

COURSE CODE	COURSE NAME	L-T-P-C	YEAR OF INTRODUCTION
EC205	ELECTRONIC CIRCUITS	3-1-0-4	2016
Prerequisite: Nil			
Course objectives:			
<ul style="list-style-type: none"> To develop the skill of analysis and design of various analog circuits using discrete electronic devices as per the specifications. 			
Syllabus:			
High pass and low pass RC circuits, Differentiator, Integrator, Analysis of BJT biasing circuits, small signal analysis of transistor configurations using small signal hybrid π model, low frequency and high frequency analysis of BJT amplifiers, Cascade amplifiers, Wide band amplifiers, Feedback amplifiers, Oscillators, Tuned amplifiers, Power amplifiers, Sweep circuits and multivibrators, transistor voltage regulator, DC analysis of MOSFET circuits, small signal equivalent circuit, Small signal analysis of MOSFET amplifier circuits, Analysis of multistage MOSFET amplifiers			
Expected outcome:			
<ul style="list-style-type: none"> At the end of the course, students will be able to analyse and design the different electronic circuits using discrete electronic components. 			
Text Books:			
<ul style="list-style-type: none"> Sedra A. S. and K. C. Smith, Microelectronic Circuits, 6/e, Oxford University Press, 2013 Millman J. and C. Halkias, Integrated Electronics, 2/e, McGraw-Hill, 2010 			
References:			
<ol style="list-style-type: none"> Neamen D., Electronic Circuits - Analysis and Design, 3/e, TMH, 2007 Rashid M. H., Microelectronic Circuits - Analysis and Design, Cengage Learning, 2/e, 2011 Spencer R. R. and M. S. Ghauri, Introduction to Electronic Circuit Design, Pearson, 2003 Razavi B., Fundamentals of Microelectronics, Wiley, 2015 			
Course Plan			
Module	Course content (48 hrs)	Hours	Sem. Exam Marks
I	RC Circuits: Response of high pass and low pass RC circuits to sine, step, pulse and square wave inputs, Differentiator, Integrator	5	15
	BJT biasing circuits: Types, Q point, Bias stability, Stability factors, RC coupled amplifier and effect of various components, Concept of DC and AC load lines, Fixing of operating point, Classification of amplifiers	5	
II	Small signal analysis of CE, CB and CC configurations using small signal hybrid π model (gain, input and output impedance). Small signal analysis of BJT amplifier circuits, Cascade amplifier	7	15
FIRST INTERNAL EXAM			
III	High frequency equivalent circuits of BJT, Short circuit current gain, cutoff frequency, Miller effect, Analysis of high frequency response of CE, CB and CC amplifiers	4	15
	Wide band amplifier: Broad banding techniques, low frequency and high frequency compensation, Cascode amplifier.	4	
IV	Feedback amplifiers: Effect of positive and negative feedback on gain, frequency response and distortion, Feedback topologies and	3	15

	its effect on input and output impedance, Feedback amplifier circuits in each feedback topologies (no analysis required)		
	Oscillators & Tuned Amplifiers: Classification of oscillators, Barkhausen criterion, Analysis of RC phase shift and Wien bridge oscillators, Working of Hartley, Colpitts and Crystal oscillators; Tuned amplifiers, synchronous and stagger tuning	6	
SECOND INTERNAL EXAM			
V	Power amplifiers: Classification, Transformer coupled class A power amplifier, push pull class B and class AB power amplifiers, efficiency and distortion, Transformer-less class B and Class AB power amplifiers, Class C power amplifier (no analysis required)	6	20
	Switching Circuits: Simple sweep circuit, Bootstrap sweep circuit, Astable, Bistable, and Monostable multivibrators, Schmitt Trigger	5	
VI	Transistor based voltage regulator: Design and analysis of shunt and series voltage regulator, load and line regulation, Short circuit protection	4	20
	MOSFET amplifiers: Biasing of MOSFET amplifier, DC analysis of single stage MOSFET amplifier, small signal equivalent circuit. Small signal voltage and current gain, input and output impedances of CS configuration, MOSFET Cascade amplifier	5	
END SEMESTER EXAM			

Question Paper Pattern (End Sem Exam)

Maximum Marks: 100

Time : 3 hours

The question paper shall consist of three parts. Part A covers modules I and II, Part B covers modules III and IV, and Part C covers modules V and VI. Each part has three questions uniformly covering the two modules and each question can have maximum four subdivisions. In each part, any two questions are to be answered. Mark pattern is according to the syllabus with maximum 60 % for theory, derivation, proof and 40% for logical/numerical problems.