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

COURSE PLAN – PART I			
Course Title	ANALOG ELECTRONIC CIRCUITS		
Course Code	EEPC14	No. of Credits	03
Course Code of Pre-requisite subject(s)	EEPC10		
Session	January 2018	Section	A
Name of Faculty	Dr. N. Ammasai Gounden	Department	EEE
Email	ammas@nitt.edu	Telephone No.	0431-2503253
Name of Course Coordinator(s)			
Course Type	[√] Core course [ ] Elective course		

SYLLABUS (APPROVED IN BoS)

Small signal amplifiers - biasing circuits of BJT and FET transistors, analysis and design of BJT and FET amplifiers, chopper stabilized amplifiers
Large signal amplifiers – analysis and design of class A and class B power amplifiers, class C and class D amplifiers, thermal considerations, tuned amplifiers
Feedback amplifiers – gain with feedback - effect of feedback on gain stability, distortion, bandwidth, input and output impedances; topologies of feedback amplifiers
Oscillators – Barkhausen criterion for oscillation - Hartley & Colpitts oscillators - phase shift, Wien bridge and crystal oscillators - 1lap oscillator – oscillator amplitude stabilization
Pulse circuits – attenuators – RC integrator and differentiator circuits – diode clampers and clippers – multivibrators - Schmitt Trigger- UJT Oscillator

COURSE OBJECTIVES

To give a comprehensive exposure to all types of amplifiers and oscillators constructed with discrete components such as BJTs and FETs. This helps to develop a strong basis for building linear and digital integrated circuits.

COURSE OUTCOMES (COs)

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

1. Understand the working of different types of amplifier, oscillator and multivibrator circuits.
2. Design BJT and FET amplifier and oscillator circuits.
3. Analyze transistorized amplifier and oscillator circuits.
4. Understand the applications of different types of amplifier, oscillator, attenuators and multivibrator circuits.

Aligned Programme Outcomes (POs)

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

COURSE PLAN – PART II

COURSE OVERVIEW

The foundation of electronic circuits is established by the study of the two transistor types namely BJT and FET in amplifiers, oscillators and multivibrators. The various types of amplifiers and oscillators in which the transistors are operated in linear mode and the multivibrator circuits in which the transistors are operated in switching mode will be discussed in depth. This course is a classical course which will present complete practical discrete – circuit transistor amplifiers and oscillators. Much reading, thinking, problems solving and laboratory experience are required to have a comprehensive understanding of this course.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week	Topic	Mode of Delivery
1.	2nd week of January 18 (10 to 12) **(3 Contact Hours)**	Introduction to the course, Biasing- dc load line; Q point selection, AC load line; stability factor, Analysis of fixed bias circuit	Lecture / Tutorial C & T / PPT or any suitable mode
2.	3rd week of January 18 (17 to 19) **(3 Contact Hours)**	Analysis of collector to base bias and potential divider bias circuits; small signal amplifier fundamentals, analysis of CE amplifier in mid frequency region	
3.	4th week of January 18 (24 to 31) **(3 Contact Hours)**	Analysis of CE amplifier in LFR and HFR – approximate & exact – Analysis of CC amplifier; Multistage amplifier	
4.	1st week of February 18 (1 to 2) **(2 Contact Hours)**	FET biasing circuits; analysis of CS amplifier – voltage gain, input & output impedance;	
5.	2nd week of February 18 (7 to 9) **(3 Contact Hours)** **08.02.2018 : 50 minutes (3.30 pm – 4.20 pm)**	Darlington amplifier – expression for current gain, input resistance; Biasing problem in Darlington amplifier, bootstrapping circuit. Tutorial problems on CE, CC, amplifier circuits. **(Assessment-3(1) : Solving numerical examples – 10 marks)**	
6.	3rd week of February 18 (14 to 16) **(3 Contact Hours)**	**Case Study 1:** Application of Darlington amplifier in the design of SCR firing circuit; Introduction to direct coupled amplifier; Differential amplifier – biasing, modes of operation.	
7.	4th week of February 18 (21 to 23) **(3 Contact Hours)**	Analysis and application of differential amplifier; Tuned amplifier; Tutorial problems **(Assessment - 1) Written test**	
8.	Last week of February & 1st week of March 18 (28, 7 to 9) **(4 Contact Hours)**	Introduction to feedback amplifiers; Types of feedback; advantages with analysis; sampling and mixing circuits, topologies of feedback amplifiers; tutorial problems.	

