

Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Electrical and Electronics Engineering

BEE301Circuit Theory
Third Semester (Odd Semester)

Course (catalog) description

To develop problem solving skills and understanding of circuit theory through the application of techniques and principles of electrical circuit analysis to common circuit problems.

Compulsory/Elective course: Compulsory for EEE students

Credit hours&contact hours : 4 & 60

Course Coordinator : Mrs. S. Sherine

Instructors : Mrs. S. Sherine

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@bharathuniv.ac.in)	Consultation
Mrs. S. Sherine	Second year EEE	KS 101	04422290125	sherine07@gmail.com	12.30-1.30 PM

Relationship to other courses:

Pre –requisites : BEE101 (BASIC ELECTRICAL AND ELECTRONICS ENGINEERING)

Assumed knowledge : The students will have a physics and mathematics background obtained at a high school (or equivalent) level. In particular, working knowledge of basic mathematics including differentiation, integration and probability theories are assumed.

Following courses : NETWORK ANALYSIS AND SYNTHESIS

Syllabus Contents**UNIT I BASIC CIRCUIT CONCEPTS 12**

Circuit elements – Kirchhoff's Law – V-I Relationship of R,L and C – Independent Sources – Dependent sources – Simple Resistive circuits – Networks reduction – Voltage division – current source transformation.- Analysis of circuit using mesh current and nodal voltage methods.

UNIT II SINUSOIDAL STEADY STATE ANALYSIS 12

Phasor – Sinusoidal steady state response concepts of impedance and admittance – Analysis of simple circuits – Power and power factors — Solution of three phase balanced circuits and three phase unbalanced circuits --Power measurement in three phase circuits.

UNIT III NETWORK THEOREMS (BOTH AC AND DC CIRCUITS) 12

Superposition theorem – Thevenin's theorem - Norton's theorem-Reciprocity theorem- Maximum power transfer theorem.

UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS 12

Transient response of RL, RC and RLC Circuits using Laplace transform for DC input with sinusoidal input.

UNIT V RESONANCE AND COUPLED CIRCUITS 12

Series and parallel resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

Text book(s) and/or required materials

T1. Sudhaker A. and Shyam Mohan S.P, "Circuits and Network Analysis and Synthesis" Tata McGraw Hill Co. Ltd., New Delhi, 1994.

T2. Hyatt W.H. and Kemmerly J.E. „Engineering Circuits Analysis“, McGraw Hill International Editions,1993.

Reference Books:

R1. Edminister J.A. "Theory and Problems of Electric Circuits "Schaum's outline series, McGraw hill Book Company 2nd edition, 1983.

R2: <http://nptel.ac.in/courses/108102042/>

Computer usage: NIL

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area :**Circuit Theory** | Electrical Machines| Electronics | Power System| Control &Instrumentation

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	August 1 st week	Session 1 to 22	2 Periods
2	Cycle Test-2	September 2 nd week	Session 25 to 44	2 Periods
3	Model Test	October 2 nd week	Session 1 to 60	3 Hrs

4	University Examination	TBA	All sessions / Units	3 Hrs.
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Mapping of Instructional Objectives with Program Outcome

To develop problem solving skills and understanding of circuit theory through the application of techniques and principles of electrical circuit analysis to common circuit problems.	Correlates to program outcome		
	H	M	L
1. To understand the basic circuit elements, fundamental laws applied for circuits.	b,c,d,j	a,f,k,l	e,g
2. To develop the ability to understand the concepts of Sinusoidal steady state response of impedance and admittance and also power measurements for simple circuits.	b,c,f	a,d,e,g,h,k,l	j
3. To understand the different network theorems	a,d,e	b, f,g,l	j,k
4. To understand the Transient response for dc circuits.	a,d,e	b,g,h,k,l	f,j
5. To understand the concepts of resonance and coupled circuits.	e	a,b,c,d,g,l	j,k

