DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	**CIRCUIT THEORY III Sem. EEE – B Section**		
Course Code	**EEPC11**	**No. of Credits**	**04**
Department	**EEE**	**Faculty**	**M. Venkatakirthiga**
Pre-requisites Course Code	**MAIR21**		
Course Coordinator(s)	**---**		
Other Course Teacher(s) / Tutor(s) E-mail	**---**	**Telephone No.**	**0431-2503263**
Course Type	[√] **Core course**	[ ] **Elective course**	

Syllabus (approved in BoS)

EEPC11 - CIRCUIT THEORY

Course Type: Programme Core (PC) ***Pre-requisites:*** MAIR21
No. of Credits: 4

Course Objectives:

To provide the key concepts and tools in a logical sequence to analyze and understand electrical and electronic circuits.

Course Content :

Fundamental concepts of R, L and C elements, DC circuits, series and parallel circuits - loop and nodal analysis, AC circuits - complex impedance - phasor diagram, real and reactive power - loop and nodal analysis applied to AC circuits.

Voltage source –current source transformations, Various Network theorems and applications to dc and ac circuits, star-delta transformations.

Resonance in series and parallel circuits, self and mutual inductances, coefficient of coupling - dot convention - analysis of coupled circuits.

Three-phase star and delta circuits with balanced and unbalanced loads - power measurements - power factor calculations.

Time response of RL, RC and RLC circuits for step and sinusoidal inputs.

Text Books:

1. *Hayt, W. H, Kemmerly J. E. & Durbin, 'Engineering Circuit Analysis', McGraw Hill Publications, 8th Edition, 2013.*
2. *Charles K. Alexander, Matthew N.O.Sadiku, 'Fundamentals of Electric Circuits', McGraw-Hill Publications, 5th Edition, 2013.*

Reference Books:

1. *Joseph. A. Edminister, 'Electric Circuits - Schaum's Outline Series', McGraw-Hill Publications, 6th Edition, 2003.*
2. *Robins & Miller, 'Circuit Analysis Theory and Practice', Delmar Publishers, 5th Edition, 2012.*

COURSE OBJECTIVES

To provide the key concepts and tools in a logical sequence to analyze and understand electrical and electronic circuits.

COURSE OUTCOMES (COs)

Upon completion of the course, the students will be able to

1. Systematically obtain the equations that characterize the performance of an electric circuit.
2. to apply circuit analysis to DC circuits
3. to apply circuit analysis to AC circuits (both single phase and three-phase) in sinusoidal steady state.
4. obtain the transient and steady-state responses of simple circuits.
5. analyze simple electro-magnetic circuits.

Aligned Programme Outcomes (POs)

COs / POs		Course outcomes(COs)				
		1	2	3	4	5
Programme Outcomes (POs)	1	H	H	H	H	H
	2	L	M	M	M	M
	3	NA	H	H	H	H
	4	NA	M	M	HL	M
	5	L	M	H	H	M
	6	NA	NA	NA	NA	NA
	7	L	M	M	M	L
	8	L	H	H	H	M
	9	NA	M	M	M	M
	10	L	M	H	H	H
	11	NA	NA	NA	NA	NA
	12	L	M	H	H	H
	13	H	H	H	H	H
	14	L	M	M	M	M

COURSE PLAN – PART II

COURSE OVERVIEW

An electric circuit is a mathematical model that approximates the behaviour of an actual electrical system. Circuit analysis has long been a traditional introduction to the art of problem solving from an engineering perspective, even for those whose interests lie outside electrical engineering. There are many reasons for this, but one of the best is that in today's world it's extremely unlikely for any engineer to encounter a system that does not in some way include electrical circuitry. They are found in homes, schools, workplaces and transportation vehicles everywhere.

Since most engineering situations require a team effort at some stage, having a working knowledge of circuit analysis therefore helps to provide everyone on a project with the background needed for effective communication. The models, the mathematical technique, and the language of circuit theory will form the intellectual framework for our engineering endeavours. Hence, this course on Circuit Theory is about developing basic problem-solving skills as they apply to situations an engineer is likely to encounter.

The focus of this course is on linear circuit analysis. Linear problems are inherently more easily solved than their nonlinear counterparts. For this reason, we often seek reasonably accurate linear approximations (or models) to physical situations. Furthermore, the linear models are more easily manipulated and understood—making design a more straightforward process. When greater accuracy is required in practice, nonlinear models are employed, but with a considerable increase in solution complexity.