9.	2nd week of March 18 (14 to 16 March) **(3 Contact Hours)**	Analysis of feedback amplifiers; salient features of voltage series feedback amplifier design.	Lecture / Tutorial C & T / PPT or any suitable mode
10.	3rd week of March 18 (21 to 23) **(3 Contact Hours)** **22.03.2018 : 50 minutes (3.30 pm – 4.20 pm)**	**Case study 2:** Application of negative feedback in dc-dc converter – Introduction to power amplifiers, classification based on Q point, analysis of class A and class B power amplifiers **(Assessment-3 (2) : Solving numerical examples – 10 marks)**	
11.	4th week of March 18 & 1st week of April 18 (28, 4 to 6) **(4 Contact Hours)**	Expression for $P_{D(max)}$ in terms of $P_{o(max)}$; thermal considerations; Tutorial problems on feedback amplifiers and power amplifiers. Introduction to oscillators - Barkhausen criterion for oscillation, RF and AF oscillators; analysis of BJT & FET phase shift oscillators, analysis of Wien bridge oscillator, amplitude stabilization. **(Assessment - 2)** **Written test**	
12.	2nd week of April 17 (11 to 13) **(3 Contact Hours)**	LC oscillators – Hartley, Colpitts and Crystal oscillators; analysis and design of UJT oscillator; analysis and design of bistable multivibrator. **Case study 3:** Application of UJT oscillator in firing the SCRs of 1- phase full converter	
13.	3rd week of April 18 (17 to 19) **(3 Contact Hours)**	Analysis and design of astable, monostable and bistable multivibrators; RC attenuators; Clippers and Clampers; Tutorial problems. **Case study 4:** application of astable and monostable multivibrators in the design of power electronic controllers.	
14.	1st week of May 18 Date of examination will be intimated later	**ASSESSMENT – 4** **(Written test)**	

C & T : Chalk and Talk and PPT : Power Point

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment-1 (1st Unit) **(Written test)**	4th week of February 18 (21 to 23)	60 Minutes	20
2	Assessment-2 (2nd and 3rd Units) **(Written test)**	1th week of April 18 (4 to 6)	60 Minutes	20

3	Assessment-3 Assignment / Open book test / Quiz (2 Nos. each for 10 marks)	During the regular class hours – details will be informed later		20
CPA	Compensation Assessment (First 4 Units) **(Written test)**	4th week of April 18	60 Minutes	20
5	Assessment-4 (All units) **(Written test)**	1st week of May 18	120 Minutes	40

Note:

1. Exact date and time for the assessments (1, 2 & 4) will be informed later.
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 class mean by two or maximum by three, whichever is lower. Hence, every student is expected to score the minimum mark to pass the course. Otherwise the student would be declared fail and 'F' grade will be awarded.

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

1. Jacob Millman, 'Micro electronics', McGraw Hill, 2nd Edition, 2009.
2. David A Bell, 'Fundamentals of electronic devices and circuits', Oxford University Press, 2009.
3. Thomas L. Floyd, David M. Buchla, 'Electronics Fundamentals', Pearson Prentice hall, 7th Edition, 2010.
4. Allen Mottershead, 'Electronic devices and circuits- An introduction',PHI,2006.
5. Robert. L. Boylestad, ' Electronic devices and circuit theory', Pearson, 10th Edition, 2009
6. Sedra smith, 'Micro electronic circuits', Oxford University Press, 2010.

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.)

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. Queries (if required) may be emailed to me / contact me during 4.00 pm to 5.00 pm on Monday and Thursday with prior intimation for any clarifications.

ATTENDANCE

1. Attendance will be taken by the faculty in all the contact hours. Every student should maintain minimum 75% physical attendance in these contact hours to attend the Assessment - 4 i.e., last assessment.

2. Any student, who fails to maintain 75% attendance, however, having score more than 50 % marks (i.e., more than 30 marks) in first three assessments will be eligible for attending the last assessment (Assessment-4).

3. Students having less than 75% attendance at the end of the semester and also having the score less than 50 % marks (i.e., less than 30 marks) in first three assessments will have to REDO the course and hence they are not eligible for attending the last assessment (Assessment-4). 'V' Grade will be awarded for such students.

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 produce ORIGINAL and OUTSTANDING WORK will be REWARDED.

FOR APPROVAL

10.01.18

Course Faculty _____ **CC-Chairperson** 10/01/18 **HOD** for 11/1/18