given circuit	Nodal analysis	T1 (704-708)
31	Knows mathematical application to networks	Laplace transforms	T1 (468-473)
32	To solve nonlinear circuits with DC	response of R - L, R - C and R - L - C series and parallel circuits subjected to dc	T1 (480-483)
33	To solve nonlinear circuits with AC	response of R - L, R - C and R - L - C series and parallel circuits subjected to sinusoidal excitations using differential equation approach with initial conditions	T1 (483-488)
34	To solve nonlinear circuits with AC	response of R - L, R - C and R - L - C series and parallel circuits subjected to sinusoidal excitations using Laplace Transform method with initial conditions	T1 (483-488)
35	To solve nonlinear circuits	response of simple R - L, R - C and R - L - C series and parallel circuits	T1 (488-490)

	with AC	subjected sinusoidal excitations using differential equation approach and Laplace Transform method with initial conditions	
36	Finds the Time constants	Time constant of R - L, R - C, series and parallel R – L - C circuits.	T1 (212-226)
37	Finds the Time constants	Time constant of R - L, R - C, series and parallel R – L - C circuits.	T1 (212-226)
38	Finds the Time constants	Time constant of R - L, R - C, series and parallel R – L - C circuits.	T1 (212-226)
39	Understands transformations	Definition of operational/ transformed impedances and admittances of L, C with initial conditions	R1 (444-445)
40	To convert circuits using Laplace transforms	operational/ transformed impedances and admittances of L, C with initial conditions	R1 (444-445)
41	Application of KVL & KCL to transformed networks	development of transformed networks	R1 453
42	Understands different analysis	solution of transformed networks	R1 (458-463)
43	Understands different analysis	solution of transformed networks	R1 (458-463)
44	Understands different analysis	solution of transformed networks	R1 (458-463)
45	Understands different analysis	solution of transformed networks	R1 (458-463)

6.Self learning material:

S.NO	UNIT	TOPIC	SOURCE
1	I	series and parallel connections of two coupled coils	R2
2	II	Advantages of 3-phase systems, Phase sequence	R2
3	III	planar and non planar and Graphs	R2
4	IV	Laplace Transform method with initial conditions	R2

7.Evaluation Scheme:

Component	Duration (minutes)	% Weightage	Marks	Date & Time	Venue
Test-1	50 Min	10	10	11-08-2010 9.30 to 10.20 A.M	CSE001,004, 005,101,102, 105,106,201, 204,205,301, 509, NSH
Test-2	50 Min	10	10	15-09-2010 9.30 to 10.20 A.M	CSE001,004, 005,101,102, 105,106,201, 204,205,301, 509, NSH
Assignement submission		5	5	Continuous	
Assignment Test	50 Min	5	5	27-10-2010 9.00 to 10.20 A.M	CSE001,004, 005,101,102, 105,106,201, 204,205,301, 509, NSH
Quiz	30 Min	5	5	27-10-2010 9.00 to 10.20 A.M	CSE001,004, 005,101,102, 105,106,201, 204,205,301, 509, NSH
Regular Lab Evaluation	Continuous	0	0		
Comprehensive Lab Exam	3 Hrs	0	0		
Comprehensive Exam	3 Hrs	60	60		
Attendance for Theory & Tutorial		5	5	Continuous	
Attendance for Lab		0	0	Continuous	

8. Chamber consultation hour: Informed in the class in first week.

9. Notices: All notices regarding the course will be put in E-learning website.

Course Coordinator