

**Revised Syllabus of B.Sc.-III(Electronics)
Semester V and semester VI Implemented From June 2015**

**SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Semester -V
Electronics(Paper-IX)
*Linear Integrated circuits***

UNIT-1: Linear IC's and Amplifier [10]

Transistor dc amplifier, Differential amplifier, Emitter coupled differential amplifier with its operation, characteristics and parameters(I/O impedances, common mode and differential mode gain, CMRR)Dual input and single ended output configuration of differential amplifier. Method to improve CMRR(constant current bias and current mirror bias)

Introduction to op-amp, block diagram of op-amp, offset balancing technique of op-amp, drift parameters of op-amp, study of IC741 and comparative study of IC's LM324, LM308, LF356.

UNIT-2: Op-amp as Analog System Building Blocks [10]

Virtual ground concept, Op-amp as inverting and non- inverting amplifier, summing amplifier (adder and subtractor), V to I and I to V converter, voltage follower, bridge amplifier, Differentiator and integrator, log and antilog amplifier.

Op-amp as comparator, regenerative comparator (Schmitt trigger),sine wave oscillators(phase shift and Wien -bridge),Triangular wave generator, square and pulse generator. Peak detector, clipping and clamping circuits.

UNIT-3: Precision Rectifier and Active filters [10]

Op-amp as precision AC/DC converter, precision rectifier. Advantage of active filters over passive filters. study of filter response (Butterworth, Chebyshev.) Different types of active filters. Study and design of low pass, high pass, band pass, band stop filters(up to 2nd order)

UNIT-4:Phase Locked –Loops (PLL) and Power Supply [10]

Block diagram of PLL with functioning of each block, calculation of capture range and lock range frequencies,application of PLL (frequency multiplier, FM modulator, frequency synthesizer and FSK) Study of IC565,IC8038.

IC555 timer as variable duty cycle(10% to 90%), sequential timer, ramp generator.

Reference Books:

- 1 Integrated Electronics - Millman-Halkias (MGH)
- 2 Op-Amps and Linear circuits - Ramakant Gaikwad (PHI)
- 3 Operational Amplifiers and Linear ICs - Caughlin and Driscoll (PHI)
- 4 Operational Amplifier with Linear Integrated Circuit – W. D. Stanley (CBS Publications)
- 5 Linear Integrated circuit - D Roy Choudhari, Shail Jain, (Wiley Eastern Ltd)
- 6 Micro electronics Circuits - Rashid (PWS publication)
- 7 Integrated circuit (New Edition) – K.R.Botkar
- 8 Linear ICs - Data Book
- 9 Op-Amp - G. B. Clayton, Butterworth Publication
- 10 Design with Operational Amplifiers and Analog ICs - Franco (Mc Graw Hill,2000)

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Semester -V
Electronics(Paper-X)
Communication Systems -I

Unit: I Fundamentals of Communication Systems [6]

Introduction and block diagram of generalized communication system, role of each block viz. Information source, transmitter, channel/ communication media and receiver.

Types of communication systems – simplex and duplex systems, analog and digital systems. Applications of electronic communication, Electromagnetic spectrum used in communication, concept of bandwidth. Noise in communication: External and internal noise. Concepts of noise voltage, S/N ratio, noise figure and noise temperature.

Unit: II Modulation and Demodulation [14]

Modulation - Need of modulation and types of modulation.

Amplitude modulation – Principle, mathematical expression, modulation index, percent (%) modulation, side bands and frequency spectrum, power distribution. Concepts of DSB, SSB & VSB. DSB generation using FET Balanced Modulator and SSB generation using phase shift method.

Frequency Modulation – Principle, mathematical expression, modulation index, side bands. Comparison of AM and FM.

AM & FM Broadcast Transmitters – Block diagram and working of each block.

Demodulation - Amplitude demodulation (Diode detector), Frequency demodulation (Foster Seely Discriminator)

Unit: III Antenna and Radio Wave Propagation [6]

Antenna: Parameters - Gain, directivity, Radiation pattern, Beam width, Bandwidth, input impedance, radiation resistance and efficiency. Types of antennas- half wave dipole, Yagi-uda and dish antennas.

