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Linear Integrated Circuit — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 3rd Semester • Session 2026-27

Subject 3.3 (Practicum) • Total 100 Marks • 3 Credits • L 2 - P 2

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
3.3	Linear Integrated Circuit	Practicum	2 - 2	3	Theory 40	Theory 60 (3 hrs)	100
Linear Integrated Circuit Total				3	40	60	100

What This Subject Aims To Do

To cover the fundamentals of operational amplifiers and their linear and non-linear applications — signal conditioning, medical electronics and instrumentation — and to build the skills to maintain linear electronic circuits based on integrated circuits.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Operational Amplifiers	6	21%
2	Applications of Operational Amplifiers	4	16%
3	Special Purpose Operational Amplifiers	6	21%
4	Voltage Regulator	6	21%

5	Comparator and Timers	6	21%
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Unit 1 — Operational Amplifiers (6 Periods, 21%)

Topics: Symbol, pin diagram, ratings of IC 741, Electrical properties, transfer characteristics & parameters of ideal OP AMP, DC and AC performance characteristics, slew rate, Open and closed loop configurations, Block diagram & operating principle, OP-AMP with positive and negative feedback.

In simple words: The op-amp itself: the 741 chip, what an ideal op-amp should do, what a real one actually does, and open-loop vs closed-loop operation.

Unit 2 — Applications of Operational Amplifiers (4 Periods, 16%)

Topics: Open loop configuration-Inverting, Non-inverting, Close loop configuration – Inverting, non- inverting, Differential amplifier, unity gain amplifier, Inverting & non-inverting configuration of Adders (summing, scaling, averaging amplifier), Subtractor, Integrator & Differentiator

In simple words: The classic op-amp circuits: amplifiers, adders, subtractors, and circuits that integrate or differentiate a signal.

Unit 3 — Special Purpose Operational Amplifiers (6 Periods, 21%)

Topics: Bridge amplifier, instrumentation amplifier with two & three OP AMPS, V-I converters, I-V converters, logarithmic & Antilogarithmic amplifier, Astable, Monostable and Bistable Multivibrator using OP AMP.

In simple words: More specialised op-amp circuits: instrumentation amplifiers for tiny sensor signals, converters between voltage and current, and multivibrators that generate square waves.

Unit 4 — Voltage Regulator (6 Periods, 21%)

Topics: Linear voltage regulator: Block schematic, pin diagrams, features, Specifications, rating and operating principle of IC 723, 78xx, 79xx series, switching regulator: Block schematic, pin diagram, features, specifications, ratings and operating, Principle of switching regulator IC LM 317, LM337 Regulator.

In simple words: How to get a steady DC supply voltage: the 723, 78xx/79xx and adjustable LM317/LM337 regulator chips, and switching regulators.

Unit 5 — Comparator and Timers (6 Periods, 21%)

Topics: Op-Amp as comparator, Study of Op-amp peak to peak detector, phase detector circuit, voltage level detector circuit, Schmitt trigger using op-amp, Study of timer IC – 555, Block diagram, operating principle, pin diagram, Features of IC-555, IC-555 as Astable, Monostable, bi-stable & Schmitt Trigger, Sample and hold circuit, Phase Locked Loop- Principle & block diagram of PLL, Transfer characteristics, lock range & capture range.

In simple words: Using an op-amp to compare voltages, the famous 555 timer chip in its three modes, and the phase-locked loop.

Practical Work

- To Interpret the parameters of given Op-Amplifier from data sheet.
- To test performance of OP_AMP as an inverting & Non inverting amplifier and observe input/output waveforms. To test performance of OP_AMP as unity gain amplifier.
- To design and test performance of OP_AMP as an Adder and Subtractor.
- To test performance of OP_AMP as an Integrator & Differentiator.
- To test performance of OP_AMP Instrumentation Amplifier calculate gain & frequency response.
- To build & test Astable multivibrator using IC 741 for different values of R and C.
- To build/test Monostable multivibrator using IC 741 for different values of R and C.
- To build & test fixed/variable voltage regulator using LM723 & plot line/ load regulation characteristics.
- To build & test variable voltage regulator using LM317 & measure the dropout voltage & plot line/ load regulation characteristics.
- To build & test variable voltage regulator using LM337 & measure the dropout voltage & plot line/ load regulation characteristics.
- To build & test voltage regulator using 78xx and 79xx and measure the dropout voltage & plot line/ load regulation characteristics.
- To build Op-Amp as voltage Regulator- IC 723.
- Various applications of Timer IC555.

Reference Books (as listed in the syllabus)

- Design with operational amplifiers and analog integrated circuits, 3rd Edition Sergio Franco Tata McGraw-Hill, 2007
- Linear Integrated Circuits, D.Roy Choudhry, Shail Jain New Age International Pvt. Ltd
- System design using Integrated Circuits. B.S.Sonde New Age Pub, 2nd Edition, 2001
- Analysis and Design of Analog Integrated Circuits Gray and Meyer Wiley International, 2005.

- OP-AMP and Linear ICs Ramakant A. Gayakwad Prentice Hall / Pearson Education, 4th Edition, 2001
- Operational Amplifier and Linear Integrated Circuits K Lal Kishore, Pearson Education, 2006

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Source: BTEUP 2nd Year curriculum (folder2627), approved in C.D.C. meeting held on 16.07.2026. Topic lists follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text.

Please confirm with your own polytechnic for any local changes.

