EF 31/ IE 31 **Semester - III**

Code	Name of Paper	Lecture	Tutorial	Practical
EL31	ELECTRONIC COMPONENTS AND SHOP PRACTICE	2	-	4

CONTENTS

1. Resistors :

1.1 Classification of resistors
1.2 Colour coding , tolerance and various parameters related with resistor
1.3 Constructional details, specifications, applications of various types of resistors

1.3.1 Fixed - carbon composition, metal film, carbon film, wire wound, alloy
1.3.2 Semi-variable - carbon (vertical and horizontal type) presets cermet, multiturn trimpot
1.3.3 Variable - carbon and wire wound (log and linear) with and without switch, multi turn pot and ganged pot,
1.3.4 Special resistors - LDR, VDR, Thermistor, Sensistors, Fusible resistors.

1.4 Failures in resistors

2. Capacitors :

2.1 Classification of capacitors
2.2 Constructional detail, specification, application of various types of capacitors-

2.2.1 Fixed capacitor - mica, paper, ceramic, plastic film and electrolytic
2.2.2 Variable capacitor - Gang (Air and PVC). Trimmer and padder

2.3 Failures in capacitor
2.4 Identification marking on capacitor (colour coding)

3. Inductors :

3.1 Classification of inductor
3.2 Construction detail, specification, application of fixed and variable inductors - Aircore, Iron core and Ferrite core inductors

4. Electronic Hardwares:

4.1 Construction, working, specification and application of electronic hardwares such as

4.1.1 Switches - Slide, toggle, push button type
4.1.2 Band switches - Rotary wafer type , slide type, push button type
4.1.3 Relay - construction, symbol, contacts
4.1.4 Connectors - Rack and panel, printed circuit, co-axial, tape cable, and plate connectors
4.1.5 Miscellaneous - Crocodile clips, indicator (mains), jacks, plugs, socket, heatsinks and component preformer

4.2 Loud speaker (PM type), Tweeter and woofer
4.3 Microphone - Carbon type, electrodynamic type, condenser and crystal microphone
4.4 Construction of soldering iron, soldering station and desoldering station
4.5 Different tools used in electronic workshop such as:- Nose plier, Cutter, Wire stripper, Tweezer, Screw driver etc.,

5. Soldering and De-Soldering Techniques :

5.1 Soldering - connection, flux alloy, different soldering materials and problems
5.2 Different soldering methods - hand, wave, dip and ultrasonic
5.3 De-soldering technique

PRACTICALS

1. Identification of different type of resistors and study of their colour coding
2. Identification of different type of capacitors and study of their colour coding
3. Identification of different type of switches and their mechanism of operation
4. Study of different tools used in electronics workshop
5. Use and application of component preformer
6. Study of analog and digital multimeters and their uses for measuring voltage, current and resistance
7. Testing of electronic components. Such as: Switches, resistors, capacitors, inductors, diode and transistors
8. To study and read the component data manual
9. Identification of different type of connectors
10. Use of CRO for various measurements
11. Use of function generator for different waveform generation.
12. Study of relay and contacts.
13. Soldering and de-soldering of different components on PCB by soldering iron
14. Preparation of sketches of different electrical and electronic component as per international standards on drawing sheets

---

REFERENCE BOOKS :

1. Electronics Component & Shop Practice K.R. Nahar
2. Hand Book of Philips Component
3. Maintenance of Electronic Equipments K.S. Jamwal
4. Electronic Shop Practice. Madhavia Joshi.
5. Electrical & Electronic Materials M.L.Gupta

******

Code	Name of Paper	Lecture	Tutorial	Practical
EL32	**ELECTRICAL ENGINEERING AND MEASUREMENT**	3	-	2

EF 32/ IE 32

CONTENTS

1. D.C. Machine :

1.1 Principle of D.C. motor
1.2 Construction of D.C. motor
1.3 Back e.m.f., speed, torque and power relationship
1.4 Characteristics of D.C. motor
1.5 Type and application of D.C. motor
1.6 Simple idea of motor starter

2. A.C. Machine :

2.1 Brief construction and working of single phase induction motor
2.2 Brief construction and working of synchronous motor
2.3 Construction and working of stepper motor

3. Polyphase Circuit :

3.1 Star delta connection
3.2 Current, voltage and power relation for star delta connection
3.3 Advantage and disadvantage of polyphase circuit
3.4 Simple problem on star delta circuit

4. A.C. Bridges :

4.1 Generalized treatment of four arm A.C. bridges

4.2 Sources and detectors
4.3 Maxwell's inductance and capacitance bridges
4.4 Hay's bridge
4.5 Anderson bridge
4.6 Heaviside bridge
4.7 Schersing bridge
4.8 De-sauty's bridge and Wein's bridge

5. Measuring Instruments :

5.1 Classification of measuring instruments
5.2 General consideration of torques employed in indicating type instrument (deflection torque, control torque, damping torque)
5.3 Construction and working of voltmeter and ammeter

5.3.1 Moving iron type
5.3.2 Moving coil type
5.3.3 Rectifier type
5.3.4 Dynamometer type

5.4 Construction and working of wattmeter

5.4.1 Dynamometer type
5.4.2 Induction type

5.5 Induction type energy meter
5.6 Ohmmeter

5.6.1 Series type
5.6.2 Shunt type

6. Range Extension and Calibration :

6.1 Significance of range extension
6.2 Use of series and shunt multipliers
6.3 Instrument transformer for range extension
6.4 Working principle of potentionmeter
6.5 Calibration method of ammeter and voltmeter (D.C.) by potentiometer
6.6 Multirange ammeter and voltmeter
6.7 Simple problems
6.8 Vector impedance meter
6.9 Magger
6.10 Cable fault locator

PRACTICALS

1. Study of D.C. motor parts
2. Study the load characteristics of D.C. shunt and series motor
3. Study of induction motor
4. Study of synchronous motor
5. Study of stepper motor
6. Study of construction of moving coil, moving iron type instruments
7. Study of Maxwell's impedance, capacitive bridge.
8. Study of Hay's bridge
9. Study of Schering's bridge
10. Study of De-sauty's bridge and Wein bridge
11. Use of series multiplier for voltmeter range extension
12. Use of shunt multiplier for ammeter range extension
13. Calibration of voltmeter and ammeter (D.C.) using potentiomeor
14. Measurement of insulation resistance by megger
15. Study of induction type energy meter

REFERENCE BOOKS :

1. A Course in Elect. Engg. K.D. Sharma
2. Electrical Technology S.L. Uppal
3. Electrical Technology J.B. Gupta
4. A Course in Electrical & Electronics Measurements & Measuring Instruments A.K. Sawhrey
5. Electrical Machine I.J. Nagpal
6. Electrical Technology B.L. Thareja