Linear circuit analysis can be separated into four broad categories: (1) dc analysis, where the energy sources do not change with time; (2) transient analysis, where things often change quickly; (3) sinusoidal analysis, which applies to both ac power and signals; and (4) frequency response, which is the most general of the four categories, but typically assumes something is changing with time.

This course begin with the topic of resistive circuits to learn a number of very powerful engineering circuit analysis techniques, such as nodal analysis, mesh analysis, superposition, source transformation, Thévenin's theorem, Norton's theorem, and several methods for simplifying networks of components connected in series or parallel. Then, the analysis of the circuits with ac source and related components are introduced. To study circuits which are suddenly energized or de-energized, transient analysis of simple RL, RL and RLC are also included in this course.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1.	22 – 26 July '19 **(3 Contact Hours)**	Discussion on course plan DC circuits – series and parallel circuits	Lecture / Tutorial / C & T
2.	29 July – 02 Aug. '19 **(4 Contact Hours)**	DC circuits – loop and nodal analysis, special case-circuit with dependent sources	
3.	05 – 09 August '19 **(4 Contact Hours)**	Source transformation, equivalent circuits, star-delta transformation **(Assessment-1 : Problem solving / numerical examples from DC circuit analysis – 5 marks)**	
4.	12 – 16 August '19 **(2 Contact Hours)**	Network theorems with DC circuits	
5.	19 – 23 August '19 **(3 Contact Hours)**	AC circuits – Complex Impedance, phasor diagram, real and reactive power AC circuit analysis – loop and nodal analysis and network theorems **(Assessment-1 : Problem solving / numerical examples from Network theorems and AC circuit analysis – 10 marks)**	
6.	26 – 30 August '19 **(3 Contact Hours)**		
7.	03 - 06 Sept. '19 **(3 Contact Hours)**	Resonance in series and parallel circuits Self and mutual inductances	
8.	09 - 14 Sept. '19 **(3 Contact Hours)**	Coefficient of coupling – dot convention – Analysis of coupled circuits **(Assessment - 2) Technical Quiz (Unit I and II) 15 marks**	
9.	16 - 20 Sept. '19 **(4 Contact Hours)**	Analysis of coupled circuits Contd., Introduction to time-response of circuits. Time response of RL, RC, and RLC circuits for step and sinusoidal inputs **(Assessment-3 : Problem solving / numerical examples from Unit III and V – 15 marks)**	
10.	23 - 27 Sept. '19 **(4 Contact Hours)**		
11.	01 - 04 Oct. '19 **(2 Contact Hours)**		
12.	07 - 11 Oct. '19 **(2 Contact Hours)**		
13.	14 - 18 Oct. '19 **(4 Contact Hours)**	Three-phase star and delta connected circuits with balanced and unbalanced loads – power measurements – power factor calculations **(Assessment -4) Technical Quiz (Unit III and V) 15 marks**	
14.	21 - 25 Oct. '19 **(4 Contact Hours)**		
15.	28 Oct. - 01 Nov. '19 **(4 Contact Hours)**		

S.No.	Week	Topic	Mode of Delivery
16.	4 - 8 Nov. '19 **(3 Contact Hours)**	Three-phase circuits contd. Doubt clearing sessions	
17.	11 – 15 Nov. '19	Compensation Assessment	
18.	18-11-19 to 22-11-19	**ASSESSMENT – 5** **40 marks**	End semester Examination

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment-1 (First 2 Units) : **Problem solving**	05 – 09 August '19 26 – 30 August '19	60 Minutes	15
2	Assessment-2 (First 2 Units) : **(Technical Quiz)**	09 - 14 Sept. '19	60 Minutes	15
3	Assessment-3 **Problem solving / numerical examples from Unit III and V**	07 - 11 Oct. '19	60 Minutes	15
4	Assessment-4 (III and V Units) : **(Technical Quiz)**	28 Oct. - 01 Nov. '19	60 Minutes	15
CPA	Compensation Assessment **(Written test)**	11 – 15 Nov. '19	60 Minutes	20
5	Assessment-5 (All units) : **(End semester Examination)**	18-11-19 to 22-11-19	150 Minutes	40

Note:

1. Exact date and time for the assessments will be as per the Office of the Dean (Academic) instructions.
2. Attending all the assessments (i.e., Assessment 1 to 4) are MANDATORY for every student.
3. If any student is not able to attend Assessment-1 / Assessment-2 due to genuine reason, he/she is permitted to attend the Compensation Assessment (CPA) with 20% weightage (20 marks).
4. At any case, CPA will not be considered as an improvement test.

