Course code	Course Name	L-T-P-Credits	Year of Introduction
BM207	DESIGN OF ELECTRONIC CIRCUITS	3-1-0-4	2016

Prerequisite : Nil

Course Objectives

To acquaint students with basic concepts, design, analysis and applications of electronic circuits containing passive components, BJT and MOSFETs.

Syllabus

Small signal amplifiers using BJT and MOSFET, equivalent Models, frequency response, Multi-stage amplifier. Power amplifier-class A, B, AB, C, D and S power amplifiers. Feed-back amplifiers, negative feedback, feedback topologies, low frequency and high frequency oscillators. Pulse shaping using RC circuits and their applications. Transistor and MOSFET as switches, simple sweep and bootstrap sweep circuits. Multivibrators using BJTs and their applications. Differential amplifiers, BJT and MOSFET differential pairs.

Expected Outcome

The student will be able to

- Analyze and design circuits using BJTs and MOSFETs
- Understand different applications of BJTs and MOSFETs
- Get familiarized with the concept of pulse shaping, amplification and feedback in electronic circuits

Text Books:

1. Adel S. Sedra & Kenneth C. Smith: Microelectronic circuits, Oxford University Press. Fifth Edition
2. R E Boylstead and L Nashelsky: Electronic Devices and Circuit Theory, 9/e, Pearson Education
3. Millman and Taub, Pulse, digital and Switching Waveforms, Tata McGraw Hill.

Reference Books:

1. Millman & Halkias, Integrated Electronics, Tata McGraw Hill
2. Gray & Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley & Sons
3. Sung-Mo Kang & Yusuf Leblebici, CMOS Digital Integrated Circuits - Analysis & Design, Tata McGraw Hill.
4. Allan Mottershead, Electronic Devices &Circuits, Prentice Hall of India, New Delhi,2003
5. Schilling & Belove, Electronic Circuits, Discrete &Integrated, Tata McGraw Hill
6. Razavi, "Fundamentals of Microelectronics", Wiley Education

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	BJT small-signal amplifier circuits: *Biasing in amplifier circuits*, small-signal operation and equivalent Models	4	15%
	Single-stage BJT amplifiers – CE, CB, CC amplifiers, The BJT internal capacitances and High-frequency Model,	6	

	Frequency Response of the Common-Emitter amplifier, Multi-stage RC coupled CE amplifier		
II	MOSFET amplifier circuits: *Biasing in MOS amplifier circuits*, small-signal operation and Models	4	**15%**
	Single-stage MOS amplifier, The MOSFET internal capacitances and High-frequency Model, Frequency Response of the Common-Source amplifier	6	
FIRST INTERNAL EXAM			
III	Power amplifier: classification, class A and Class B power amplifier	4	**15%**
	Class C and Class AB amplifiers, Class D and S Power Amplifiers, *Power BJTs and power MOSFETS*	4	
IV	Feed-back amplifiers: General feedback structure, properties of negative feedback, the four basic feedback topologies	5	**15%**
	Basic principles of sinusoidal oscillators, RC, LC and *crystal oscillators*	4	
SECOND INTERNAL EXAM			
V	Pulse Circuits: pulse shaping using RC circuits - Differentiating and integrating circuits – applications. *Transistor and MOSFET as switch*	4	**20%**
	Simple sweep circuits- bootstrap sweep. Multivibrators - astable, monostable and bistable circuits - applications	5	
VI	Differential amplifiers: the BJT differential pair, operation with Common-Mode and differential input voltages	5	**20%**
	The MOS differential pair, small-signal operation of the MOS differential pair	5	
END SEMESTER EXAM			

***Note*: Topics in italics are self-study topics.**

QUESTION PAPER PATTERN:

Maximum Marks: 100 Exam Duration: 3 Hours

There shall be three parts for the question paper.

Part A includes Modules 1 & 2 and shall have three questions of fifteen marks out of which two are to be answered. There can be subdivisions, limited to a maximum of 4, in each question.

Part B includes Modules 3 & 4 and shall have three questions of fifteen marks out of which two are to be answered. There can be subdivisions, limited to a maximum of 4, in each question.

Part C includes Modules 5 & 6 and shall have three questions of twenty marks out of which two are to be answered. There can be subdivisions, limited to a maximum of 4, in each question.

Note: Each part shall have questions uniformly covering both the modules in it.