******

Code	Name of Paper	Lecture	Tutorial	Practical
EL33	NETWORK ANALYSIS	3	2	-

EF 33/ IE 33

CONTENTS

1. General Network Concept :

1.1 Network Elements (Definition and examples)

1.1.1 Active and passive, Linear and non-linear, Unilateral and bilateral, Lumped and distributed circuit parameters

1.2 Initial conditions in elements
1.3 Mutual inductance (coupling coefficient and dot rule)
1.4 Voltage and current sources (ideal and practical)
1.5 Dependent and independent sources
1.6 Accompanied and unaccompanied sources
1.7 Classification of networks (Definition and examples)

1.7.1 One port network
1.7.2 Two port network

1.8 Network configuration (No formula derivation)

1.8.1 Balanced and unbalanced T section
1.8.2 Symmetrical and Asymmetrical (Pie) section
1.8.3 L section
1.8.4 Lattice section
1.8.5 Bridge
1.8.6 Bridge T section
1.8.7 ladder network

2. Mesh and Nodal Analysis :

2.1 Definition of branch, node, mesh, loop and tree.
2.2 Kirchhoff's laws
2.3 Voltage and current equations for simple meshes and nodes
2.4 Cramer's Rule
2.5 Simple problems upto three variable using Cramer's rules (for DC circuits only)

3. Laplace Transformation :

3.1 Introduction to Laplace transformation
3.2 Solution of first order and second order differential equations (no initial condition)
3.3 Laplace transform of -

3.3.1 Unit step function
3.3.2 Ramp function
3.3.3 Exponential function
3.3.4 Impulse function
3.3.5 Sinusoidal functions
3.3.6 Parabolic function
3.3.7 Derivative of function
3.3.8 Integral of function

3.4 Laplace transform theorems

3.4.1 Shifting theorem
3.4.2 Initial and final value theorem

3.5 Inverse Laplace transformation for simple, multiple and conjugate complex roots.
3.6 Application of Laplace transformation for simple RL, RC and RLC series circuits
3.7 D.C. transients in RL, RC and RLC circuits

3.7.1 Determination of initial condition
3.7.2 Determination of final condition
3.7.3 Simple numerical problems

4. Network Theorems :

4.1 Statement, proof, application and numerical problems (DC circuit only) related to

4.1.1 Superposition theorem
4.1.2 Reciprocity theorem
4.1.3 Thevenin's theorem
4.1.4 Norton's theorem
4.1.5 Millman's theorem
4.1.6 Maximum power transfer theorem
4.1.7 Tellegen's theorem (Only statements)
4.1.8 Star Delta conversion

5. Two Port Networks :

5.1 Introduction
5.2 Open circuit impedance parameters
5.3 Short circuit admittance parameters
5.4 Hybrid (h) parameters
5.5 Transmission parameters
5.6 Inter-relationship between Z and Y parameters
5.7 Equivalent models of Z and Y parameters
5.8 Reciprocity and symmetry of two port networks
5.9 Equivalent T and (Pie) section representation
5.10 Determination of Z and Y parameters for some special networks (T, p, lattice, bridge T)
5.11 Idea of image impedance, characteristics impedance for two port networks

6. Resonance :

6.1 Series resonance in uncoupled circuits

6.1.1 Definition, reactance curves, resonance condition, selectivity and bandwidth

6.2 Parallel resonance in uncoupled circuits

6.2.1 Circuit and phasor diagram
6.2.2 Derivation of resonance conditions
6.2.3 Selectivity and bandwidth

6.3 Q factor, Q factor on energy basis

REFERENCE BOOKS :

1. Network Analysis Arumugan & Prem Kumar
2. Network Analysis Dhar & Gupta
3. Network Analysis Ven Valenburg
4. A Course in Circuit Analysis Soni & Gupta
5. A Course in Circuit Analysis Umesh & Sinha
6. Circuit Theory Iyer
7. Electric Circuits Josheep Edminster
8. Network Analysis Suba Rao & Prasad
9. Circuit Analysis Hayt

******

Code	Name of Paper	Lecture	Tutorial	Practical
	ELECTRONIC DEVICES AND CIRCUITS	3	-	2

CS34 / EF34 / EL34 / IE34

CONTENTS

1. Vacuum Tubes :

1.1 Types of emissions.
1.2 Brief idea of construction, characteristics, working and applications of

1.2.1 Diode Valve.
1.2.2 Triode Valve.
1.2.3 Tetrode Valve.
1.2.4 Pentode Valve.
1.2.5 Photo Tube.

2. Semiconductor and PN Junction :

2.1. Metal, non metals and semiconductors and their Energy Band Diagram.
2.2 Intrinsic and Extrinsic Semiconductors.
2.3 Effect of temperature on extrinsic semiconductor
2.4 Energy band diagram of extrinsic semiconductor
2.5 Fermi Level and fermi dirac distribution

2.6 Drift and diffusion current
2.7 Hall effect
2.8 P-N Junction Diode

2.8.1 Space charge region, Barrier potential and effect of temperature
2.8.2 Energy band diagram
2.8.3 Biasing of diode.
2.8.4 V-I characteristics
2.8.5 Static and dynamic resistance
2.8.6 Transition and diffusion capacitance
2.8.7 Zenner and Avalanche breakdown

2.9 Working, characteristics and application of

2.9.1 Tunnel diode
2.9.2 Zener diode
2.9.3 Varactor diode
2.9.4 Photo diode
2.9.5 Light emitting diode (LED)

2.10 Photo conductors
2.11 Cds photo conductive cells and photo voltaic cell.

3. Bipolar Junction Transistor (BJT) :

3.1 Constructional details of PNP and NPN transistors
3.2 Working of a transistor

3.2.1 Charge transport phenomenon
3.2.2 Transistor amplifying action
3.2.3 Relation between different currents in a transistor
3.2.4 Simple problems

3.3 Configuration of transistor (CB, CE and CC)
3.4 Behavior of BJT in Active, Cut off and Saturation regions

3.4.1 Transistor as a switch
3.4.2 Transistor as an amplifier

4. Transistor Biasing and Bias Stability :

4.1 D.C. and A.C. Load line.
4.2 Operating point and its stability
4.3 Factors affecting bias stability
4.4 Stability factors
4.5 Bias stabilization
4.6 Calculation of operating point and stability factor for