Radio wave propagation: Ground wave, Sky wave and Space wave propagation. Ionosphere, Skip distance, MUF, Expression for critical frequency ($F_c = 9 \sqrt{N_{\max}}$).

Unit: IV Radio Receivers and Television [14]

Radio Receivers: AM Superhet Receiver - block diagram and working of each block, Selection of Intermediate Frequency, Receiver characteristics (selectivity, sensitivity & fidelity) **FM Receiver** – block diagram and working of each block.

Television: Scanning - Horizontal & vertical scanning, scanning frequency, interlaced scanning. Picture formation, picture tube, picture qualities (Brightness, contrast, aspect ratio, viewing distance, colour level and hue)

TV Broadcasting – Composite video signal, horizontal and vertical sync pulses. Channel bandwidth, VSB transmission. **TV transmitter** - Block diagram and working of each block. **TV Receiver** – Block diagram of B/W TV receiver and working of each block.

Colour TV Principle - Concepts of Plasma, LCD, LED, OLED TV Panels, Cable TV, Dish TV and Set – Top Box.

Reference Books

1. Communication Electronics – Frenzel 3rd Edition (MGH)
2. Electronic Communication – Roddy & Colins (PHI)
3. Principles of Communication – Anokh Singh
4. Antenna and Wave Propagation – K D Prasad
5. Monochrome and Colour TV – Gulati (John Willing)
6. Television – Dhake (TMH)

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Semester -V
Electronics(Paper-XI)
8051 Microcontroller Interfacing and Embedded C

UNIT 1.Serial communication in 8051.

[10]

Serial Port : Serial port of 8051, RS-232 standard and IC MAX-232, Concept of Baud rate, Baud rate in 8051, Baud rate doubling using crystal frequency and PCON register, SBUF, SCON registers, various modes of serial port, Importance of TI and RI flags, programming for data transmission and reception in mode-1 in ALP

UNIT 2. Programming of 8051 in C

[10]

Advantages and disadvantages Program in 8051-C & Assembly Language. Data types and time delay in 8051-C, I/O programming in 8051-C, Accessing SFR addresses in 8051- C, Logical operation in 8051 C. Data conversion programs in 8051 C. Accessing code ROM space in 8051 C, programming for Time delay generation (using timer), external interrupts (Level and edge triggering) and transmits, receive data serially

UNIT 3.Real World Interfacing of 8051

[14]

Interfacing LED, LCD, Switch, Relay, 4X4 matrix keyboard, opto-coupler, thumb wheel switch and seven segment display, seven segment (multiplexing mode), Stepper Motor, DAC0808 and ADC0804. Speed Control of DC motor by PWM technique.

UNIT 4. Applications of 8051

[06]

Case study's: i) Temperature measurement using LM35, ADC0804, LCD. ii) Water level controller iii) Traffic Light controller iv) speed measurement of motor v) Gate Emulator (Logic Gate study using microcontroller) (Use ALP/C during programming)

Reference Books:

1. The 8051 Microcontroller -K. J. Ayala, (Penram International)
2. The 8051 Microcontroller and Embedded Systems, M. A. Mazadi, J. G. Mazadi, Pearson Education, Asia
3. Programming and customizing the 8051 Microcontroller - MYKE Predko (TMH, New Delhi)
4. C and the 8051: Programming and Multitasking, Schultz, P T R Prentice-Hall, Inc. Embedded C, Michael J. Pont,

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Semester -V
Electronics(Paper-XII)
Power Electronic Devices and Applications

Unit 1 :-Power Diodes and Transistors **(12)**

Power Diode: Construction of the diode (drift layer), conductivity modulation, I-V characteristics , Reverse recovery effect (analysis), types of diode, series and parallel connection of diode, diodes with RC,RL,LC and RLC loads.

Power Transistors : structure, operation, effect of drift layer. Switching characteristics , specifications, Base drive circuits.

Power MOSFET : MOSFET structure, characteristics, operation and drive circuits.