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

S.NO	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I BASIC CIRCUIT CONCEPTS			
1.	Basics of Circuit elements	Yes	[T1]
2.	Kirchhoff’s Law	Yes	
3.	V-I Relationship of R,L and C	Yes	
4.	Independent Sources	Yes	
5.	Dependent sources	Yes	
6.	Simple Resistive circuits	Yes	
7.	Networks reduction	Yes	
8.	Voltage division	Yes	
9.	source transformation (current to voltage)	Yes	
10.	source transformation (voltage to current)	Yes	
11.	Analysis of circuit using mesh current methods.	Yes	
12.	Analysis of circuit using nodal voltage methods.	Yes	
UNIT II SINUSOIDAL STEADY STATE ANALYSIS			
13.	Introduction to Phasor	No	[T1] / [R2]
14.	Sinusoidal steady state response concepts of impedance	Yes	
15.	Sinusoidal steady state response concepts of admittance	Yes	
16.	Analysis of simple circuits	Yes	
17.	Power and power factors	Yes	
18.	Solution of three phase balanced circuits	Yes	
19.	Solution of three phase Unbalanced circuits	Yes	
20.	Power measurement in three phase circuits	Yes	
21.	Extra Problems	Yes	
22.	Extra Problems	Yes	
23.	Review of unit – 2	Yes	
24.	Surprise Test	Yes	
UNIT III NETWORK THEOREMS (BOTH AC AND DC CIRCUITS)			
25.	Superposition theorem	Yes	[T1] / [R2]
26.	Superposition theorem - Problems	Yes	
27.	Thevenin’s theorem	Yes	
28.	Thevenin’s theorem - Problems	Yes	
29.	Norton’s theorem	Yes	
30.	Norton’s theorem- Problems	Yes	
31.	Reciprocity theorem	Yes	
32.	Reciprocity theorem- Problems	Yes	
33.	Reciprocity theorem- Problems	Yes	
34.	Maximum power transfer theorem.	Yes	
35.	Maximum power transfer theorem.- Problems	Yes	
36.	Review of unit – 3	Yes	
UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS			
37.	Transient response Introduction	Yes	
38.	Review of Laplace transform	Yes	
39.	Transient response of RL Circuits- Problems	Yes	

40.	Transient response of RL Circuits- Problems	Yes	[T1] / [R2]
41.	Transient response of RC Circuits - Problems	Yes	
42.	Transient response of RC Circuits - Problems	Yes	
43.	Transient response of RLC Circuits - Problems	Yes	
44.	Transient response of RLC Circuits - Problems	Yes	
45.	Extra Problems	Yes	
46.	Extra Problems	Yes	
47.	Review of unit – 2	Yes	
48.	Surprise Test		
UNIT V RESONANCE AND COUPLED CIRCUITS			
50.	Series and parallel resonance – their frequency response	Yes	[T1] / [R2]
51.	Series and parallel resonance – their frequency response	Yes	
52.	Series and parallel resonance – their frequency response	Yes	
53.	Quality factor and Bandwidth	Yes	
54.	Quality factor and Bandwidth	Yes	
55.	Self and mutual inductance	Yes	
56.	Self and mutual inductance	Yes	
57.	Coefficient of coupling	Yes	
58.	Coefficient of coupling	Yes	
59.	Tuned circuits	Yes	
60.	Single tuned circuits	Yes	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	05%
Cycle Test – II	-	05%
Model Test	-	10%
Attendance	-	05%
SEMINAR&ASSIGNMENT	-	05%
Final exam	-	70%

Prepared by:
S. SHERINE Assistant professor , Department of EEE

Dated :

Addendum

ABET Outcomes expected of graduates of B.Tech / EEE / program by the time that they graduate:

- a) An ability to apply knowledge of mathematics, science, and engineering fundamentals.
- b) An ability to identify, formulate, and solve engineering problems.
- c) An ability to design a system, component, or process to meet the desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- d) An ability to design and conduct experiments, as well as to analyze and interpret data.
- e) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- f) An ability to apply reasoning informed by the knowledge of contemporary issues.
- g) An ability to broaden the education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- h) An ability to understand professional and ethical responsibility and apply them in engineering practices.
- i) An ability to function on multidisciplinary teams.
- j) An ability to communicate effectively with the engineering community and with society at large.
- k) An ability in understanding of the engineering and management principles and apply them in project and finance management as a leader and a member in a team.
- l) An ability to recognize the need for, and an ability to engage in life-long learning.

Program Educational Objectives

PEO1: PREPARATION

Electrical Engineering Graduates are in position with the knowledge of Basic Sciences in general and Electrical Engineering in particular so as to impart the necessary skill to analyze and synthesize electrical circuits, algorithms and complex apparatus.

PEO2: CORE COMPETENCE

Electrical Engineering Graduates have competence to provide technical knowledge, skill and also to identify, comprehend and solve problems in industry, research and academics related to power, information and electronics hardware.

PEO3: PROFESSIONALISM

Electrical Engineering Graduates are successfully work in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen so as to be able to handle critical situations and meet deadlines.

PEO4: SKILL

Electrical Engineering Graduates have better opportunity to become a future researchers/ scientists with good communication skills so that they may be both good team-members and leaders with innovative ideas for a sustainable development.

PEO5: ETHICS

Electrical Engineering Graduates are framed to improve their technical and intellectual capabilities through life-long learning process with ethical feeling so as to become good teachers, either in a class or to juniors in industry.

Course Teacher	Signature
S. SHERINE	

Course Coordinator
(S. SHERINE)

HOD/EEE
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