4.6.1 Fixed Bias Circuit.
4.6.2 Collector to base biasing.
4.6.3 Voltage Divider biasing (Self bias)

4.7 Bias Compensation techniques using

4.7.1 Diode.
4.7.2 Thermistor and Sensistor.

4.8 Thermal stability and Thermal runaway

5. Small Signal Transistor Amplifier :

5.1 CB, CE and CC amplifier and their low frequency small signal equivalent circuit using hybrid parameters.
5.2 Calculation of voltage gain, current gain, input impedance, output impedance and power gain for resistive loads. (Av, Ai, Zi, Zo, Avs, Ais, and Ap)
5.3 Analysis of emitter follower circuit
5.4 Approximate analysis of CE amplifier with and without RE , Emitter follower circuits
5.5. Classification of amplifiers

6. Field Effect Transistor :

6.1 Construction, operation and characteristics of JFET , E and D MOSFET
6.2 Biasing of FET
6.3 Small signal model of JFET
6.4 Terminology used with JFET
6.5 Precaution for handling of MOSFETs

7. Rectifiers and Power Supplies :

7.1 Working of rectifiers

7.1.1 Half wave rectifier
7.1.2 Centre tape full wave rectifier
7.1.3 Bridge rectifier

7.2 Analysis of rectifiers (for all type)

7.2.1 Calculations for average and RMS values
7.2.2 PIV of diodes
7.2.3 Ripple factor
7.2.4 Regulation and efficiency

7.3 Calculation of ripplefactor and working of following filters:

7.3.1 Capacitance filter
7.3.2 Inductance filter
7.3.3 L-C and (Pie) filters

7.4 Voltage Multipliers
7.5 Regulated power supply using zener diode

7.5.1 Simple problems on zener regulator.

PRACTICALS

1. To plot the V-I characteristics of P-N diode and LED.
2. To plot the V-I characteristics of zener diode and study of zener diode regulator circuit
3. To plot the V-I characteristics of PNP transistor in CB, CE and CC configuration
4. To plot the V-I characteristics of NPN transistor in CB, CE and CC configuration and calculate h-parameter for CE configuration.
5. Study of the different biasing circuits and observe the effect of component variation on operating point
6. Study of half wave and full wave rectifiers.
7. Study of bridge rectifier.
8. To study the filter circuits and measure the ripple factor.
9. To plot the V-I characteristics of JFET
10. To plot the V-I characteristics of MOSFET.
11. To study the voltage multipliers.
12. To Study Emitter follower circuits and measure its input and output impedances
13. To study the behavior of Cds photo conductive, photo voltaic cell and photo conductors

---

REFERENCE BOOKS :

1. Electronic Devices & Circuits : Millman & Halkias
2. Electronic Devices & Circuits : G.K. Mittal
3. Electronic Devices & Circuits : A.Mottershed
4. Functional Electronics : K.V. Ramanan
5. Electronic Devices & Circuits : Mathur, Kulshrestha & Chadda
6. Electronic Devices & Circuits : Sanjeev Gupta

******

Code	Name of Paper	Lecture	Tutorial	Practical
CS35 EF35 EL35 IE35	**DIGITAL ELECTRONICS**	3	-	2

CONTENTS

1. Introduction :

1.1 Digital signal and its representation
1.2 Advantages of digital techniques

2. Number System :

2.1 Decimal, binary, octal and hexa-decimal number system
2.2 Conversion of a number from one system to another system
2.3 Binary addition, subtraction and multiplication
2.4 Representation of positive and negative numbers
2.5 1's complement and 2's complement
2.6 Subtraction using 2's complement
2.7 Parity bit
2.8 Binary codes (Gray, Excess -3, Hamming codes), ASCII code
2.9 Floating point number

3. Logic Gates :

3.1 Introduction
3.2 Symbol and truth table of NOT, AND, OR, NAND, NOR, EX-OR and EX-NOR gates
3.3 Universal gates
3.4 Positve, negative and tristate logic

4. Logic Families :

4.1 Classification of digital ICs.
4.2 Characteristics of digital ICs.
4.3 RTL/RCTL
4.4 DTL
4.5 TTL logic - Operation of TTL NAND gate, open collector and totem - pole output, characteristics of TTL, TTL subfamilies
4.6 Concept of ECL and I2 L.
4.7 PMOS, NMOS and CMOS (NAND, NOR, NOT) Circuits.
4.8 Comparison of logic families
4.9 Interfacing TTL with CMOS family

5. Boolean Algebra :

5.1 Historical review - logical statements, logical constants and variables, truth table
5.2 Boolean operators
5.3 Postulates of Boolean algebra
5.4 Laws of Boolean algebra
5.5 Duality theorem
5.6 De' Morgan's theorem
5.7 Simplification of Boolean expressions
5.8 Verification of Boolean expressions using truth table

6. Minimization Techniques (K-Mapping) :

6.1 Representation of Boolean expression - min. and max. term SOP, POS
6.2 Conversion of truth tables in POS and SOP form
6.3 Karnaugh map upto 4 variables - implication of logic function with and without don't care conditions
6.4 Realization of logic diagrams using NAND/NAND, NOR/NOR gate

7. Combinational Logic Design :

7.1 Binary half and full adder
7.2 Binary half and full subtractor
7.3 Binary serial, parallel and BCD adder
7.4 Parity bit generator and checker
7.5 Binary comparator
7.6 Multiplexer

7.6.1 4 to 1 multiplexer
7.6.2 16 to 1 multiplexer

7.7 Demultiplexer

7.7.1 1 to 4 Demultiplexer
7.7.2 1 to 16 Demultiplexer

7.8 Encoder

7.8.1 Decimal to BCD

7.9 Decoder

7.9.1 BCD to Decimal
7.9.2 BCD to seven segment

8. Sequential Systems :

8.1 Introduction
8.2 Symbol, logic circuit, truth table of R-S, J-K, M/S J-K,D,T flip-flops
8.3 Edge and level triggering
8.4 Shift registers

8.4.1 Left, right and bi-direction
8.4.2 Series and parallel
8.4.3 Universal shift register

8.5 Asynchronous and synchronous counters - up, down and up-down
8.6 Mod counters - Mod 5, Mod 9, decade counter
8.7 Ring counters, Johnson counter
8.8 Programmable counters
8.9 Use of shift register for simple binary multiplication and division.