IGBT : Structure, characteristics, Operation and drive circuits, Comparison of power transistor, MOSFET and IGBT.

Unit 2 :- Thyristors **(6)**

Structure, I-V Characteristics, two transistor analogy, Turn ON and turn Off process, Thyristor rating, concept of di/dt and dv/dt, Triac, different modes of operation, rating, MOS controlled Thyristors.

Unit 3 :- Uncontrolled and Controlled rectifiers **(12)**

Uncontrolled rectifier Basic and three phase supply, phase and line voltage waveforms, three phase half wave rectifier with R and L load, analysis with resistive load, three phase full wave rectifier with resistive and large inductive load, three phase bridge rectifier with resistive and inductive load, analysis with resistive load.

Comparison of HWR,FWR, and FWBR.

Control Rectifiers: Concept of firing angle, Half convertor with R,L load. Use of freewheeling diode, semi-converter with R,L load. Studies on these circuits with RLE load. Full converter with R and large inductive load (Analysis of all these circuits with resistive load)

Unit 4 :- Single phase AC voltage controllers **(10)**

Principle of ON/OFF control, single- phase bidirectional controller with resistive and inductive load.(Analysis of these circuits). Applications of Power Electronics: SMPS, UPS, Electronic Ballast, power factor correction. Principle of induction and dielectric heating.

Reference Books :-

- 1)Power Electronics – M.H. Rashid (PHI)
- 2) Power Electronics- Jamil Asghar(PHI)
- 3) Power Electronics-P.C. Sen
- 4) Power Electronics-Samir K. Datta(PHI)
- 5)Thyristor Engineering – M.S.Berde, Khanna Publications
- 6) Power Electronics Principles and Applications-S. Biswas(Dhanapat Rai Publications)
- 7) Power Electronics- I by J.S. Katre(Tech-Max)
- 8) Power Electronics- Dr. P.S. Bhimbhra (Khanna publications)
- 9) Power Electronics- by Jalnekar(Technical Publications Pune)
- 10) Electronics in Industry- G.M. Chute and R.D. Chute(Mc-Graw Hill)

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Semester -VI
Electronics(Paper-XIII)
Industrial Processes control and PLC programming

UNIT 1 **10**

Introduction to control system :

Basic elements of control system, open loop control system, closed loop control system, control system terminology, manually controlled closed loop systems, automatic controlled closed loop systems, comparison closed-loop system and open-loop control, feed-forward control system, adaptive control system, classification of control system. ON-OFF controller , proportional control, PI controller, PD controller and PID control.

UNIT 2 **10**

Components of Control System:

Opamp as a zero crossing detector, non-inverting comparator, inverting comparator, Two position control using opamp, proportional controller, integral controller using Opamp ,derivative controller, PI controller, PID controller.

UNIT 3 **10**

Introduction to PLC :

Programmable logic controller (PLC) basics: Definition, overview of PLC systems, block diagram of PLC, input/output modules, power supplies, isolators, features like scan time, system scale, user interface. Modular PLC and Redundant PLC and Applications, communication protocols: RS485, Profibus Modbus.

Advance control Algorithm

Distributed control system, DCS components/block diagram, SCADA, adaptive control system.

UNIT 4 **10**

Ladder Programming basics

Basic components: fuse, pushbutton, selector switches, limit switches, indicators, relay, time delay relays functions and symbols.

General PLC programming procedures, programming on-off inputs/ outputs.

Auxiliary commands and functions: PLC Basic Functions: Register basics, timer functions, counter functions.

Ladder Programming: Programs for Boolean logic and flip-flops, counters ,timers, flasher.

Application program Bottle filling plant, elevator control, washing machine control.

