

**GOVERNMENT OF RAJASTHAN**  
**BOARD OF TECHNICAL EDUCATION RAJASTHAN JODHPUR**  
**SEMESTER SCHEME-2020-21**



**IV SEMESTER**  
(SESSION 2021-2022 & ONWARDS)

**MICROCONTROLLER AND APPLICATIONS**

Course Code	EL 4001(Same as EF/ER 4001)
Course Title	Microcontroller and Applications
Number of Credits	3(L-3,T-0, P-0)
Prerequisites	NIL
Course Category	PC

**COURSE CONTENTS:****UNIT I INTRODUCTION**

- 1.1 Introduction to Microprocessors and Microcontrollers
- 1.2 Architectures [8085,8086]
- 1.3 Intel MCS- 51 family features
- 1.4 8051 -organization and architecture

**UNIT II PROGRAMMING WITH 8051**

- 2.1 8051 instruction set
- 2.2 addressing modes
- 2.3 conditional instructions
- 2.4 I/O Programming
- 2.5 Arithmetic logic instructions
- 2.6 single bit instructions
- 2.7 interrupt handling
- 2.8 programming counters, timers and Stack

**UNIT III**

- 3.1 MCS51 and external Interfaces
- 3.2 User interface – keyboard, LCD, LED
- 3.3 Real world interface -ADC, DAC
- 3.4 SENSORS Communication interface

**UNIT IV C PROGRAMMING WITH 8051**

- 4.1 I/O Programming
- 4.2 Timers/counters
- 4.3 Serial Communication
- 4.4 Interrupt
- 4.5 User Interfaces- LCD, Keypad, LED and communication interfaces [RS232]

**UNIT V ARM PROCESSOR CORE BASED MICROCONTROLLERS**

- 5.1 Need for RISC Processor-ARM processor fundamentals
- 5.2 ARM core based controller [LPC214X]
- 5.3 IO ports, ADC/DAC, Timers

**REFERENCES /SUGGESTED LEARNING RESOURCES:**

1. The 8051 Micro Controller and Embedded Systems Muhammad Ali Mazidi& Janice Gilli Mazidi, R.D.Kinely PHI Pearson Education, 5th Indian reprint
2. Microprocessor and Microcontrollers Krishna Kant Eastern Company Edition, Prentice Hall of India, New Delhi
3. Microprocessor & Microcontroller Architecture: Programming & Interfacing using 8085,8086,8051 Soumitra Kumar Mandal McGraw Hill Edu,
4. Microcontrollers: Architecture implementation and Programming Tabak Daniel, Hintz Kenneth j Tata McGraw Hill, 2007
5. ARM Developer's Guide.UM10139 LPC214X User manual – Rev.4 Andrew N.Sloss,Dominic Symes, Chris Wright User manual – Rev.4
6. Microprocessors and interfacing: programming and hardware Douglas V. Hall Tata McGraw Hill, 2editon, 2000
7. "Microcontroller – Fundamentals and Applications with Pic Valder – Perez Yeesdee Publishers, Tayler & Francis

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**CONSUMER ELECTRONICS**

Course Code	EL 4002
Course Title	Consumer Electronics
Number of Credits	3 (L-3,T-0, P-0)
Prerequisites	NIL
Course Category	PC

**COURSE CONTENTS:****UNIT-I AUDIO FUNDAMENTALS AND DEVICES**

- 1.1 Basic characteristics of sound signal
- 1.2 Audio level metering, decibel level in acoustic measurement
- 1.3 Microphone & Types
- 1.4 speaker types & working principle
- 1.5 Sound recording principle & types

**UNIT-II AUDIO SYSTEMS**

- 2.1 CD player
- 2.2 home theatre sound system, surround sound
- 2.3 Digital console block diagram, working principle, applications
- 2.4 FM tuner, ICs used in FM tuner TDA 7021T
- 2.5 PA address system

