DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE TEMPLATE			
Course Title	Analog Electronic Circuits - A Section		
Course Code	EEPC14	No. of credits	03
Department	EEE	Faculty	N. Ammasai Gounden
Pre-requisites Course Code	EEPC10		
Course Coordinator(s)	---		
Other Course Teacher(s) / Tutor(s) E-mail	---	Telephone No.	0431-2503253
Course Type	√ Core course	☐ Elective course	

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 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 TEACHING AND LEARNING ACTIVITIES			
S.No.	**Week**	**Topic**	**Mode of Delivery**
1.	1st week of January 17 (4 to 6) **(2 Contact Hours)**	Introduction to the course, Biasing- dc load line; Q point selection	Lecture / Tutorial C & T / PPT or any suitable mode
2.	2nd week of January 17 (11 to 13) **(3 Contact Hours)**	AC load line; stability factor, analysis of fixed bias, collector to base bias and potential divider bias circuit; small signal amplifier fundamentals, analysis of CE amplifier in mid frequency region	
3.	3rd week of January 17 (18 to 20) **(3 Contact Hours)**	Analysis of CE amplifier in LFR and HFR – approximate & exact – Analysis of CC amplifier; Multistage amplifier	
4.	4th week of January 17 (25 to 27) **(2 Contact Hours)**	FET biasing circuits; analysis of CS amplifier – voltage gain, input & output impedance; Tutorial problems on CE, CC, amplifier circuits.	
5.	1st week of February 17 (1 to 3) **(3 Contact Hours)** **02.02.2017 : 50 minutes (3.30 pm – 4.20 pm)**	Darlington amplifier – expression for current gain, input resistance; Biasing problem in Darlington amplifier, bootstrapping circuit. **(Assessment-3(1) : Solving numerical examples – 5 marks)**	
6.	2nd week of February 17 (8 to 10) **(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.	3rd week of February 17 (15 to 17) **(3 Contact Hours)**	Analysis and application of differential amplifier; Tuned amplifier; Tutorial problems **(Assessment - 1) Written test**	
8.	4th week of February 17 (22 to 24) **(3 Contact Hours)** **22.02.2017 : 50 minutes (2.20 pm – 3.10 pm)**	Introduction to feedback amplifiers; Types of feedback; advantages with analysis; sampling and mixing circuits, topologies of feedback amplifiers; tutorial problems. **(Assessment-3 (2) : Solving numerical examples – 5 marks)**	
9.	2nd week of March 17 (8 to 10 March) **(3 Contact Hours)**	Analysis of feedback amplifiers; salient features of voltage series feedback amplifier design.	
10.	3rd week of March 17 (15 to 17)	Case study 2: Application of negative feedback in dc-dc converter – Introduction to	

	(3 Contact Hours)	power amplifiers, classification based on Q point, analysis of class A and class b power amplifiers	
11.	4th week of March 17 (22 to 24) **(3 Contact Hours)** **24.03.2017 : 50 minutes (4.20 pm – 5.10 pm)**	Expression for $P_{D(max)}$ in terms of $P_{o(max)}$; thermal considerations; Tutorial problems on feedback amplifiers and power amplifiers. **(Assessment-3 (3) : Solving numerical examples – 5 marks)**	
12.	5th week of March 17 (29 to 31) **(3 Contact Hours)**	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**	Lecture / Tutorial C & T / PPT or any suitable mode
13.	1st week of April 17 (5 to 7) **(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	
14.	2nd week of April 17 (12 to 14) **(3 Contact Hours)** **13.04.2017 : 50 minutes (3.30 pm – 4.20 pm)**	Analysis and design of astable, monostable and biostable multivibrators; RC attenuators; Clippers and Clampers; Tutorial problems; Case study 4: application of astable and monostable multivibrators in the design of power electronic controllers. **(Assessment-3 (4) : Solving numerical examples – 5 marks)**	
15.	3rd / 4th week of April 17 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)**	3rd week of February 17 (15 to 17)	60 Minutes	20
2	Assessment-2 (2nd and 3rd Units) **(Written test)**	5th week of March 17 (29 to 31)	60 Minutes	20

3	Assessment-3 Assignment / Open book test / Quiz (4 Nos. each for 5 marks)	During the regular class hours – details will be informed later		20
CPA	Compensation Assessment (First 4 Units) **(Written test)**	2nd week of April 17 (12 to 14)	60 Minutes	20
5	Assessment-4 (All units) **(Written test)**	3rd / 4th week of April 17	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 Friday 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 producing ORIGINAL and OUTSTANDING WORK will be REWARDED.

FOR APPROVAL

Course Faculty _____ **CC-Chairperson** S. Magesh **HOD** _____