Grading the students

1. Grading will be based on the clusters (range) of the total marks (all the assessments i.e., Assessment 1 to 4, put together for each student) scored. For grading, Gap theory or Normalized curve method will be used to decide the clusters (range) of the total marks.

2. The passing minimum shall be as per the Office of the Dean (Academic) instructions. Hence, every student is expected to score the minimum mark to pass the course as prescribed by the Office of the Dean (Academic). Otherwise the student would be declared fail and 'F' grade will be awarded.

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. *Hayt, W. H, Kemmerly J. E. & Durbin, 'Engineering Circuit Analysis', McGraw Hill Publications, 8th Edition, 2013.*
2. *James W. Nilsson and Susan A. Riedel, 'Electric Circuits', Pearson Education Publications, 9th Edition, 2011.*
3. *Charles K. Alexander, Matthew N.O.Sadiku, 'Fundamentals of Electric Circuits', McGraw-Hill Publications, 5th Edition, 2013.*
4. *Joseph. A. Edminister, 'Electric Circuits - Schaum's Outline Series', McGraw-Hill Publications, 6th Edition, 2003.*
5. *Robins & Miller, 'Circuit Analysis Theory and Practice', Delmar Publishers, 5th Edition, 2012.*

Following NPTEL course materials will form the additional references :

1. Basic Electrical Circuits by Dr Nagendra Krishnapura, Department of Electrical Engineering, IIT Madras. Web-site: http://nptel.ac.in/courses/117106108/#

2. Circuit theory by Prof. S.C. Dutta Roy, IIT Delhi. Web-site : http://nptel.ac.in/courses/108102042/#

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

Feedback from the students during class committee meetings
Anonymous feedback through questionnaire

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

ATTENDANCE

As prescribed by the Office of the Dean (Academic).

ACADEMIC HONESTY & PLAGIARISM

1. All the students are expected to be genuine during the course work. Taking of information by means of copying simulations, assignments, looking or attempting to look at another student's paper or bringing and using study material in any form for copying during any assessments is considered dishonest.
2. Tendering of information such as giving one's program, simulation work, assignments to another student to use or copy is also considered dishonest.
3. Preventing or hampering other students from pursuing their academic activities is also considered as academic dishonesty.

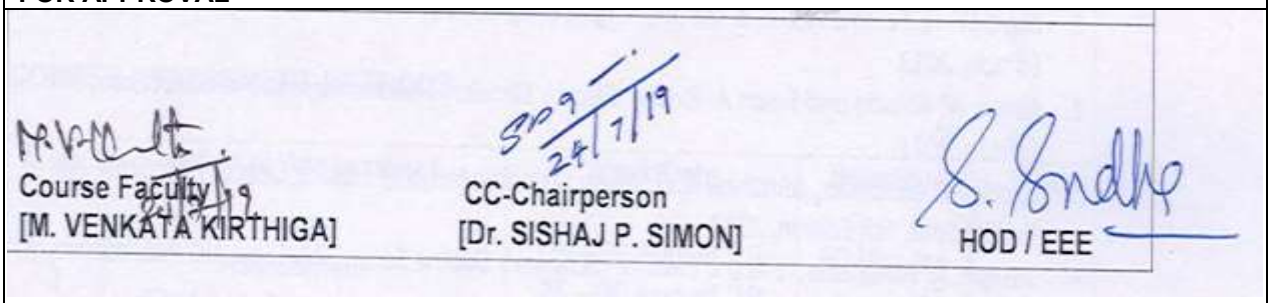
4. Any evidence of such academic dishonesty will result in the loss of marks on that assessment. Additionally, the names of those students so penalized will be reported to the class committee chairperson and HoD for necessary action.
5. Students who honestly producing ORIGINAL and OUTSTANDING WORK will be REWARDED.

ADDITIONAL COURSE INFORMATION

CORRESPONDENCE

1. All the students are advised to check their NITT WEBMAIL regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/ any other information regarding this course) will be done through their webmail.
2. The faculty is available for consultation at times as per the intimation given by the faculty.
3. Queries may also be emailed to the Course Coordinator directly at circuitsiiyear@gmail.com

FOR APPROVAL



Guidelines

a) The number of assessments for any theory course shall range from 4 to 6.

b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.

c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.

d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.

f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.

g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.