**UNIT-III TELEVISION SYSTEMS-**

- 3.1 Monochrome TV standards,
- 3.2 scanning process, aspect ratio, persistence of vision and flicker, interlace scanning, picture resolution, Composite video signal
- 3.3 Colour TV standards
- 3.4 colour theory, hue, brightness, saturation, luminance and chrominance,
- 3.5 Different types of TV camera
- 3.6 Transmission standards

**UNIT-IV TELEVISION RECEIVERS AND VIDEO SYSTEMS-**

- 4.1 PAL-D colour TV receiver
- 4.2 Digital TVs: - LCD, LED, PLASMA, HDTV, 3-D TV, projection TV
- 4.3 DTH receiver
- 4.4 Video interface, Digital Video, SDI, HDMI Multimedia Interface
- 4.5 Digital Video Interface, 4.6 CD and DVD player

**UNIT-V HOME / OFFICE APPLIANCES**

Diagrams, operating principles and controller for

- 5.1 FAX
- 5.2 Photocopier
- 5.3 Microwave Oven
- 5.4 Washing Machine
- 5.5 Air conditioner
- 5.6 Refrigerators
- 5.7 Digital camera
- 5.8 cam coder

**REFERENCES /SUGGESTED LEARNING RESOURCES:**

1. Consumer Electronics Bali S.P Pearson Education India,2010 , latest edition
2. Audio video systems: principle practices & troubleshooting Bali R and Bali S.P Khanna Book Publishing Co. (P) Ltd., 2010Delhi, India, latest edition
3. Modern Television practices Gulati R.R. New Age International Publication (P) Ltd. New Delhi Year 2011, latest edition
4. Audio video systems Gupta R.G. Tata Mcgraw Hill, New Delhi, India 2010, latest edition
5. Mastering Digital Television Whitaker Jerry & Benson Blair McGraw-Hill Professional, 2010, latest edition
6. Standard handbook of Audio engineering Whitaker Jerry & Benson Blair McGraw-Hill Professional, 2010, latest edition

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**DIGITAL COMMUNICATION SYSTEMS**

Course Code	EL 4003
Course Title	Digital Communication Systems
Number of Credits	3 (L-3,T-0, P-0)
Prerequisites	NIL
Course Category	PC

**COURSE CONTENTS:****UNIT 1**

- 1.1 Block diagram and sub-system description of a digital communication system
- 1.2 Sampling of low-pass and band-pass signals
- 1.3 PAM, PCM,
- 1.4 Signal to quantization noise ratio analysis of linear and nonlinear quantizers
- 1.5 Line codes and bandwidth considerations
- 1.6 PCM TDM hierarchies
- 1.7 frame structures, frame synchronization and bit stuffing

**UNIT 2**

- 2.1 Quantization noise analysis of DM and ADM; DPCM and ADPCM
- 2.2 Low bit rate coding of speech and video signals
- 2.3 Baseband transmission
- 2.4 matched filter, performance in additive Gaussian noise
- 2.5 Inter-symbol interference (ISI), Nyquist criterion for zero ISI
- 2.6 sinusoidal roll-off filtering
- 2.7 correlative coding
- 2.8 equalizers and adaptive equalizers; Digital subscriber lines

**UNIT 3**

- 3.1 Geometric representation of signals,
- 3.2 maximum likelihood decoding
- 3.3 Correlation receiver, equivalence with matched filter
- 3.4 Generation, detection and probability of error analysis of OOK, BPSK, coherent and non-coherent FSK, QPSK and DPSK
- 3.5 QAM, MSK and multicarrier modulation
- 3.6 Comparison of bandwidth and bit rate of digital modulation schemes