Reference Books :

1. Control System Engineering- I.J. Nagrath and M.Gopal (New Age International Publication 5th Edition 2006)
2. Feedback Control System Principles And Control System R.A.Barapate (Techmax publication 10th edition)
3. Modern Control Engineering-Katsuhiko Ogata (Prentice Hall, 2010)
4. Computer Based Industrial Control- Krishna Kant (PHI Learning 2004)
5. Programmable Logic Control Programming And Applications - John R. Hackworth Frederic D. Hackworth (Pearson Education India forth edition 2008)
6. Introduction To Programmable Logic Controller- Gray and Dunning (2nd edition Thomson Education)

SHIVAJI UNIVERSITY, KOLHAPUR

B.Sc. (Part III) Semester -VI

Electronics(Paper-XIV)

Communication Systems -II

Unit: I Telephone Communication System [10]

Telephony Principle, telephone hand-set (instrument), local loop, need of telephone exchange, types of exchanges, Electronic exchange – block diagram and working. PSTN
Pulse and DTMF dialling, Different tones in telephone, EPABX Concepts of value added services – call transfer, call queuing, conference call, priority calls etc.

Unit: II Modern Communication Systems [10]

FAX – Principle, block diagram of a facsimile transceiver and working of each block.

Video Conferencing Technique – Block diagram and working

ISDN – Concept of ISDN interface

Optical Fiber Communication

Principle, fiber optic cables, splices & connectors, transmitter, receiver Block diagram of Optical Fiber Communication and its working

Satellite Communication – Satellite orbits, Earth Station, transponders, VSAT

Unit: III Digital Communication [10]

Pulse Modulation – PAM, PCM Block diagram and working of delta modulation

MODEM – Concept of ASK, FSK, BPSK, QPSK, Block diagram of MODEM using FSK.

Multiplexing Techniques - Study of multiplexing and multiple access techniques: Space division multiplexing, Time division multiplexing, Frequency Division Multiplexing , Code division multiplexing,

Unit: IV Wireless Communication [10]

Introduction to wireless communication system. Need of wireless communication systems.

Introduction to mobile communication, Cellular concept, Working of GSM, Hand over, Introduction to GPRS. Introduction to RFID, Zigbee, Bluetooth and Wi-Fi (Comparison based on range, data rate, frequency, Power) 3G, IP Telephony

Reference Books

1. Electronics : Principles and Applications. L.E.Frenzel 3rd Edition.
2. Modern Electronic Communication. G.M. Miller 7th Edition.
3. Mobile Communication Jochen Schiller 2nd Edition.
4. Wireless Communications: Principles and Practice. Rappaport
5. Wireless Communications and Networks. William Stallings

SHIVAJI UNIVERSITY, KOLHAPUR

B.Sc. (Part III) Semester -VI

Electronics (Paper XV)

Advanced Microcontroller Architecture: PIC

UNIT 1.Introduction

[10]

Introduction, Features of PIC microcontrollers: Watch Dog Timer (WDT), Brownout detector, ISP, I²C bus, SPI bus. Harvard vs.Von Neumann architecture (#57-58), CISC and RISC(62-65), Overview of PIC12XX, PIC16XX, PIC17XX and PIC18XX (*Microchip Manual pg.17).

WREG register(#18), PIC file register, SFRs, GPR, GP RAM vs EEPROM, File register and access bank in the PIC18(#21-25), PIC status register(#35-36), Pin diagram (18F458) (\$ 2, 10-15), Minimum connection(Clock and reset circuit)(#280),Configuration register and LIST directive(#282-292)

UNIT 2. Instruction set and programming of PIC18

[10]

Instruction set(#660-697), Addressing modes, stack and stack pointer in PIC18(#88-90), ROM width in the PIC18(#55-56),PIC18 time delay and delay calculations, pipelining, instruction cycle time, branch penalty, loop inside a loop delay(#95-102), I/O ports programming, I/O bit manipulation programming, program for square wave generation at port pin and port, reading and monitoring single bit, readinginput pin vsLATx port(#109-129), BCD to ASCII, ASCII to BCD(#162 to 164) conversion, bank switching(#197-203)

UNIT 3.Facilities in PIC18 Part-I

[10]

Programming timers 0 and 1: T0CON, INTCON, T1CON, PIR1 register, steps to programming((ALP/C)) timer 0 in 16 bit mode and 8-bit mode, delay calculation (Timer count calculation),T2CON, T3CON register (#314-359)

PIC18 Interrupts: Interrupt vector table in PIC18, sources of interrupts, interrupts enabling, programming(ALP/C)of external hardware interrupts, port B change interrupts, setting interrupt priority(#402-406,417-422,427-428,432-434).

