

1. **HDL Programming (VHDL and Verilog)**- Nazeih M.Botros- John Wiley India Pvt. Ltd. 2008.

**REFERENCE BOOKS:**

1. **Fundamentals of HDL** – Cyril P.R. Pearson/Sanguin 2010.
2. **VHDL** –Douglas perry-Tata McGraw-Hill
3. **A Verilog HDL Primer**- J.Bhaskar – BS Publications
4. **Circuit Design with VHDL**-Volnei A.Pedroni-PHI

**LINEAR IC's & APPLICATIONS**  
(Common to EC/TC/IT/BM/ML)

Sub Code	:	10EC46	IA Marks	:	25
Hrs/ Week	:	04	Exam Hours	:	03
Total Hrs.	:	52	Exam Marks	:	100

**UNIT 1:**

**Operational Amplifier Fundamentals:** Basic Op-Amp circuit, Op-Amp parameters – Input and output voltage, CMRR and PSRR, offset voltages and currents, Input and output impedances, Slew rate and Frequency limitations; Op-Amps as DC Amplifiers- Biasing Op-Amps, Direct coupled -Voltage Followers, Non-inverting Amplifiers, Inverting amplifiers, Summing amplifiers, Difference amplifier.

**UNIT 2:**

**Op-Amps as AC Amplifiers:** Capacitor coupled Voltage Follower, High input impedance - Capacitor coupled Voltage Follower, Capacitor coupled Non-inverting Amplifiers, High input impedance - Capacitor coupled Non-inverting Amplifiers, Capacitor coupled Inverting amplifiers, setting the upper cut-off frequency, Capacitor coupled Difference amplifier, Use of a single polarity power supply.

**UNIT 3:**

**Op-Amps frequency response and compensation:** Circuit stability, Frequency and phase response, Frequency compensating methods, Band width, Slew rate effects,  $Z_{in}$  Mod compensation, and circuit stability precautions.

**UNIT 4:**

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**OP-AMP Applications:** Voltage sources, current sources and current sinks, Current amplifiers, instrumentation amplifier, precision rectifiers, Limiting circuits.

**UNIT 5:**

**More applications:** Clamping circuits, Peak detectors, sample and hold circuits, V to I and I to V converters, Log and antilog amplifiers, Multiplier and divider, Triangular / rectangular wave generators, Wave form generator design, phase shift oscillator, Wein bridge oscillator.

**UNIT 6:**

**Non-linear circuit applications:** crossing detectors, inverting Schmitt trigger circuits, Monostable & Astable multivibrator, Active Filters –First and second order Low pass & High pass filters.

**UNIT 7:**

**Voltage Regulators:** Introduction, Series Op-Amp regulator, IC Voltage regulators, 723 general purpose regulator, Switching regulator.

**UNIT 8:**

**Other Linear IC applications:** 555 timer - Basic timer circuit, 555 timer used as astable and monostable multivibrator, Schmitt trigger; PLL-operating principles, Phase detector / comparator, VCO; D/A and A/D converters – Basic DAC Techniques, AD converters.

**TEXT BOOKS:**

1. “Operational Amplifiers and Linear IC’s”, David A. Bell, 2<sup>nd</sup> edition, PHI/Pearson, 2004
2. “Linear Integrated Circuits”, D. Roy Choudhury and Shail B. Jain, 2<sup>nd</sup> edition, Reprint 2006, New Age International

**REFERENCE BOOKS:**

1. “Opamps- Design, Applications and Trouble Shooting”, Terrell, Elsevier, 3<sup>rd</sup> ed. 2006.
2. “Operational Amplifiers”, George Clayton and Steve Winder, Elsevier 5<sup>th</sup> ed., 2008

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3. "Operational Amplifiers and Linear Integrated Circuits", Robert F. Coughlin & Fred F. Driscoll, PHI/Pearson, 2006  
4. "Design with Operational Amplifiers and Analog Integrated Circuits", Sergio Franco, TMH, 3e, 2005

**MICROCONTROLLERS LAB**  
(Common to EC/TC/EE/IT/BM/ML)

Sub Code	:	10ESL47	IA Marks	:	25
Hrs/ Week	:	03	Exam Hours	:	03
Total Hrs.	:	42	Exam Marks	:	50

**I. PROGRAMMING**

1. Data Transfer - Block move, Exchange, Sorting, Finding largest element in an array.
2. Arithmetic Instructions - Addition/subtraction, multiplication and division, square, Cube – (16 bits Arithmetic operations – bit addressable).
3. Counters.
4. Boolean & Logical Instructions (Bit manipulations).
5. Conditional CALL & RETURN.
6. Code conversion: BCD – ASCII; ASCII – Decimal; Decimal - ASCII; HEX - Decimal and Decimal - HEX .
7. Programs to generate delay, Programs using serial port and on-Chip timer / counter.

**Note: Programming exercise is to be done on both 8051 & MSP430.**

**II. INTERFACING:**

Write C programs to interface 8051 chip to Interfacing modules to develop single chip solutions.

8. Simple Calculator using 6 digit seven segment displays and Hex Keyboard interface to 8051.
9. Alphanumeric LCD panel and Hex keypad input interface to 8051.
10. External ADC and Temperature control interface to 8051.
11. Generate different waveforms Sine, Square, Triangular, Ramp etc. using DAC interface to 8051; change the frequency and amplitude.
12. Stepper and DC motor control interface to 8051.
13. Elevator interface to 8051.

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