**UNIT 4**

- 4.1 Introduction to Information and Coding Theories
- 4.2 Information Theory: information measures, Shannon entropy, differential entropy, mutual information
- 4.3 capacity theorem for point-to-point channels with discrete and continuous alphabets
- 4.4 Coding Theory: linear block codes – definitions, properties, bounds on minimum distance (singleton, Hamming, CV, MRRW)
- 4.5 Soft versus hard decision decoding, some specific codes (Hamming, RS, and Concatenated)
- 4.6 Convolutional codes – structure, decoding (the Viterbi and BCJR algorithms)
- 4.7 Turbo codes
- 4.8 LDPC codes

**REFERENCES /SUGGESTED LEARNING RESOURCES:**

1. Communication Systems Haykin, S 4th Ed., John Wiley & Sons
2. Modern Digital and Analog Communication Systems Lathi, B.P. and Ding, Z Intl. 4th Ed., Oxford University Press.
3. Digital Communications Proakis, J.G. and Saheli, M 5th Ed., McGraw-Hill
4. Digital Communication: Fundamentals and Applications Sklar, B., and Ray, P.K 2nd Ed., Dorling Kindersley
5. Elements of Information Theory T. Cover and J. Thomas 2/e, Wiley.
6. Principles of Digital Communication R. G. Gallager Cambridge Univ. Press
7. A Foundation in Digital Communication A. Lapidoth Cambridge Univ. Press
8. Error Control Coding S. Lin and D. Costello 2/e, Prentice Hall.

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**ELECTRONIC EQUIPMENT MAINTENANCE**

Course Code	EL 40041 (Same as EF 40041)
Course Title	Electronic Equipment Maintenance
Number of Credits	3 (L-3, T-0, P-0)
Prerequisites	NIL
Course Category	PE

**COURSE CONTENTS:****UNIT 1:**

- 1.1 Fundamental Troubleshooting Procedures inside Electronic Equipment:
- 1.2 Reading Drawings And Diagrams – Block Diagram, Circuit Diagram, Wiring Diagram;
- 1.3 Dis-assembly and re-assembly of equipment,
- 1.4 Equipment Failures and causes such as poor design, production deficiencies, careless storage and transport, inappropriate operating conditions
- 1.5 Nature of faults, Fault location procedure, Fault finding aids – Service and maintenance manuals and instruction manuals
- 1.6 Test and Measuring instruments, special tools Troubleshooting techniques
- 1.7 Approaching components for tests, Grounding systems in Electronic Equipment,
- 1.8 Temperature sensitive Intermittent problems Corrective actions, Situations where repairs should not be attempted

**UNIT 2:**

- 2.1 Passive Components and Their Testing Passive Components- Resistors, Capacitors, Inductors
- 2.2 Failures in fixed resistors, testing of resistors, variable resistors, variable resistors as potentiometers, failures in potentiometers, testing of potentiometers, servicing potentiometers, LDRs and Thermistors
- 2.3 Types of capacitors and their performance, Failures in capacitors, testing of capacitors and precautions Therein, variable capacitor types,
- 2.4 Testing of inductors and inductance measurement

**UNIT 3:**

- 3.1 Testing of Semiconductor Devices Types of semiconductor devices,
- 3.2 Causes of failure in Semiconductor Devices
- 3.3 Types of failure Test procedures for
  - 3.3.1 Diodes
  - 3.3.2 Special types of Diodes
  - 3.3.3 Bipolar Junction Transistors
  - 3.3.4 Field Effect Transistors
  - 3.3.5 Thyristors
  - 3.3.6 Operational Amplifiers, Fault diagnosis in op-amp circuits

**UNIT 4:**

- 4.1 Logic IC families, Packages in Digital ICs,
- 4.2 IC identification, IC pin-outs, Handling ICs,
- 4.3 Digital troubleshooting methods – typical faults, testing digital ICs with pulse generators Logic clip, Logic Probe, Logic Pulser, Logic Current Tracer, Logic Comparator
- 4.4 Special consideration for fault diagnosis in digital circuits
- 4.5 Handling precautions for ICs sensitive to static electricity
- 4.6 Testing flip-flops, counters, registers, multiplexers and demultiplexers, encoders and decoders; Tri-state logic

**UNIT 5:**

- 5.1 Rework and Repair of Surface Mount Assemblies
- 5.2 Surface Mount Technology and surface mount devices Surface Mount Semiconductor packages – SOIC, SOT, LCCC, LGA, BGA, COB, Flat packs and Quad Packs,
- 5.3 Cylindrical Diode Packages, Packaging of Passive Components as SMDs
- 5.4 Repairing Surface Mount PCBs, Rework Stations.