PRACTICALS

1. Verify the truth tables of NOT, AND, OR, NAND, NOR, EX-OR, EX-NOR gates
2. Design a NOT, AND, OR, EX-OR, EX-NOR gates using universal gates
3. Design a binary half and full adder
4. Design a binary half and full subtractor
5. Study of BCD to 7 segment decoder
6. Verify the truth table of RS, D, J-K, M/S J-K,D,T flip-flops.
7. Study of asynchronous binary ripple up, down and up-down and different mod counters
8. Study of synchronous counters
9. Study of decade counter
11. Study of programmable counter
12. Study of a shift register using flip flops
13. Study of ring counter using flip flops

REFERENCE BOOKS :

1. Digital Principles & Applications : Malvino Leach.
2. Integrated Electronics : Millman & Halkias
3. Digital Electronics : T.C. Bartee
4. Digital Electronics Practice Using IC's : R.P. Jain.
5. Modern Digital Electronics : R.P. Jain
6. Digital Electronics : L. Solanki
7. Digital Intregrated Circuit : K.R. Botker
8. Digital Design : Flloyd
9. Digital Logic Design : Morris Mano.

******

Code	Name of Paper	Lecture	Tutorial	Practical
	BASIC COMMUNICATION ENGINEERING	3	-	2

CS36 / EF36 / EL36

CONTENTS

3.9 SSB generation by filter and phase shift methods
3.10 Block diagram of AM transmitter

4. Frequency Modulation :

4.1 Derivation of FM wave equation
4.2 Modulation index and frequency deviation for FM
4.3 Frequency spectrum for sinusoidal FM
4.4 FET reactance and varactor diode FM modulator circuits
4.5 Block diagram of FM transmitter using direct and indirect method (Armstrong method)
4.6 Comparison of AM and FM system

5. Radio Receivers :

5.1 Various types of receivers
5.2 Receiver characteristics and their measurements
5.3 Electronic tuning system
5.4 AM demodulator - envelope detection, product demodulator (SSB detection circuit)
5.5 FM demodulator - balance slope, Foster Seely and ratio detector circuit
5.6 Block diagram of Super heterodyne AM receiver and circuit of each stage
5.7 Block diagram of FM receiver

PRACTICALS

1. Generation of AM and measurement of the modulation index.
2. Perform the AM demodulation (Envelope detector)
3. Generation of F.M.
4. Operation of standard R.F. signal generator.
5. Measurement of selectivity, sensitivity, fidility of radio receiver
6. Study of F.M. demodulation.
7. Assembling of two band radio receiver.
8. Alignment and tunning of a transistor radio receiver.
9. Fault finding exercise in a radio receiver.

REFERENCES BOOKS

1. Communication System. : George Kannedy.
2. Radio Engg. : G.K. Mithal.
3. Electronic Communications. : Roddy & Coolen.
4. Carrier Communication : N.N. Biswas

******

Code	Name of Paper	Lecture	Tutorial	Practical
EL37	**ELECTRONIC INSTRUMENTS**	3	-	2

EF 37

CONTENTS

1. Performance Characteristics of Measuring Devices and Errors :

1.1 Accuracy and precision
1.2 Resolution, drift
1.3 Linearity and hysteresis
1.4 Threshold
1.5 Response time and calibration
1.6 Repeatability and maintainability
1.7 Span
1.8 Errors - Gross, Systematic and Random Errors
1.9 Sensitivity

2. Multimeter :

2.1 Principle of measurement of

2.1.1 D.C. Voltage and current
2.1.2 A.C. Voltage and current
2.1.3 Resistance

2.2 Calculation of shunt and multiplier for range extension
2.3 AC and D.C. sensitivity
2.4 Loading effect
2.5 Specifications and limitations of multimeter.

3. Electronic Voltmeter :

3.1 Characteristics of different analog electronic voltmeter
3.2 Circuits for D.C. voltmeter using BJTs and FETs (single device and balanced bridge type)
3.3 Theory and operation of circuits for average, peak, peak to peak and RMS responding A.C. electronic voltmeters
3.4 Comparison of amplifier rectifier type and rectifier amplifier type electronic voltmeter

4. Cathode Ray Oscilloscope (C.R.O) :

4.1 Construction of CRT and deflection sensitivity
4.2 Block diagram of CRO
4.3 Various controls of CRO
4.4 Detail of X-Y section and delay line
4.5 Horizontal sweep section
4.6 Synchronization of sweep and triggered sweep
4.7 Measurement of voltage, current, frequency and phase angle using CRO
4.8 CRO probes
4.9 Construction and working of dual trace and dual beam CROs

5. Working Principle and Application of :

5.1 Q-meter
5.2 AF/RF signal generators
5.3 Harmonic distortion analyzers.
5.4 Transistor Tester
5.5 Curve Tracer
5.6 LCR bridge
5.7 Output power meter (AF)

6. Digital Displays :

6.1 Construction and Working Principle of different type of displays. Such as Diode Matrix, 7-segment using LED and LCD, Dot matrix using LED
6.2 Comparison of different type of displays

PRACTICALS

1. Measurement of D.C. voltage and current by multimeter
2. Measurement of A.C. voltage and current by multimeter
3. Measurement of resistance by multimeter
4. Complete study of multimeter and specification.
5. Study of electronic voltmeter
6. Study and use of CRO for voltage, frequency and phase angle measurement
7. Measurement of phase and frequency using lissajous figure by CRO
8. Testing of transistors using transistor tester
9. Study of seven segment display (LED and LCD)
10. Measurement of Harmonic distortions of on Amplifier using harmonic distortions Analyzer
11. Measurement of output power of an Audio Amplifier using AF power meter
12. Measurement of L, C, and R by LCR Bridge/ meter
13. Measurement of Q factor of a coil / capacitor by Q meter

REFERENCE BOOKS :

1. A Course in Electrical and Electronics Measurement & Instrumental A.K. Sawhney
2. Modern Electronic Instrumentation and Measurement Techniques Cooper
3. Electronic Instrumentation Fundamentals Malvino
4. Electronic Measurement Terman Pettit
5. Electronic Instruments David Bell

******

Semester – IV

Code	Name of Paper	Lecture	Tutorial	Practical
EL41	**ELECTRONICS WORKSHOP**	2	-	4

EF 41

CONTENTS

1. Printed Circuit Board Fabrication :

1.1 Introduction
1.2 Types and specification of PCB
1.3 Basic steps of fabrication

1.3.1 Master art preparation
1.3.2 Resist Coating (tape resist, resist paint, silk screen, photographic)
1.3.3 Etching technique
1.3.4 Resist removal
1.3.5 Drilling
1.3.6 Lacquer coating

1.4 Advantage and limitation of PCB
1.5 Safety recommendation
1.6 Block diagram of PCB plant
1.7 Preparation of PCB art work for

1.7.1 Battery eliminator circuit
1.7.2 Audio amplifier circuit
1.7.3 R.C. phase shift oscillator
1.7.4 Multivibrators (using IC 555, 741)
1.7.5 Half adder and full adder circuits

2. Semiconductor Device Fabrication :

2.1 Introduction
2.2 Intrirsic semiconductor fabrication

2.2.1 Floating zone apparatus
2.2.2 Crystal pulling apparatus

2.3 Semiconductor diode and transistor fabrication

2.3.1 Point contact techniques
2.3.2 Grown junction techniques
2.3.3 Alloy junction techniques
2.3.4 Diffused junction techniques
2.3.5 Epitaxial growth techniques

3. Transformer :

3.1 Principle of transformer
3.2 Voltage, current and turn ratio relationship
3.3 Construction details of following transformers.

