**20EC2105– ANALOG & DIGITAL ELECTRONICS**

**(EEE)**

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 2-1-0 |
| **Pre-requisite:** | Basic knowledge of semiconductor physics. | **Sessional Evaluation :****External Exam Evaluation:****Total Marks:** | 4060100 |
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| **Course Objectives:** | Students undergoing this course are expected to learn: |
| 1. Design rectifiers & filters circuits and BJT biasing circuits and its applications..
2. The working of FET and MOSFET.
3. The constructional features and operation of FET amplifier & feedback amplifier.
4. The Digital electronics fundamentals and examine the structure of various number systems.
5. The analysis and design of various combinational and synchronous sequential circuits.
6. The concept of various counters and Registers.
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| **Course Outcomes:** | Upon successful completion of the course, the student will able to: |
| **CO1** | Design rectifiers & filters circuits and BJT biasing circuits and its applications. |
| **CO2** | Understand the working of FET and MOSFET. |
| **CO3** | Distinguish the constructional features and operation of FET amplifier & feedback amplifier. |
| **CO4** | Understand the fundamental concepts and techniques used in digital electronics and examine the structure of various number systems. |
| **CO5** | Understand analysis and design of various combinational and synchronous sequential circuits. |
| **CO6** | Understand concept of various counters and Registers..  |
| **Course Content:** | **UNIT-I****Diode Rectifiers:** Half wave and full wave rectifiers, Analysis of filters (C, L, LC. and CLC) used with Full wave rectifier.**Bipolar Junction Transistor:** BJT biasing schemes, Small signal analysis of single stage BJT amplifiers, Comparison of CE, CB and CC amplifiers, Approximate model analysis, Effects of coupling and bypass capacitors on low frequency response.**UNIT – II****Field Effect Transistor:** Introduction, Construction & Operation of N-Channel JFET, Characteristic Parameters, Saturation Drain Current, Slope of the Transfer Characteristic at IDSS, Comparison of JFET and BJT, Applications, MOSFET, Enhancement MOSFET, Depletion MOSFET, Comparison of MOSFET and JFET.**UNIT –III****FET Amplifiers:** FET biasing schemes, Small signal model, Analysis of CS, CD and CG amplifiers, High frequency response.**Feedback Amplifiers:** Feedback concept, Classification, Effect of negative feedback on gain, Stability, Noise, Distortion, Bandwidth, Input and Output resistances. Different types of feedback circuits without analysis.**UNIT – IV****DIGITAL FUNDAMENTALS:** Number Systems-Decimal, Binary, Octal, Hexadecimal, Binary Arithmetic – Addition, subtraction, multiplication, division. Conversion of number systems. Binary Codes , BCD, Excess3, Gray, Error correcting and detecting code, Alphanumeric codes. **BOOLEAN THEOREMS AND LOGIC GATES:** Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map Minimization.**UNIT – V****COMBINATIONAL LOGIC CIRCUIT DESIGN:** Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder, BCD Adder, Multiplexer, Demultiplexer, Decoder, Encoder**.** **SYNCHRONOUS SEQUENTIAL CIRCUITS:** Flip flops – SR, JK, T, D, Master/Slave FF, operation and excitation tables, Triggering of Flip flops, Analysis and design of clocked sequential circuits.**UNIT – VI****REGISTERS AND COUNTERS:** Design of Counters, Ripple Counters, Ring and Johnson Counters, Shift registers, Universal Shift Register. |
| **Text Books & Reference Books:** | **TEXT BOOKS:**1. “Electronic devices and circuits”, by Mottershed, PHI.
2. “Electronic Devices & Circuits”, by Jacob Millman&Christos C. Halkias, McGraw- Hilll
3. “Digital design”, by Morris Mano, Pearson Education Asia.
4. “Fundamentals of logic design”, by Roth & Charles, 2nd Edition, West Publishing Company, 1979.

**REFERENCE BOOKS:**1.“Electronic Devices and circuits”, by S. Salivahanan, N. Suresh Kumar, McGraw- Hill 2.“Electronic devices and circuits” , by Boylestad, Louis Nashelsky, 9ed.., 2008 PE. 3.“Fundamentals of logic circuits”, by A. Anand Kumar, PHI Learning.4.“Digital logic - applications and design”, by Jon M, Yarbrough, Thomson -Brooks India  edition. |
| **e-Resources:** | https://nptel.ac.in/courseshttps://iete-elan.ac.inhttps://freevideolectures.com/university/iitm |