**REFERENCES /SUGGESTED LEARNING RESOURCES:**

1. Modern Electronic Equipment: Trouble- shooting, Repair and Maintenance Khandpur TMH 2006
2. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting R. G. Gupta TMH 2001
3. Student Reference Manual for Electronic Instrumentation Laboratories David L Terrell Butterworth-Heinemann
4. Electronic Testing and Fault Diagnosis G. C. Loveday, A. H Wheeler Publishing

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**SIMULATION SOFTWARE**

Course Code	EL 40042(Same as EF/ER 40042)
Course Title	Simulation Software
Number of Credits	3 (L-3,T-0, P-0)
Prerequisites	NIL
Course Category	PE

**Course Contents:****UNIT I**

- 1.1 Introduction to PSpice software
- 1.2 General purpose circuit simulation using Schematic Editor,
- 1.3 Introduction to netlist command based SPICE simulation,
- 1.4 Basic netlist commands. Basic circuit analyses: DC, AC Transient

**UNIT II**

- 2.1 Introduction to PCB Design software Schematic Entry, Netlist Creation, Working with component libraries,
- 2.2 Design of Boards, Layout of Parts, Optimizing Parts Placements, Pads and Via, Manual and Auto Routing,
- 2.3 Handling Multiple Layers

**UNIT III**

- 3.1 Introduction to SCILAB,
- 3.2 use SCILAB functions.
- 3.3 Writing simple programs using SCILAB, handling arrays, files, plotting of functions etc.
- 3.4 Writing SCI files for Creation of analog & discrete signals, plotting of signals etc.
- 3.5 Simulation of electronic circuits using SCILAB

**REFERENCES /SUGGESTED LEARNING RESOURCES:**

1. NGSpice, LTSpice, MULTISIM, Orcad, Proteus or other open source PCB design tools, SCILAB
2. Website: <http://www.scilab.org/> (To download SCILAB open source software)
3. <http://www.linear.com/>.
4. <http://www.expresspcb.com/>
5. <http://ngspice.sourceforge.net/>

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**LINEAR INTEGRATED CIRCUITS**

Course Code	EL 40051(Same as EF/ER 40051)
Course Title	Linear Integrated Circuits
Number of Credits	3 (L-3,T-0, P-0)
Prerequisites	NIL
Course Category	PE

**COURSE CONTENTS:****UNIT I - IC FABRICATION AND CIRCUIT CONFIGURATION FOR LINEAR IC**

- 1.1 Advantages of ICs over discrete components –
- 1.2 Manufacturing process of monolithic Ics
- 1.3 Construction of monolithic bipolar transistor – Monolithic diodes – Integrated Resistors Monolithic Capacitors, Inductors. Current mirror and current sources, Current sources as active loads, Voltage sources, Voltage References, BJT Differential amplifier with active loads, General operational amplifier stages and internal circuit diagrams of IC 741, DC and AC performance characteristics, slew rate, Open and closed loop configurations.

**UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS**

- 2.1 Sign Changer
- 2.2 Scale Changer
- 2.3 Phase Shift Circuits
- 2.4 Voltage Follower,
- 2.5 V-to-I and I-to-V converters
- 2.6 Adder, subtractor
- 2.7 Instrumentation amplifier
- 2.8 Integrator, Differentiator
- 2.9 Logarithmic amplifier, Antilogarithmic amplifier
- 2.10 Comparators, Schmitt trigger
- 2.11 Precision rectifier, peak detector
- 2.12 Clipper and clamper
- 2.13 Low-pass, high-pass and band-pass Butterworth filters

**UNIT III ANALOG MULTIPLIER AND PLL**

- 3.1 Analog Multiplier using Emitter Coupled Transistor Pair - Gilbert Multiplier cell – Variable transconductance technique.
- 3.2 analog multiplier ICs and their applications,
- 3.3 Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator,
- 3.4 Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK modulation and demodulation and Frequency synthesizing.

**UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS**

- 4.1 Analog and Digital Data Conversions,
- 4.2 D/A converter – specifications –
- 4.3 weighted resistor type, R-2R Ladder type, Voltage Mode and Current-Mode R2R Ladder types switches for D/A converters, high speed sample-and-hold circuits
- 4.4 A/D Converters specifications - Flash type - Successive Approximation type - Single Slope type – Dual Slope type - A/D Converter using Voltage-to-Time Conversion - Over-sampling A/D Converters.

**UNIT V WAVEFORM GENERATORS AND SPECIAL FUNCTION ICs**

- 5.1 Sine-wave generators, Multi-vibrators and Triangular wave generator, Saw-tooth wave generator,
- 5.2 ICL8038 function generator,
- 5.3 Timer IC 555,
- 5.4 IC Voltage regulators – Three terminals fixed and adjust- able voltage regulators - IC 723 general purpose regulator Monolithic switching regulator,
- 5.5 Switched capacitor filter IC MF10,
- 5.6 Frequency to Voltage and Voltage to Frequency converters,

- 5.7 Audio Power amplifier, Video Amplifier, Isolation Amplifier,
- 5.8 Opto-couplers and fibre optic IC.

**REFERENCES /SUGGESTED LEARNING RESOURCES**

1. Design with operational amplifiers and analog integrated circuits, 3rd Edition Sergio Franco Tata McGraw-Hill, 2007
2. Linear Integrated Circuits, D.Roy Choudhry, Shail Jain New Age International Pvt. Ltd
3. System design using Integrated Circuits B.S.Sonde New Age Pub, 2nd Edition, 2001
4. Analysis and Design of Ana- log Integrated Circuits Gray and Meyer Wiley International, 2005.
5. OP-AMP and Linear Ics Ramakant A.Gayakwad Prentice Hall / Pearson Education, 4th Edition, 2001
6. Operational Amplifier and Linear Integrated Circuits K Lal Kishore Pearson Education, 2006

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(SEMESTER SCHEME-2020-21)



**POWER ELECTRONICS**

Course Code	EL 40052(Same as EF/ER/RA 40052)
Course Title	POWER ELECTRONICS
Number of Credits	3 (L-3T-0, P-0)
Prerequisites	NIL
Course Category	PE

**COURSE CONTENTS:****UNIT I POWER SEMI CONDUCTOR DEVICES AND CONTROLLED RECTIFIER**

- 1.1 Classification of Thyristor family
- 1.2 Working, of SCR, IGBT, GTO, DIAC and TRIAC

**UNIT II SCR PROTECTION AND COMMUTATING CIRCUITS**

- 2.1 Need of SCR protections: Over voltage and over current protection
- 2.2 Snubber circuit, freewheeling diode, Thermistor, heat sink
- 2.3 Turn off (commutation) method and types-Natural commutation, Forced commutation, Series resonance/ current commutation, Voltage commutation

**UNIT III CHOPPERS**

- 3.1 Function and working of choppers
- 3.2 Types of chopper circuits: A type to E-type
- 3.3 Jone's chopper circuit

**UNIT IV INVERTERS AND CYCLOCONVERTER**

- 4.1 Working principle of inverter
- 4.2 Classification of inverter-  
Phase and 3-phase inverters  
Line commutated and forced commutated inverters  
Series, Parallel and bridge inverter
- 4.3 Operating principle of cyclo converter.
- 4.4 Types of cyclo-converters:  
Single phase to single phase cyclo converter  
Single phase to bridge cyclo converter

**UNIT V OTHER INDUSTRIAL APPLICATIONS OF POWER ELECTRONIC DEVICES**

- 5.1 Speed control of D.C. Motor using armature voltage control.
- 5.2 Speed control of D.C. Motor using SCR chopper circuit.
- 5.3 Speed control of D.C. drive using PLL method.