3.3.1 Core type
3.3.2 Shell type
3.3.3 Auto transformer

3.4 Design procedure of iron core small transformers and numerical problems
3.5 Constructional details of transformers winding machine .

4. Coils and IFTs :

4.1 Classification of Coils according to frequency range
4.2 Classification of coils according to type of winding
4.3 Important terms related to coils

4.3.1 Skin effect.
4.3.2 Dielectric losses.
4.3.3 Distributed capacitance.
4.3.4 Quality factors.

4.4 Imperical formulae for designing of coils with numerical examples
4.5 Toroids - brief idea
4.6 Intermediate frequency transformer (IFT) -

4.6.1 Construction of IFT
4.6.2 IFT details for radio receiver

5. Impregnation Plants :

5.1 Need of impregnation plant
5.2 Diagram of impregnation plant schematic
5.3 Working procedure of Impregnation Plants.
5.4 Safety precautions
5.5 Limitations and advantages
6. Use and practices of an electronics work bench and circuit maker for basic circuits.

PRACTICALS

1. Study of transformer
2. Study of coil winding machine
3. Familiarization with different type of stampings and bobin
4. To design winding and test small transformer of single and tapped secondary
5. To design winding and test the transformer of multiple secondary
6. Preparing and testing IFT
7. Familiarization with various wires used in coil
8. Winding of two band radio transistor Antenna coils for MW and SW
9. Study of PCB plant equipment
10. To design and prepare PCB using tape resist method
11. To design and prepare PCB using resist paint method
12. To design and prepare PCB using silk screen method
13. To design and prepare PCB using photographic method
14. Study of process camera
15. Fabrication and testing of gadgets as mentioned in article 1.7
16. To design PCB using PC software (circuit maker / Easy PC)
17. Use and practice on electronic work bench for basic electronic circuits.

REFERENCE BOOKS :

1. Coil Winding & Fabrication Practice K.R. Nahar
2. Transformer & Coil BPB Publication
3. PCB - Design & Technology W.C. Bosshort

******

Code	Name of Paper	Lecture	Tutorial	Practical
EL42	**ELECTRONIC CIRCUITS**	3	-	2

EF 42 3 -- 2

CONTENTS

noise reduction, input impedance and output impedance
4.4 Analysis of various Negative feedback amplifier circuits.
4.5 Comparison of negative voltage feedback and negative current feedback

5. Oscillators :

5.1 Positive feedback concept
5.2 Barkhausen criterion
5.3 Working and calculation of frequency (no formula derivation) for Hartley (series and shunt) , Colpitt's, Clapp, tuned collector, R-C phase shift, Wein bridge, Crystal and beat frequency oscillator

6. Tuned Amplifier :

6.1 Need of tuned amplifier and its design consideration
6.2 Classification of tuned amplifier - Single, double and stagger tuned.
6.3 Single tuned amplifier and its analysis
6.4 Double tuned amplifier and its analysis
6.5 Tuned drain amplifier and tuned collector amplifier
6.6 Applications

7. Transistor at High Frequency and Special Circuit :

7.1 High frequency small signal p model of transistor
7.2 Current gain, alpha cut off frequency (fa)
7.3 fT , fb and their relationship
7.4 Darlington pair and bootstrapping
7.5 Cascode amplifier

PRACTICALS

1. Study of JFET amplifier and plot its frequency response
2. Study of depletion and enhancement MOSFET amplifier and plot its frequency response
3. Plot the frequence response of two stage R-C coupled amplifier and measure its bandwidth
4. Plot the frequence response of transformer coupled amplifier
5. Plot the frequency response of direct coupled amplifier
6. Study of transistor push-pull amplifier
7. Study of complimentary transistor power amplifier
8. Study of phase inverter
9. Study of Dartington pair
10. Plot the frequency response of negative feedback amplifier and observe the effect of negative feed back
11. Plot the frequency response of single tuned and double tuned voltage amplifiers

12. Study of Hartley oscillator and calculate frequency of oscillation
13. Study of Colpitt's oscillator and calculate frequency of oscillation
14. Study of RC phase shift oscillator
15. Study of a Wein bridge oscillator and calculate frequency of oscillation.
16. Study of crystal oscillator
17. Study of clapp oscillator

REFERENCE BOOKS :

1. Electronic Devices & Circuits Millman Halkias
2. Integrated Electronics Millman Halkias
3. Electronic Devices & Circuits Allen Mottershed.
4. Electronic Principles Malvino
5. Electronic Devices & Circuits Sanjeev Gupta
6. Applied Electronics G.K. Mithal
7. Electronic Devices & Circuits Mathus, Kulshresta & Chadda

******

Code	Name of Paper	Lecture	Tutorial	Practical
EL43	**PULSE AND WAVE SHAPING CIRCUITS**	3	-	2

EF 43

CONTENTS

1. Linear Wave Shaping Circuits :

1.1 R-C circuit as high pass and low pass circuit
1.2 High pass circuit as a differentiator
1.3 Response for step, pulse and square wave input
1.4 Calculation of percentage tilt
1.5 Low pass circuit as an integrator
1.6 Calculation of Rise time
1.7 Response of low pass circuit for step, pulse and square wave input

2. Non Linear Wave Shaping :

2.1 Various clipping circuits using ideal diode
2.2 Transfer characteristics

2.3 Transistor clippers
2.4 Clamping circuit and its application as a staircase wave formgenerator
2.5 Clamping circuit theorem

3. Multivibrator :

3.1 Transistor as a switch and Switching times.
3.2 Bistable Multivibrator (BMV)

3.2.1 Fixed bias and self bias BMV and their working
3.2.2 Calculation of voltage at different points in fixed bias BMV
3.2.3 Symmetrical and unsymmetrical triggering
3.2.4 Working of Schmitt trigger
3.2.5 Hysterisis elimination

3.3 Monostable Multivibrator (MMV)

3.3.1 Working of MMV (collector coupled)
3.3.2 Calculation of time duration
3.3.3 Wave shape at different points and calculation of voltage at different points
3.3.4 Working of emitter coupled MMV
3.3.5 Comparison of collector coupled MMV with emitter coupled MMV

