<table>
<tr><td rowspan="2">Course Code</td><td rowspan="2">Title of the course</td><td rowspan="2">Program Core (PCR) / Electives (PEL)</td><td colspan="4">Total Number of contact hours</td><td rowspan="2">Credit</td></tr>
<tr><td>Lecture (L)</td><td>Tutorial (T)</td><td>Practical (P)</td><td>Total Hours</td></tr>
<tr><td>ECC01</td><td>Basic Electronics</td><td>PCR</td><td>2</td><td>1</td><td>0</td><td>3</td><td>3</td></tr>
<tr><td colspan="2">Pre-requisites</td><td colspan="6">Course Assessment methods (Continuous (CT) and end assessment (EA))</td></tr>
<tr><td colspan="2">(10+2) Level Mathematics and Physics</td><td colspan="6">CT+EA</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">CO1: Knowledge of Semiconductor Physics and Devices.
CO2: Have an in depth understanding of basic electronic circuit, construction and operation.
CO3: Ability to make proper designs using these circuit elements for different applications.
CO4: Learn to analyze the circuits and to find out relation between input and output.</td></tr>
<tr><td>Topics Covered</td><td colspan="7">Semiconductors [3 Hours]
1.1. Concept of band formation in solids; Fermi-Dirac distribution function, concept of Fermi level, invariance of Fermi level in a system under thermal equilibrium
1.2. Definitions of insulator, conductor and semiconductor using band diagram
1.3. Crystalline structure of semiconductor
1.3.1. Covalent bond
1.3.2. Generation of holes and electrons
1.3.3. Effect of temperature on semiconductor
1.4 Intrinsic semiconductor
1.5 Doping and Extrinsic semiconductor
1.5.1 n-Type semiconductor and band diagram
1.5.2 p-Type semiconductor and band diagram
1.5.3 Mass-action law of semiconductor
1.6. Conductivity of semiconductor (including mathematical expression)
1.7 Carrier transport phenomenon
Diodes [2 Hours]
2.1. Construction
2.2. Unbiased diode; Depletion layer and Barrier potential; junction capacitance (expression only)
2.3. Principle of operation with forward biasing and reverse biasing
2.4. Characteristics
2.5 Diode’s three models/equivalent circuits
Diode Circuits [3 Hours]
3.1 Diode rectifier
3.1.1 Half wave rectifier
3.1.2 Full wave rectifier : centre tap and bridge rectifier
3.1.3 Capacitive filter and DC power supply (Numerical problems)
3.2 Special Diodes
3.2.1 Zener diode : Avalanche breakdown and Zener breakdown and characteristics.
3.2.2 Zener diode as a voltage regulator
3.2.3 Display devices : LED and LCD
Bipolar Junction Transistor (BJT) [4 Hours]
4.1 n-p-n and p-n-p transistor and their constructions
4.2 Principle of operation
4.3 Transistor configuration : common base, common emitter, and common collector
4.4 Transistor characteristics: input and output characteristics of CB and CE configurations.
4.5 DC load line: quiescent (Q) point; cut-off, active, and saturation region
4.6 Amplifier : Principle of operation
4.7 Transistor as a switch</td></tr>
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	Transistor Biasing [2 Hours] 5.1 Need of biasing 5.2 Methods of biasing : base resistor or fixed bias, emitter feedback, voltage divider biasing 5.3 Stability of Q-point (qualitative discussions) 5.4 (Numerical problems) **Single Stage Amplifier [2 Hours]** Classification of amplifiers (voltage amplifier, current amplifier, power amplifier etc.) Class-A CE Amplifier with coupling and bypass capacitors, Qualitative discussions of magnitude characteristics of frequency response (graph only) **Feedback Amplifier [3 Hours]** 7.1 Positive and negative feedback 7.2 Deduction of gain with negative feedback, explanation of stability of gain with negative feedback, other effects of negative feedback (no deduction), numerical problems. **Other Semiconductor Devices [2 Hours]** 8.1 JFET : Construction, principle of operation, characteristics 8.2 MOSFET: Construction, principle of operation, characteristics 8.3 Power Electronic Device-SCR : Brief discussions **Operational Amplifier [4 Hours]** 9.1 Characteristics of ideal operational amplifier 9.2 Pin Configuration of IC 741 9.3 Analysis of simple operational amplifier circuits: concept of virtual ground; noninverting amplifier and inverting amplifier. 9.4 Applications: voltage follower, summer, differentiator, integrator, and comparator **Oscillator [2 Hours]** 10.1 Positive feedback and condition of oscillation 10.2 R-C phase-shift oscillator, Wien bridge oscillator **Boolean Algebra [1 Hour]** 11.1 Boolean algebra, De Morgan's theorem, simplification of Boolean expressions 11.2 Number system, range extension of numbers, overflow 11.3 Different codes: Gray code, ASCII code and BCD codes and their Applications **Logic Gates [1 Hour]** 12.1 NOT, OR, AND, NOR, NAND, EX-OR, EX-NOR gates 12.2 Simplification of logic functions 12.3 Realizations of logic expressions using logic gates **CRO and its applications and other test and measurement instruments [1 Hour]**
Text Books, and/or reference material	TEXT BOOKS 1. Introduction Electronic Devices & Circuit Theory,11/e, 2012, Pearson: Boylestad & Nashelsky 2. Integrated Electronics: Millman & Halkias REFERENCE BOOKS 1. The Art of Electronics 3e, by Paul Horowitz, Winfield Hill 2. Electronics - Circuits and Systems, Fourth Edition by Owen Bishop 3. Electronics Fundamentals: Circuits, Devices & Applications (8e) by Thomas L. Floyd & David M. Buchla. 4. Electronic Principles, by Albert Paul Malvino Dr. and David J. Bates