**REFERENCES /SUGGESTED LEARNING RESOURCES**

1. Power Electronics Rashid, Muhammad H. PHI Learning, and New Delhi latest edition
2. Power Electronics Gupta, B. R., Singhal V. S.K. Kataria and sons, New Delhi

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**MICROCONTROLLER AND APPLICATIONS LAB**

Course Code	EL 4006(Same as EF/ER 4006)
Course Title	Microcontroller and Applications Lab
Number of Credits	1 (L-0,T-0, P-2)
Prerequisites	NIL
Course Category	PC

**PRACTICALS:**

1. Programming 8051 Micro controller using ASM and C, and implementation in flash 8051 microcontroller.
2. Programming with Arithmetic logic instructions [Assembly]
3. Program using constructs (Sorting an array) [Assembly]
4. Programming using Ports [Assembly and C]
5. Delay generation using Timer [Assembly and C]
6. Programming Interrupts [Assembly and C]
7. Implementation of standard UART communication (using hyper terminal) [Assembly and C].
8. Interfacing LCD Display. [Assembly and C]
9. Interfacing with Keypad [Assembly and C]
10. Programming ADC/DAC [Assembly and C]
11. Interfacing with stepper motor. [Assembly and C]
12. Pulse Width Modulation. [Assembly and C] Programming ARM Micro controller using ASM and C using simulator.
13. Programming with Arithmetic logic instructions [Assembly]
14. GPIO programming in ARM microcontroller. [C Programming].
15. Timers programming in ARM Microcontroller. [C Programming].

**REFERENCES /SUGGESTED LEARNING RESOURCES**

1. The 8051 Micro Controller and Embedded Systems Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D. Kinney PHI Pearson Education, 5th Indian reprint
2. Microprocessor and Microcontrollers Krishna Kant Eastern Company Edition, Prentice Hall of India, New Delhi
3. Microprocessor & Microcontroller Architecture: Programming & Interfacing using 8085, 8086, 8051 Soumitra Kumar Mandal McGraw Hill Edu,
4. Microcontrollers: Architecture implementation and Programming Tabak Daniel, Hintz Kenneth j Tata McGraw Hill, 2007
5. ARM Developer's Guide. UM10139 LPC214X User manual – Rev.4 Andrew N. Sloss, Dominic Symes, Chris Wright User manual – Rev.4
6. Microprocessors and interfacing: programming and hardware Douglas V. Hall Tata McGraw Hill, 2nd edition, 2000
7. "Microcontroller – Fundamentals and Applications with Pic Valder – Perez Yeesdee Publishers, Taylor & Francis

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**DIGITAL COMMUNICATION SYSTEMS LAB**

Course Code	EL 4007
Course Title	Digital Communication SystemsLab
Number of Credits	1 (L-0,T-0, P-2)
Prerequisites	NIL
Course Category	PC

**PRACTICALS:**

1. Pulse Code Modulation and Differential Pulse Code Modulation.
2. Delta Modulation and Adaptive Delta modulation.
3. Simulation of Band Pass Signal Transmission and Reception • Amplitude Shift Keying • Frequency Shift Keying • Phase Shift Keying.
4. Performance Analysis of Band Pass Signal Transmission and Reception • Amplitude Shift Keying • Frequency Shift Keying • Phase Shift Keying.
5. Implementation of Amplitude Shift Keying
6. Implementation of Frequency Shift Keying
7. Implementation of Phase Shift Keying.
8. Time Division Multiplexing: PLL (CD 4046) based synch, clock and data extraction

