

DEPARTMENT OF Instrumentation and Control Engineering
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech Instrumentation and Control Engineering		
Course Title	Analog Signal Processing		
Course Code	ICPC18	No. of Credits	3
Course Code of Pre-requisite subject(s)	Nil		
Session	Jan 2020	Section (if, applicable)	A
Name of Faculty	Dr. S. Narayanan	Department	ICE
Email	narayanan@nitt.edu	Telephone No.	0431-2503364
Name of Course Coordinator(s) (if, applicable)	NA		
E-mail	-----	Telephone No.	
Course Type	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
<p>Introduction to analog signals and systems, Random signal analysis, application of statistical methods to the measurement of waveforms.</p> <p>Analog signal processing circuits: amplifiers, analog multipliers, integrators, differentiators, active and passive filters. Universal Filters and their application.</p> <p>Current-to-voltage and voltage-to-current converter, analog-to-digital converter, digital-to-analog converter, voltage-to-frequency converter, frequency-to-voltage converter.</p> <p>Switched capacitor filter, Phase locked loop, Schmitt trigger, automatic gain control, regulators, wave form generators, oscillators.</p> <p>Case studies: bridge linearization, PLL design using divider and multipliers, regulator design with low voltage dropout, transmitter design and realization of controllers.</p>			
COURSE OBJECTIVES			
<p>This course emphasizes intuitive understanding and practical implementations of the theoretical concepts of amplifiers, filters and other circuits which are essential for signal conditioning.</p>			

COURSE OUTCOMES (CO)	
Course Outcomes	Aligned Programme Outcomes (PO)
On completion of this course, the students will be able to	
1. Understand the implications of the properties of systems and signals.	1,2,3,4,5,6,7
2. Design and simulate various analog signal conditioning circuits.	1,2,3,4,5,6,7
3. Implement various analog signal conditioning circuits in real time.	1,2,3,4,5,6,7
4. Trouble shoot analog signal conditioning circuits.	1,2,3,4,5,6,7

COURSE PLAN – PART II			
COURSE OVERVIEW			
<p>Real world looks for system-level design skills in both analog and digital domains. The main focus of the course is analog system design. It will cover the design and test of practical circuits based on op-amps and other ICs.</p> <p>Real world signals are processed for a variety of reasons, such as to remove unwanted noise, to correct distortion, to make them suitable for transmission. Analog signal processing unit comprises of various blocks which includes the theory of amplification, filtering, analyzing, transmitting and reproducing the analog signals.</p>			
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	I , II , III & IV	<p>Introduction to system and system analysis</p> <p>Introduction to various forms of systems. Frequency domain analysis application: op-amp static characteristics, study of various parameters like bandwidth slew rate, input and output impedance, CMRR</p>	Chalk and talk
2	V & VI	<p>Study of various feedback circuits and its features.</p> <p>1. Various modes of amplifier design 2. Various applications using various resistive feedback circuits and its implementation issues</p>	Chalk and talk
3.	VI & VII	<p>Analysis of dynamic feedback</p> <p>1. Filter design. – various methodologies- list of specification and its implementation issues switched capacitor filter</p>	Chalk and talk

4.	VIII & IX	Waveform generators and oscillators, regulators	Chalk and talk
5.	X & XI	V to F converter, F to V converter, PLL, Multiplier A/D converter and D/A Converter Concepts. Selection of suitable converters	Chalk and talk
6.	XII	Random signal analysis.	Chalk and talk

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Test-1 & Tutorials	5 th Week	1 hour	15% + 5%
2	Test-2 & Tutorials	8 th Week	1 hour	15% + 5%
3	Assignment test & Tutorials	11 th Week	-----	10% + 5%
CPA	Compensation Assessment	One week before end sem	1 hour	15%
4	Final Assessment	Last week	3 hours	45%

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

MODE OF CORRESPONDENCE (email/ phone etc) email

COMPENSATION ASSESSMENT POLICY

Students who have missed the first or second cycle test can register with the consent of faculty for the Re-Test examination which shall be conducted soon after the completion of the second cycle test. no compensation test for assignment test and final assessment.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- **At least 75% attendance in each course is mandatory.**
- **A maximum of 10% shall be allowed under On Duty (OD) category.**
- **Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

ADDITIONAL INFORMATION

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FOR APPROVAL

S. Natarajan
Course Faculty

B. V. Ramiah
CC-Chairperson 22/11/2020

HOD *[Signature]* 22/11/2020