# Semester Lecture Plan

**Name of the college:** Government College of Arts, Science & Commerce, Sanquelim-Goa

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| **Name of Faculty:** Aga D. A. | **Subject:** Physics (THEORY) and (PRACTICALS) | |
| **Paper code:-PHY- 300 Analog and Digital Electronics** | **Program/Course: T.Y. B.Sc.** | **Division: A** |
| **Academic year: 2025 – 2026** | **Semester: V** | **Total Lectures: 60 Plus Practicals** |

**Course Objectives: This course aims to provide the students with a foundation in basic knowledge of Analogue and Digital Electronics.**

**Course Learning Outcome: The student after undergoing this course will be able to: 1. Describe and explain the basic function of a transistor, transistor as a Switch, Multivibrators using Transistors. 2) Explain FETs in detail 3) Design and Assemble the circuits of Voltage regulators using IC 78-- and 79—series. 4)Draw and Discuss the block diagram of IC555 and its use as Astable & Monostable multivibrator. 5) Illustrate the Number system logic and 6) Classify Flip Flops and Counters with diagram, truth table and waveforms.**

| Month | Lectures From: | To: | No. of lectures allotted | Topic, Subtopic to be covered | Learning outcome | ICT Tools | Reference books |
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| JUNE | 20/06/2025 | 28/06/2025 | 05 | Topic 1 Binary number system, Binary to Decimal and Decimal to Binary conversion | **The student will be able to: 1. Describe and explain Binary number system, Binary to Decimal and** | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986). 2. R. P. Jain, Modern Digital |

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| | | | | | **Decimal to Binary conversion , Preparation of 2 i/p, 3i/p and 4 i/p truth table** | | Electronics, TMH (2003). |
| June and July | 30/06/2025 | 05/07/2025 | 04 | Topic-1 Basic logic gates, NOT,OR, AND, gates | **The student will be able to: . Describe and explain Basic logic gates, NOT,OR, AND, gates** | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH (2003). |
| JULY | 07/07/2025 | 12/07/2025 | 04 | Topic 1 NOR, NAND, and EX-OR, Bubbled OR and Bubbled AND gates | **The student will be able to: 1) Describe and explain NOR, NAND, and EX-OR, Bubbled OR and Bubbled AND gates** | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH (2003). |
| | | | 04 | **PRACTICAL** | **Verification of De Morgan Laws and Boolean Identities. (Construction using Gates).** | | |
| JULY | 14/07/2025 | 19/07/2025 | 04 | Topic1 De Morgan's Law's, | **The student will be able to:** | White board and marker | 1. Malvi |

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| | | | | Boolean Algebra, NAND and NOR gates as universal building blocks in logic circuits, | **1. Describe and explain De Morgan's Law's, Boolean Algebra, NAND and NOR gates as universal building blocks in logic circuits,** | | no and Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH (2003).J. Millman and C. Halkias, Electronic Devices and Circuits , Mc Graw Hill (1972). |
| | | | 04 | **PRACTICAL** | **NAND and NOR gates as universal building blocks.** | | |
| JULY | 21/07/2025 | 26/07/2025 | 04 | Topic 2 Sum of Products methods and Product of Sum methods of representation of logical functions. | **The student will be able to:<br>1. Describe and explain Sum of Products methods and Product of Sum methods of representation of logical functions.** | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH (2003). |
| | | | 04 | **PRACTICAL** | **REVISION** | | |
| July and August | 28/07/2025 | 02/08/2025 | 04 | Topic 2 Binary addition and Subtraction, Half adder and Full adder, Multiplexer and Demultiplexer. | **The student will be able to: . Describe and explain Binary addition and Subtraction, Half adder and** | White board and marker | 1.Allen Mottershed, Electronic Devices and Circuits An Introduction: PHI (1997).<br>2.Malvino, Electronic Principles, |

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| | | | | Encoders and decoders | **Full adder, Multiplexer and Demultiplexer. Encoders and decoders** | | TMH (2007).<br>J. Millman and C. Halkias, Electronic Devices and Circuits , Mc Graw Hill (1972). |
| | | | 04 | **PRACTICAL** | **Binary addition- Half adder and Full adder using logic gates.** | | |
| **AUGUST** | 04/08/2025 | 09/08/2025 | 03 | Logic families – DTL, TTL Standard TTL NAND gate, | **The student will be able to: Explin Logic families – DTL, TTL Standard TTL NAND gate,** | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH (2003). |
| | | | 04 | **PRACTICAL** | **Digital MULTIPLEXER** | | |
| AUGUST | 11/08/2025 | 16/08/2025 | 04 | Schottky TTL, ECL OR and NOR gate, MOS (inverter, NAND and NOR gates) and CMOS (inverter, NAND and NOR gates)., | **The student will be able to: Explain Schottky TTL, ECL OR and NOR gate, MOS (inverter, NAND and NOR gates) and CMOS (inverter, NAND and NOR gates)** | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH (2003). |
| | | | 04 | **PRACTICAL** | **REVISION** | | |