**REFERENCES /SUGGESTED LEARNING RESOURCES:**

1. Communication Systems Haykin, S 4th Ed., John Wiley & Sons
2. Modern Digital and Analog Communication Systems Lathi, B.P. and Ding, Z Intl. 4th Ed., Oxford University Press.
3. Digital Communications Proakis, J.G. and Saheli, M 5th Ed., McGraw-Hill
4. Digital Communication: Fundamentals and Applications Sklar, B., and Ray, P.K 2nd Ed., Dorling Kindersley
5. ElementsofInformation Theory T. Cover and J. Thomas 2/e, Wiley
6. Principles of Digital Communication R. G. Gallager Cambridge Univ. Press
7. A Foundation in Digital Communication A. Lapidoth Cambridge Univ. Press
8. Error Control Coding S. Lin and D. Costello 2/e, Prentice Hall

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SEMESTER SCHEME-2020-21

**ELECTRONIC EQUIPMENT MAINTENANCE LAB**

Course Code	EL 40081(Same as EF 40081)
Course Title	Electronic Equipment MaintenanceLab
Number of Credits	1 (L-0,T-0, P-2)
Prerequisites	NIL
Course Category	PE

**PRACTICALS:**

1. Demonstrate use of various hand held tools.
2. Test the performance of different passive electronic components (fixed/variable)
3. Test the performance of active electronic components like general purpose transistor/FET
4. Verify the functionality of TTL and CMOS Digital IC's using IC tester
5. Explore datasheet of minimum any five electronics components and analog/ Digital IC's

**REFERENCES /SUGGESTED LEARNING RESOURCES:**

1. Modern Electronic Equipment: Trouble- shooting, Repair and Maintenance Khandpur TMH 2006
2. Electronic Instruments and Systems: Principles, Maintenance and Troubleshooting R. G. Gupta TMH 2001
3. Student Reference Manual for Electronic Instrumentation Laboratories David L Terrell Butterworth-Heinemann
4. Electronic Testing and Fault Diagnosis G. C. Loveday, A. H Wheeler Publishing

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(SEMESTER SCHEME 2020-21)

**SIMULATION SOFTWARE LAB**

Course Code	EL 40082(Same as EF/ER 40082)
Course Title	Simulation Software Lab
Number of Credits	1 (L-0,T-0, P-2)
Prerequisites	NIL
Course Category	PE

**Course Outcomes:**After successful completion of the course students should be able to:

1. Design the electronics circuits using software tools like NGspice/LTSpice/Multisim.
2. Simulate various analog and digital circuits using NGspice/LTSpice/Multisim
3. Able to design PCB for given circuit using PCB Software like EAGLE, ExpressPCB, and OrCAD.
4. Use open source SCILAB tool and write simple programs
5. Plot various waveforms using SCILAB.
6. Simulate basic electronic system blocks using SCILAB

**PRACTICALS:-**

1. Simulation of one rectifier circuit and one clipper/clamper circuit.
2. Simulation of any one transistor biasing circuit.
3. Simulation of CE single/double stage amplifier circuit.
4. Simulation of any one power amplifier circuit.
5. Simulation of any one JFET/MOSFET amplifier circuit.
6. Simulation of any one negative feedback circuit.
7. Simulation of encoder/multiplexer circuit.
8. Simulation of decoder/de multiplexer circuit.
9. Simulation of any one flip-flop circuit using gates.
10. Simulation of any one register/counter circuit.
11. Design of PCB for any one circuit from experiment 1 to 6.
12. Design of PCB for any one circuit from experiment 7 to 10.
13. Plot the sine, cosine, triangle and exponential waveform using SCILAB.
14. Plot sampled sine, cosine, triangle and exponential waveform using SCILAB.
15. Study of Simulink. (Only source and sink available in Simulink library).