3.4 Astable Multivibrator (AMV)

3.4.1 Working of collector coupled AMV
3.4.2 Wave shapes at different points
3.4.3 Working of emitter coupled AMV
3.4.4 Calculation of free running frequency for collector coupled AMV
3.4.5 Comparison of collector coupled with emitter coupled AMV

3.5 Application of Multivibrators

4. Blocking Oscillator :

4.1 Need of blocking oscillator
4.2 Working of Mono stable and Astable Blocking oscillator and their wave shape at different points :
4.3 Blocking oscillator as sawtooth generator
4.4 Calculation of pulse repeating frequency
4.5 Synchronization of blocking oscillator

5. Time Base Generators (Sweep circuits) :

5.1 Need of time base generator
5.2 General features of time base signals
5.3 Methods of generating time base waveforms

5.4 Principle and working of Miller sweep and bootstrap sweep time base generating circuit

---

PRACTICALS

1. Design a RC high pass filter for a given frequency

1.1 Plot its frequency response
1.2 Measures the percentage tilt
1.3 Observe it as a differentiator (for different time constant)

2. Design a RC low pass filter for a given frequency

2.1 Plot its frequency response
2.2 Measure its rise time
2.3 Observe it as an integrator (for the different time constant)

3. Observe the wave forms of various clipping circuit
4. Observe the wave forms of various clamping circuits
5. Study of Bistable multivibrator and measure voltages at different points
6. Observe the voltage wave forms at different points of MMV and measure its pulse width.
7. Observe the voltage waveforms at different points of AMV and measure its free running frequency.
8. Observe the output wave form of a schmitt trigger and measure LTP and UTP.
9. Observe the output waveform of a staircase generator
10. Observe the waveform of a blocking oscillator.
11. Observe the waveform of a transistorized Sweep circuit.

REFERENCE BOOKS :

1. Pulse & Wave Shaping Circuits. Millman & Taub.
2. Pulse Circuits Rajul Singhal
3. Pulse & Digital Circuits K.K. Agarwal
4. Electronic Devices & Circuits G.K. Mithal
5. Wave Shaping & Digital Circuits Agarwal & Rai

******

Code	Name of Paper	Lecture	Tutorial	Practical
EL44	**DIGITAL INSTRUMENTS**	3	-	2

EF 44

.CONTENTS

4. Digital Multimeter :

4.1 DC voltage attenuator
4.2 Current to voltage convertor
4.3 AC/DC convertor
4.4 Resistance to voltage convertor
4.5 HF to LF voltage converter
4.6 Accuracy of DMM

4.6.1 Sources of errors in D.C. voltage measurement
4.6.2 Sources of errors in DC/AC currents
4.6.3 Sources of errors in AC/DC conversion

4.7 RMS detector in DMM and DMM specifications

5. Digital Frequency Counter :

5.1 Block diagram and working

5.1.1 Basic circuit
5.1.2 Time base
5.1.3 Start stop gate

5.2 Errors in measurements
5.3 Block diagram of universal counter

5.3.1 Measurements of period, frequency, time interval and ratio

6. General Purpose Digital Instruments :

6.1 Basic block diagram, working and applications of -

6.1.1 Signal generator
6.1.2 Function generator
6.1.3 Digital storage CRO
6.1.4 Digital phase meter
6.1.5 Logic analyser
6.1.6 Signature analyser
6.1.7 Logic probe
6.1.8 Logic pulser

7. Guarding Techniques:

7.1 Safety guard and signal ground.
7.2 Ground loops and ground currents.
7.3 Common mode and series mode voltage.
7.4 Avoiding parasitic voltage.

PRACTICALS

1. Assembling and Testing of 3/4 bit DAC using Resistive network divider
2. Assembling and Testing of 3/4 bit DAC using resistive ladder network
3. Design of 2/3 bit simultaneous type A/D converter
4. Study of Ramp type A/D converter
5. Study of Successive Approximation type ADC
6. Study of different digital multimeters
7. Measurement of current, voltage and resistance by digital multimeters
8. Study of logic probes
9. Study and operation of digital frequency counter
10. Study of digital IC tester and testing of IC
11. Study and operation of logic analyser
12. Study and operation of signature analyser

REEFERENCE BOOKS :

1. Digital Instrumentation Bouwen
2. Electronic Instrumentation Kalsi
3. Electronic Measurement & Instrumentation A.K. Sawhni
4. Electronic Measurement & Instrumentation Cooper Helfric

******

Code	Name of Paper	Lecture	Tutorial	Practical
EL45	**INSTRUMENTATION AND CONTROL SYSTEM**	3	-	2

EF 45

CONTENTS

1. Basic Concept of Measurement :

1.3.3. Precision.
1.3.4. Expected Value.
1.3.5. Error (Gross, Systematic and Random error).
1.3.6. Sensitivity.
1.3.7. Linearity.
1.3.8. Hysterisis.
1.3.9. Repeatability.
1.3.10. Threshold

1.4. Calibration of measuring devices.

2. Transducers :

2.1 Concept of Primary and Secondary transducers.
2.2 Difference between active and passive transducer.
2.3 Difference between analog and digital transducer.
2.4 Construction and working of the following transducers and measurement of quantities such as Displacement (Linear and angular), Strain, Stress, Temperature, Pressure, Flow level, pH value.

2.4.1 Potentiometers
2.4.2 Strain gauge (resistance and semiconductor type)
2.4.3 Resistance Temperature detectors (RTD)
2.4.4 Thermo couples, thermistor.
2.4.5 Linear variable differential transformer (LVDT).
2.4.6 Capacitive transducer
2.4.7 Load Cell
2.4.8 Piezo Electric Transducer
2.4.9 Photo Cells
2.4.10 Photo Voltaic Cell
2.4.11 Techogenerator
2.4.12 Ultrasonic method for level measurement
2.4.13 Electro magnetic flow meter.
2.4.14 pH electrodes

3. Signal Conditioning :

3.1 Introduction.
3.2 DC Signal Conditioning.
3.3 AC Signal Conditioning.
3.4 Brief idea of data acquisition system

4. Control System :

4.1 Concept of open loop and close loop system
4.2 Automatic control system
4.3 Transfer function

4.4 Block diagram reduction techniques
4.5 Concept of feedback control and its effects

5. Control System Components :

5.1 Working principle and construction of -

5.1.1 Synchro Transmitter
5.1.2 Synchro receiver
5.1.3 Control transformer
5.1.4 DC and A.C. servo motors

5.2 Characteristics of servo amplifier for A.C. and D.C. error signals

6. Position Control System :

6.1 Introduction.
6.2 Study position control in small/large system with the help of block diagrams of -

6.2.1 Pen recorder
6.2.2 Real drive
6.2.3 Machine tool control
6.2.4 Level Control
6.2.5 Temperature Control

PRACTICALS

1. To measure the linear and angular displacement by

1.1 LVDT.
1.2 Potentiometer.
1.3 Capacitive transducer.

2. Measurement of speed of the shaft by contact and non contact methods.

2.1 Photo electric transducer.
2.2 Magnetic transducer
2.3 Techogenerator

3. Measurement of force by strain gauge bridge
4. Measurement of pH value using pH meter
5. Error detection by synchro pair
6. Measurement of temperature and draw the characteristics of following -

6.1 Thermocouple.
6.2 RTD
6.3 Thermister

7. To draw the torque and speed curve for servo motor.
8. Measurement of level by capacitive transducer.
9. To observe the output wave form of synchro transmitter on CRO and find the electrical zero.