UNIT4. Facilities in PIC18 Part-II

[10]

PIC18 serial communication: serial port programming, SPBRG, TXREG, RCREG, TXSTA, RCSTA register, Interfacing MAX232 to PIC18, programming(ALP/C) PIC18 to transfer and receive data serially, importance of TXIF and RCIF flag, quadrupling baud rate, baud rate error calculation(#375-387)

ADC programming in the PIC18: ADC features programming, ADCON0 , ADCON1 register, conversion time, steps for programming(ALP/C) the ADC using pollingin assembly, ADC programming using interrupts(#483-492)

References:

1. # Muhammad Ali Mazadi et al. “*PIC microcontroller and Embedded Systems using assembly and C for PIC 18,*” Pearson Education publication,1st Edition, Fourth Impression 2011(Indian Edition).
2. PIC micro 18C MCU reference manual, ww1.microchip.com/downloads/en/DeviceDoc/39500a.pdf
3. PIC18FXX8 data sheet , ww1.microchip.com/downloads/en/devicedoc/41159d.pdf
4. Peatman, John B. Design with PIC microcontrollers. Simon & Schuster Trade, 1997.

SHIVAJI UNIVERSITY, KOLHAPUR
B.Sc. (Part III) Semester -VI
Electronics (Paper XVI)
Electronic Instrumentation

Unit 1 :- Introduction

(6)

Performance characteristics, Static Characteristics, Errors in measurement, Types of Errors, Sources of errors, Dynamic characteristics and Response , Standard and international standards

Unit 2 :- Transducers

(12)

Selection factors, Electrical transducers and their parameters, Types of Transducers, Electro-acoustic transducer : Microphone : Carbon, Piezoelectric, Moving coil, Loud Speakers: PMMC Loud Speaker, Force/ Pressure transducer : Strain-Gauges, Potentiometer, Piezo-Electric Transducer, Linear Variable Differential Transducer (LVDT), Capacitive Transducer, Load Cell, Photoconductive Cells, Photovoltaic Cell, Digital Displacement Transducer, Temperature Transducer: RTD, Thermocouple, IC LM 34/35, Thermister

Unit 3:- Signal Conditioning

(10)

Introduction, Instrumentation Amplifier, study of IC LM725, Strain Gauge, Bridge Amplifier, Thermocouple Amplifier, Study of IC AD594, Thermister Amplifier (IC-5420), Data Acquisition system for measurement of temperature, p H and Level, Grounding , Shielding and Isolation Techniques.

Unit 4 : Display devices, Recorders and Instruments

(12)

LED, LCD, Display Technique using LED and LCD, CRT Display.

Recorders: XY and XT Recorders, Digital Recorders, Magnetic Tape- Recorders.

Instruments : Digital Voltmeters and Multi meter, Digital Tachometer, p H meter, Electrocardiograph (ECG), Oscilloscope.

Reference Books :-

- 1) Electronic Instruments- K.S. Kalsi (Tata Mc-Graw Hill)
- 2) Instrumentation, Measurements and Analysis- B.S. Nakara and VSV Mani(TMH)
- 3) Instruments and Instrumentation Technology- M.M.S. Anand (PHI)
- 4) Instrumentation and Measurements- Moorthy (Prentice Hall India)
- 5) Instrumentation, Devices and System- C.S. Rangan, G.R. Sharma and VSV Mani (TMH)
- 6) A Course in Electrical and Electronic Measurements and Instrumentation , A.K. Sawheney (Dhanpat Rai and Sons)
- 7) Transducers and Display system B.S. Sonde

B.Sc. (Part III) Practical Course
(List of Experiments)

GROUP A

1. Study of op-amp as Summing amplifier (Adder and Subtractor).
2. Op-amp as Integrator and Differentiator.
3. Study of Schmitt Trigger using op-amp.
4. IC 555 as variable duty cycle.
5. Study of function generator using IC 8038
6. Study of PLC Simulator (TriLOGI Software) and implementing Boolean function.
7. Programming PLC for sequential logic RS -FF,JK-FF,T-FF,D-FF
8. Study of PLC timers and counters in PLC
9. Programming PLC for Bottle filling plant
10. Programming for Automatic parking Gate
11. Study and implementation of proportional controller using opamp.