**REFERENCES /SUGGESTED LEARNING RESOURCES:**

NGspice, LTSpice,MULTISIM, Orcad, Proteus or other open source PCB design tools, SCILAB  
 Website: <http://www.scilab.org/> (To download SCILAB open source software)  
<http://www.linear.com/>  
<http://www.expresspcb.com/>  
<http://ngspice.sourceforge.net/>

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**LINEAR INTEGRATED CIRCUITS LAB**

Course Code	EL 40091(Same as EF/ER 40091)
Course Title	Linear Integrated Circuits Lab
Number of Credits	1 (L-0,T-0, P-2)
Prerequisites	NIL
Course Category	PE

**PRACTICAL OUTCOMES (PROs)****PRACTICALS:**

1. Operational Amplifiers (IC741)-Characteristics and Application.
2. Waveform Generation using Op-Amp (IC741).
3. Applications of Timer IC555.
4. Design of Active filters.
5. Study and application of PLL IC's
6. Design of binary adder and subtractor.
7. Design of counters.
8. Study of multiplexer and Demultiplexer /decoders.
9. Implementation of combinational logic circuits.
10. Study of DAC and ADC
11. Op-Amp voltage Regulator- IC 723

**REFERENCES /SUGGESTED LEARNING RESOURCES**

1. Design with operational amplifiers and analog integrated circuits, 3rd Edition Sergio Franco Tata McGraw-Hill, 2007
2. Linear Integrated Circuits, D.Roy Choudhry, Shail Jain New Age International Pvt. Ltd
3. System design using Integrated Circuits B.S.Sonde New Age Pub, 2nd Edition, 2001
4. Analysis and Design of Ana- log Integrated Circuits Gray and Meyer Wiley International, 2005.
5. OP-AMP and Linear Ics Ramakant A.Gayakwad Prentice Hall / Pearson Education, 4th Edition, 2001
6. Operational Amplifier and Linear Integrated Circuits K Lal Kishore Pearson Education, 2006

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SEMESTER SCHEME-2020-21

**POWER ELECTRONICS LAB**

Course Code	EL 40092(Same as EF/ER/RA 40092)
Course Title	Power Electronics Lab
Number of Credits	1 (L-0,T-0, P-2)
Prerequisites	NIL
Course Category	PE

**PRACTICAL OUTCOMES (PROs)****PRACTICALS:**

1. Test the performance of IGBT
2. Test the performance of GTO
3. Test the performance of TRIAC for AC load control
4. Troubleshoot Snubber circuits
5. Troubleshoot SCR commutating circuits.
6. Simulate chopper circuit, observe and print the various wave forms.
7. Test the Speed control of DC motor using chopper circuits
8. Test the Speed control of motor using PLL method.

**REFERENCES /SUGGESTED LEARNING RESOURCES**

1. Power Electronics Rashid, Muhammad H. PHI Learning, and New Delhi latest edition
2. Power Electronics Gupta, B. R., Singhal V. S.K. Kataria and sons, New Delhi

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(SEMESTER SCHEME-2020-21)

**ESSENCE OF INDIAN KNOWLEDGE AND TRADITION**

Course Code	EL 4222(Common in all branches of Engg.)
Course Title	Essence of Indian Knowledge and Tradition
Number of Credits	0(L-2,T-0, P-0)
Prerequisites	None
Course Category	AU

**COURSE CONTENTS:**

Basic Structure of Indian Knowledge System:

- (i) वेद,
- (ii) ऋग्वेद (आयुर्वेद, धनुर्वेद, गन्धर्वेद, स्थानतन्त्र आदयः)
- (iii) वेदशाखाः (शिक्षा, कला, ननुस्, व्याकरण, ज्योतिषशास्त्रादयः),
- (iv) ऋग्वेदशास्त्र (धर्मशास्त्र, रीतिशास्त्र, नुराण, तन्त्रशास्त्र)
- Modern Science and Indian Knowledge System
- Yoga and Holistic Health care
- Case Studies.

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