REFERENCE BOOKS :

1. Automatic Control System B.C. Kuo.
2. Control System Engineering I.J. Nagrath & Gopal
3. A Course in Electrical & Electronics A.K. Shawney.Measurement & Instrumentation.
4. Instrumentation Measurement and Feed Back Barry E Jones.
5. Instrumentation Devices and System C.S. Ranga, Sharma, Mani.
6. Instrumentation. R.K. Jain.
7. Control Engineering N.M. Morris
8. Measurement Systems Application & Design. E.O. Deoblin.
9. Electronic Instruments Helpric Cooper

******

Code	Name of Paper	Lecture	Tutorial	Practical
EL46	**TRANSMISSION LINES AND WAVE PROPAGATION**	3	2	-

EF 46

CONTENTS

1. Electromagnetic Theory :

1.1. Maxwell's Equations.
1.2. Electromagnetic Wave Equation for free space.
1.3. Propagation of uniform plane wave.
1.4. Reflection Refraction and polarisation of electromagnetic waves. (Simple description - no derivation)

2. EM Wave Propagation :

2.1. Ground Wave propagation and effect of curvature of the earth.
2.2. Space Wave Propagation

2.2.1. Line of sight distance.
2.2.2. Effect of Atmosphere and Obstacles. (no derivation)

2.3. Sky Wave Propagation

2.3.1. Ionospheric and its characteristics
2.3.2. Critical frequency
2.3.3. Effect of the Earth's magnetic field on ionospheric propagation
2.3.4. MUF and Skip distance.
2.3.5. Ionospheric absorption and disturbances.
2.3.6. Atmospheric noise.
2.3.7. Scatter propagation.
2.3.8. Fading of Radio Waves. (no derivation)

3. Transmission Lines :

3.1. Fundamentals of Transmission Line

3.1.1. Transmission Line Equation.
3.1.2. Characteristic Impedance.
3.1.3. Terminated Loss-less Line.
3.1.4. Standing Wave Ratio V.S.W.R. and its measurement
3.1.5. Behaviour of quarter and half wave line

4. Antennas :

4.1. Principle of Radiation.
4.2. Resonant and non resonant antennas.
4.3. Radiation Pattern of l/2, l and 3l/2 dipoles. Effect of ground on l/2 dipole.
4.4. Radiation pattern of grounded l/4, l/2, and l dipole.
4.5. Radiation resistance, total resistance, efficiency, beam width, gain, aperture area of an antenna. (no derivation)
4.6. Antenna Array -

4.6.1. Principle of Pattern Multiplication
4.6.2. Broad Side array
4.6.3. End Frire array

4.7. Folded dipole and Rhombic antenna.
4.8. Yagi antenna and parasitic elements
4.9. Log Periodic and Loop antenna.
4.10. Parabolic antennas and Horn antenna
4.11. Measurement of antenna impedance and field pattern

REFERENCE BOOKS :

1. Electronic Communication System Kennedy
2. Radio Engineering Terman
3. Electro Magnetic Waves and Jordan Balman.Radiating Systems
4. Antennas Kraus
5. Radio Engineering G.K Mithal
6. Antenna & Wave Propagation KD Prasad
7. Transmission Lines & Networks Umesh Sinha

*****

Code	Name of Paper	Lecture	Tutorial	Practical
EL47	**MICROPROCESSOR**	3	-	2

EF 47/ IE 47

CONTENTS

3.2.1 Data transfer
3.2.2 Arithmetic
3.2.3 Logical
3.2.4 Branching
3.2.5 Machine control

3.3 Different interrupts of 8085 Microprocessor
3.4 Addressing modes
3.5 Stack operation and related instructions
3.6 Subroutine and related instructions
3.7 Machine and assembly language
3.8 Assembly language programming
3.9 Debugging of programs

4. Memory and I/O System :

4.1 Memory types
4.2 Memory organization
4.3 Basic concept of memory interfacing and I/O interfacing
4.4 Difference between peripheral I/O and memory mapped I/O

5. Instruction Execution and Timings :

5.1 Instruction cycle - machine cycle, T-states
5.2 Fetch cycle
5.3 Memory read and write cycle
5.4 I/O read and write cycle
5.5 Interrupt acknowledge cycle
5.6 Bus idle cycle
5.7 DMA cycle
5.8 Machine cycle with wait states.
5.9 Programs using delays and counters

6. Limitation of 8 bit Microprocessor.

PRACTICALS

1. Study of 8085 microprocessor kit
2. Addition of two 8 bit numbers with and without carry
3. Subtraction of two 8 bit numbers with and without borrow
4. Multiplication of two 8 bit number using successive addition and resistor shifting method
5. Program to find out square of a number.
6. Programs involving data arrays

6.1 Generating odd numbers.
6.2 Data transfer schemes
6.3 Sorting of odd/even numbers.
6.5 Finding largest and smallest numbers.
6.6 Arrange data array in ascending / descending order

7. Programs using stack
8. Programs using subroutine.
9. Debugging of programs using single stepping on kit

REFERENCE BOOKS :

1. Microprocessor Architecture, Programming & Application Gaonkar
2. Fundamentals of Microprocessors B.Ram & MicroComputers
3. Assembly Language Programming A.Leventhal, Osborn
4. Theory & Problems of Tokhein Microprocessor Fundamentals
5. Microprocessor & Peripheral Hand book INTEL
6. Computer Architecture & org. J.P Hayes
7. Digital Computer Fundamentals T.C.Bartee
8. An Introduction to Microprocessors A.P.Mathur

*****

Semester – V

Code	Name of Paper	Lecture	Tutorial	Practical
EL51	**AUDIO AND VIDEO SYSTEM**	3	-	3

