Course code | Course Name | L-T-P -Credits | Year of Introduction
--- | --- | --- | ---
CS207 | ELECTRONIC DEVICES & CIRCUITS | 3-0-0-3 | 2016

Pre-requisite: BE101-04 Introduction to Electronics Engg.

Course Objectives:
1. To introduce to the students the fundamental concepts of electronic devices and circuits for engineering applications
2. To develop the skill of analysis and design of various analog circuits using electronic devices
3. To provide comprehensive idea about working principle, operation and applications of electronic circuits
4. To equip the students with a sound understanding of fundamental concepts of operational amplifiers
5. To expose to the diversity of operations that operational amplifiers can perform in a wide range of applications
6. To expose to a variety of electronic circuits/systems using various analog ICs

Syllabus
RC Circuits, Diode Circuits, Regulated power supplies, Field effect transistor, DC analysis of BJT, RC Coupled amplifier, MOSFET amplifiers, Feedback amplifiers, Power amplifiers, Oscillators, Multivibrators, Operational Amplifier and its applications, Timer IC.

Expected Outcome:
Students will be able to
1. explain, illustrate, and design the different electronic circuits using electronic components
2. design circuits using operational amplifiers for various applications

Text Books:
1. David A Bell, Electronic Devices and Circuits, Oxford University Press, 2008

References:

Course Plan

<table>
<thead>
<tr>
<th>Module</th>
<th>Contents</th>
<th>Hrs (40)</th>
<th>Sem Exam Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wave shaping circuits: Sinusoidal and non-sinusoidal wave shapes, Principle and working of RC differentiating and integrating circuits, Conversion of non-sinusoidal wave shape into another. Clipping circuits - Positive, negative and biased clipper.</td>
<td>5</td>
<td>15%</td>
</tr>
<tr>
<td>Topic</td>
<td>Weightage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clamping circuits - Positive, negative and biased clamper. Voltage multipliers- Voltage doubler and tripler. Simple sweep circuit using transistor as a switch.</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulated power supplies: Review of simple zener voltage regulator, Shunt and series voltage regulator using transistors, Current limiting and fold back protection, 3 pin regulators-78XX and 79XX, IC 723 and its use as low and high voltage regulators, DC to DC conversion, Circuit/block diagram and working of SMPS.</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field effect transistors: JFET - Structure, principle of operation and characteristics, Comparison with BJT. MOSFET- Structure, Enhancement and Depletion types, principle of operation and characteristics.</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIRST INTERNAL EXAM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amplifiers: Introduction to transistor biasing, operating point, concept of load line, thermal stability, fixed bias, self bias, voltage divider bias. Classification of amplifiers, RC coupled amplifier - voltage gain and frequency response. Multistage amplifiers - effect of cascading on gain and bandwidth. Feedback in amplifiers - Effect of negative feedback on amplifiers. MOSFET Amplifier- Circuit diagram and working of common source MOSFET amplifier.</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oscillators: Classification, criterion for oscillation, analysis of Wien bridge oscillator, Hartley and Crystal oscillator. Non-sinusoidal oscillators: Astable, monostable and bi-stable multivibrators using transistors (Only design equations and working of circuit are required, Analysis not required).</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SECOND INTERNAL EXAM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational amplifiers: Differential amplifier, characteristics of op-amps(gain, bandwidth, slew rate, CMRR, offset voltage, offset current), comparison of ideal and practical op-amp(IC741), applications of op-amps- scale changer, sign changer, adder/summing amplifier, subtractor, integrator, differentiator, Schmitt trigger, Wien bridge oscillator.</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Question Paper Pattern:

1. There will be five parts in the question paper – A, B, C, D, E

2. Part A
   a. Total marks : 12
   b. Four questions each having 3 marks, uniformly covering module I and II; All four questions have to be answered.

3. Part B
   a. Total marks : 18
   b. Three questions each having 9 marks, uniformly covering module I and II; Two questions have to be answered. Each question can have a maximum of three subparts

4. Part C
   a. Total marks : 12
   b. Four questions each having 3 marks, uniformly covering module III and IV; All four questions have to be answered.

5. Part D
   a. Total marks : 18
   b. Three questions each having 9 marks, uniformly covering module III and IV; Two questions have to be answered. Each question can have a maximum of three subparts

6. Part E
   a. Total Marks: 40
   b. Six questions each carrying 10 marks, uniformly covering modules V and VI; four questions have to be answered.
   c. A question can have a maximum of three sub-parts.

7. There should be at least 60% analytical/numerical/design questions.