GROUP B

1. Build and test Amplitude Modulator and Demodulator.
2. Build and test Frequency Modulator and Demodulator.
3. Build and test Frequency Shift Keying.
4. Build and test Delta Modulation circuit using IC.
5. Build and test Pulse Amplitude Modulation.
6. Study of ASK Modulator.
7. Study of Composite Video Signal
8. Study of RF tuned amplifier
9. Build and test Pulse width modulation
10. Adjustment and study of DTH
11. Study of PSK Modulator

GROUP C

1. Stepper motor / DC motor interfacing to 8051
2. 8051 Timer programming in mode 1 and mode 2
3. Arithmetic and logical operations using 8051-C
4. LED and Relay/Thumbwheel switch and seven segment display interfacing to 8051.
5. DAC0808/ADC0804 interfacing to 8051
6. Use of MPLAB simulator: Addressing modes
7. Use of MPLAB simulator: I/O port programming(Square wave generation, Toggle port)
8. Programming of PIC(PIC18XX/PIC16XX) in timer1 16-bit mode
9. Serial communication using PIC(PIC18XX/PIC16XX)
10. Programming of PIC(PIC18XX/PIC16XX) on chip ADC

GROUP D

- 1) Study of thermocouple (594/595)
- 2) Study of characteristics of RTD(PT-100)
- 3) Study of Instrumentation Amplifier(TL084/LM324)
- 4) Measurement using Strain Gauge and Bridge Amplifier
- 5) Study of AC / DC Timer
- 6) SCR firing by UJT
- 7) AC Voltage controller
- 8) Phase Shift control of SCR
- 9) Study of ON/OFF Temperature controller (LM34/LM35/AD590)
- 10) DC Motor Control
- 11) Precision Rectifier using Op-Amp

NOTE : Minimum 8 experiments from each group

Sr.No.	Course work	Marks
1	Experiments (4X35)	140
2	Project	40
3	Industrial visit	04
4	Seminar	04
5	Experimental journal	12
Total		200

1) Project

- ✓ Every student should take up a project & submit in the report the work he/she has carried out. The project work will be assessed independently at the time of practical examination.

2) Industrial Visits

- ✓ In order to give exposure of Industry, Research Institute & advances in the field of electronics industrial visits should be arranged. It is expected that students of B.Sc. II, & III should visit the Electronics Industries / Research Institutes / Educational Institutes.

3) Seminars

- ✓ Every students of B.Sc. II & B.Sc. III Electronics will have to deliver one seminar of at least 15 min. on the advanced topics in the Electronics. The seminar will be the compulsory activity for all the students of B.Sc. II & B.Sc. III electronics.

Paper Equivalence:

Paper Number	Old Semester course	New Semester course
Ele (Paper-IX)	Linear Integrated circuits	Linear Integrated circuits
Ele(Paper-X)	Communication Systems -I	Communication Systems -I
Ele(Paper-XI)	8051 Microcontroller	8051 Microcontroller Interfacing and Embedded C
Ele(Paper-XII)	Electronic Instrumentation	Power Electronic Devices and Applications
Ele(Paper-XIII)	Linear Integrated circuits and MATLAB	Industrial Processes control and PLC programming
Ele(Paper-XIV)	Communication Systems -II	Communication Systems -II
Ele(Paper-XV)	8051 Interfacing ,Embedded C and PIC	Advanced Microcontroller Architecture: PIC
Ele(Paper-XVI)	Power Electronics	Electronic Instrumentation

Nature of Question papers (Theory)

COMMON NATURE OF QUESTION FOR THEORY PAPER MENTIONED SPERATELY:



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