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| AUGUST | 18/08/2025 | 23/08/2025 | 04 | Transistors Multivibrators. Transistor as a switch, switching times, Multivibrators – Astable, Monostable, | **The student will be able to: Explain Transistor as a switch, switching times, Multivibrators – Astable, Monostable,** | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986). 2. R. P. Jain, Modern Digital Electronics, TMH (2003). |
| | | | 04 | **PRACTICAL** | **Study and analysis of transistorised Multivibrators- Astable, Monostable.** | | |
| September | 02/09/202 | 06/09/2025 | 03 | Topic Bistable and Schmitt Trigger. Field Effect Transistors. Basic structure of the JFET, Principles of operation, Characteristic curves and parameters | **The student will be able to: Explain Bistable and Schmitt Trigger. Field Effect Transistors. Basic structure of the JFET, Principles of operation,** | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986 2. R. P. Jain, Modern Digital Electronics, TMH (2003). |
| | | | 04 | **PRACTICAL** | **Study and analysis of transistorised Multivibrators- Astable, Monostable.** | | 2. |
| **September** | 08/09/2025 | 13/09/2025 | 05 | | **The student** | White board | 1. Malvino and |

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| | | | | Topic-6 Common source amplifiers, Common gate amplifier (only qualitative discussion), The MOSFET Depletion Mode and Enhancement mode, | **will be able to: Explain 3 bit Shift register (shift left, shift right), Applications of FF's in counters, 3 bit count up/count down binary ripple counter,** | and marker | Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH (2003). |
| | | | 04 | **PRACTICAL** | **Study and analysis of transistorised Multivibrators- Astable, Monostable.** | | |
| **SEPTEMBER** | 15/09/2025 | 20/09/2025 | 04 | Dual-Gate MOSFET. FET Phase shift oscillator, FET as VVR and its applications in Attenuator, AGC and Voltmeter circuits. Applications of OP-AMP. Active diode circuits, Intergrator, Differentiator, Comparator, Window comparator, | **The student will be able to: Explain Dual-Gate MOSFET. FET Phase shift oscillator, FET as VVR and its applications in Attenuator, AGC and Voltmeter circuits. Applications of OP-AMP. Active diode circuits, Intergrator, Differentiator,** | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH (2003). |

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| | | | | Schmitt Trigger, Waveform generator – Square wave, Triangular and Ramp Generator and monostable | **Comparator, Window comparator, Schmitt Trigger, Waveform generator – Square wave, Triangular and Ramp Generator and monostable** | | |
| | | | 04 | **PRACTICAL** | **Study and analysis of transistorised Multivibrators- Bistable, Schmitt trigger.** | | |

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| **SEPTEMBER** | 22/09/25 | 27/09/25 | 04 | Voltage Regulation: Fixed voltage regulation using IC-78 & 79 series, adjustable voltage regulators using IC LM-317. Timers: IC-555 Timer : basic concept, block diagram, Monostable, Astable and Voltage controlled oscillator (VCO). | **The student will be able to: Explain Voltage Regulation: Fixed voltage regulation using IC-78 & 79 series, adjustable voltage regulators using IC LM-317. Timers: IC-555 Timer : basic concept, block diagram, Monostable, Astable and Voltage controlled oscillator (VCO).** | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH (2003). |
| | | | 04 | **PRACTICAL** | **Study and analysis of transistorised Multivibrators- Bistable, Schmitt trigger.** | | |
| **September and October** | 29/09/2025 | 04/10/2025 | 04 | Flip Flops and Counters :- Basic RS FF, Clocked RS FF, JK FF, D-type and T-type FF, Master Slave Concept, | **The student will be able to: Explain Basic RS FF, Clocked RS FF, JK FF, D-type and T-type FF, Master Slave Concept,** | White board and marker | H. S. Kalsi, Electronic Instrumentation: TMH (2004). |

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| | | | 04 | **PRACTICAL** | **F.E.T Characteristics & F.E.T Common Source Amplifier.** | | |
| **October** | 06/10/25 | 11/10/25 | 04 | Topic-3 bit Shift register (shift left, shift right), Applications of FF's in counters, 3 bit count up/count down binary ripple counter, | **The student will be able to: Explain 3 bit Shift register (shift left, shift right), Applications of FF's in counters, 3 bit count up/count down binary ripple counter,** | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH (2003). |
| | | | 04 | **PRACTICAL** | **F.E.T Characteristics & F.E.T Common Source Amplifier** | | |
| **OCTOBER** | 12/10/25 | 15/10/25 | 04 | Mod 3, Mod 5, Mod 7 Counters, BCD Decade Counter, Cascade | The student will be able to: Explain Mod 3, Mod 5, Mod 7 Counters, | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH (2003).-- |
| | | | 04 | **PRACTICAL** | **Op-Amp as a square wave generator & integrator** | | |

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| **OCTOBER** | 12/10/25 | 15/10/25 | | **BCD Decade Counter, Cascade BCD Decade counters, Principle of digital clock.** | The student will be able to: Explain BCD Decade Counter, Cascade BCD Decade counters, Principle of digital clock. | White board and marker | 1. Malvino and Leach, Digital Principles and Applications, TMH (1986).<br>2. R. P. Jain, Modern Digital Electronics, TMH |

*Note: Data filled in the above form is sample data.