

	PVKN Govt. College (Autonomous) Chittoor	Program II B.Sc. Physics Hons.
Course Code 24-PHY-3C8	TITLE OF THE THEORY PAPER ANALOG AND DIGITAL ELECTRONICS	Semester-III

Syllabus:

UNIT-I: OPERATIONAL AMPLIFIERS

- a) ~~Concept of feedback in CE amplifier, negative and positive feedback, advantages and disadvantages of negative feedback, Basic concepts of differential amplifier, Block diagram of op amp and its equivalent circuit, IC Diagram (IC 741), Ideal voltage transfer curve, Open loop Op-Amp configurations- differential, inverting and non-inverting Op-Amps.~~
- b) Voltage Series Feedback Amplifier (Non-Inverting Op amp): Gain and Bandwidth derivations: Voltage Shunt Feedback Amplifier (Inverting Op amp): Gain and Bandwidth derivations

UNIT-II: PRACTICAL OPERATIONAL AMPLIFIER AND APPLICATIONS

- a) Characteristics of an Ideal and Practical Operational Amplifier (IC 741), Input offset voltage, Input bias current, Input offset current, total output offset voltage, CMRR, slew rate and concept of virtual ground.
- b) Applications of Op-Amp: Linear Applications: Voltage Follower, Summing Amplifier, Subtracting Amplifier, Averaging Amplifier, Difference Amplifier, Integrator and Differentiator, ~~Square Wave response of Integrator and Differentiator (Brief explanation only),~~ **Simplification of Second Order differential equation.**

UNIT-III: NUMBER SYSTEMS, CODES AND LOGIC GATES

- a) Number Systems and Codes: Decimal, Binary, Octal and Hexadecimal number systems, conversions, Binary addition, Binary subtraction using 1's and 2's complement methods.
- b) Logic Gates: Construction and truth tables of OR, AND, NOT gates, Universal gates – Basic construction and truth tables of NOR & NAND, Realization of logic gates using NAND and NOR, XOR and XNOR Logic gates symbol and their truth tables. De Morgan's Laws, Boolean Laws, Simplification of Boolean Expressions using Boolean Laws.

UNIT-IV: ARITHMETIC CIRCUITS & DATA PROCESSING CIRCUITS

- a) Half Adder and Full Adder: Explanation of truth tables and Circuits. 4 - bit binary Adder.
- b) Multiplexers - ~~2 to 1 Multiplexer~~, 4 to 1 multiplexer, De-multiplexers: ~~1 to 2 Demultiplexer~~, 1 to 4 Demultiplexer, Applications of Multiplexers and Demultiplexers Decoders: ~~1 of 2 decoders~~, 2 of 4 decoders, Encoders: ~~4 to 2~~, 8 to 3 Encoder, Applications of decoders and encoders

UNIT-V: SEQUENTIAL LOGIC CIRCUITS & CODE CONVERTERS

- a) Combinational Logic vs Sequential Logic Circuits, Sequential Logic circuits: Flip-flops, Basic NAND, NOR Latches, Clocked SR Flip-flop, JK Flip-flop, D Flip-flop, Master-Slave Flip-flop, ~~Conversion of Flip-flops.~~ **4-bit binary counter**
- b) Code Converters: BCD to Decimal Converter, ~~BCD to Gray Code Converter~~, BCD to 7 segment Decoders