CONTENTS

1. Magnetic Tape (Audio System) :

1.1 Introduction of audio system

1.1.1 Monophonic
1.1.2 Stereophonic

1.2 Block diagram of tape recorder
1.3 Material used for tape
1.4 Head

1.4.1 Types
1.4.2 Construction, working
1.4.3 Comparison
1.4.4 Faults

1.5 Working principle of Magnetic tape recorder in Recording Mode
1.6 Working principle of Magnetic tape recorder in Play back Mode
1.7 Biasing technique

1.7.1 Type of biasing
1.7.2 Bias oscillator

1.8 Equalization
1.9 Tape transport mechanism

1.9.1 ATR
1.9.2 ACR
1.9.3 Comparison

1.10 Recording techniques

1.10.1 Direct recording
1.10.2 FM recording
1.10.3 PDM recording
1.10.4 Digital recording
1.10.5 Comparison between recording techniques

2. HI-FI and Stereophony :

2.1 Meaning of Hi-Fi
2.2 Basic components
2.3 Fundamental of sound harmonics
2.4 Loudness
2.5 Pitch
2.6 Timbre
2.7 Sensitivity
2.8 Stereophony recording
2.9 Broadcasting of stereophony and its reproduction
2.10 Active and passive audio circuits

2.10.1 Volume control
2.10.2 Tone control
2.10.3 Bass and treble control
2.10.4 Graphic equaliser

2.11 Basic idea about audio pre amplifier and power amplifiers

3. Magnetic Tape (Video System) :

3.1 Basic principle
3.2 Video tape transport mechanism
3.3 Video head drum assembly
3.4 Different tape threading system and formats

3.4.1 VHS
3.4.2 Betamax
3.4.3 Comparison

3.5 Azimuth recording techniques
3.6 Signal processing

3.6.1 Recording system
3.6.2 Play back system

3.7 Servo mechanism

3.7.1 Need of servo control
3.7.2 Basic principle

3.8 Block diagram and functioning of VCR

4. Basic Concept of New Trends :

4.1 Audio CD player
4.2 Audio conferencing
4.3 Video CD player
4.4 Digital versatile disk (DVD)
4.5 Video Home Entertainment Centre (VHEC)
4.6 Video Test Data Terminal
4.7 Simple audio and video compression techniques

PRACTICALS

1. Study of Audio tape transport system.
2. Study of signal processing of Audio tape recorder
3. Maintenance of Audio tape recorder
4. Study of different audio circuits volume, tone, bass, treble and equaliser
5. Alignment of audio tape recorder head
6. Study of video tape transport mechanism
7. Operating procedure of video tape recorder
8. Study of different sections of VCR
9. Alignment of internal controls of VCR
10. Fault finding of VCR
11. Study of audio CD player
12. Study of Video CD player

REFERENCE BOOKS :

1. Audio & Video Systems A.K. Saxena & K.K. Saxena
2. Hand Book of Magnetic Recording D. Jorgen
3. A Course in Electrical & Electronic Measurement & Instruments A.K. Sawhney
4. VCR - Principles, Maintenance & Repair S.P. Sharma
5. Basic TV & Video System Bernard Grob
6. VCR Trainee Manual

*****

Code	Name of Paper	Lecture	Tutorial	Practical
EF52	**POWER AND INDUSTRIAL ELECTRONICS**	3	-	3

EL 52/IE 52 3 -- 3

CONTENTS

1. Introduction :

1.1 Principle, Construction and characteristics of SCR, TRIAC, DIAC, UJT, PUT, Power MOSFET, LASCR.
1.2 Ratings of SCR
1.3 "Turn on" and "Turn off" mechanism of SCR
1.4 Series and parallel connections of SCR
1.5 Snubber circuits
1.6 UJT as a relaxation oscillator

2. Power Control and Rectifiers :

2.1 Phase control circuit of SCR

2.1.1 Simple R-C circuit
2.1.2 Transformer circuit
2.1.3 UJT circuit
2.1.4 Ramp and Pedestal circuit

2.2 Different methods of turning off SCRs
2.3 SCR Half Wave rectifier (single phase)

2.3.1 SCR with resistive load
2.3.2 SCR with inductive load (with and without free wheeling diode)

2.4 TRIAC as a power control circuit
2.5 Three phase HW and FW rectifier using PN junction diode

2.5.1 Calculation of RMS value
2.5.2 Average value
2.5.3 Ripple factor
2.5.4 PIV
2.5.5 TUF

3. Inverters and Converters :

3.1 Basic principle of inverters
3.2 Ringing choke inverter
3.3 Push pull type inverter using transistor
3.4 Series and parallel inverter circuits using SCR (Single phase)
3.5 Basic idea of PWM inverter

4. AC Stabilizer and Power Supply :

4.1 Resonant stabilizer
4.2 Electro mechanical stabilizer (using relay and servo motor)
4.3 Electronic stabilizer
4.4 Block diagram of UPS (OFF line and ON line)
4.5 Switched mode power supply (SMPS)

4.5.1 Block diagram and basic principle
4.5.2 Types of SMPS
4.5.3 Merits and demerits of SMPS

5. Timer Circuit :

5.1 Using transistor
5.2 Using SCR

6. Speed Control of D.C. Motor :

6.1 Concept of motor speed control
6.2 Speed torque relation for motor
6.3 Armature voltage control method (using SCR)
6.4 Speed control method (using techo-generator)

7. Heating, Welding and their Application :

7.1 Principle and application of induction heating
7.2 Principle and application of dielectric heating
7.3 Principle of resistance welding
7.4 Type of resistance welding
7.5 Sequential timing circuit

PRACTICALS

1. To plot V-I characteristics of SCR
2. To plot V-I characteristics of TRIAC
3. To plot V-I characteristics of UJT
4. To plot V-I characteristics of DIAC
5. Observe the various waveforms of UJT relaxation oscillator
6. Study of half wave rectifier using SCR with resistive load and inductive load.
7. Application of TRIAC as light dimmer/fan regulator
8. Study of phase inverter circuit using transistor
9. Study of inverter circuit using SCR
10. Study of electronic-mechanical/electronic A.C. stabilizer
11. Study of UPS
12. Study of SMPS
13. Study of electronic timers using transistor
14. Study of electronic timers using 555/transistor
15. Study of speed control of D.C. motor
16. Study of resistance welding
17. Assembling and testing of manual stabilizer with auto cut facility.

REFERENCE BOOKS :

1. An Introduction to Thyristor M. Ramamoorthy & their Application
2. Industrial Electronics G.K. Mithal
3. Industrial Electronics O. Cage
4. Thyristor Engineering M.S. Berde
5. Thyristor & its Application H.C. Rai
6. Electronics in Industry Chute & Chute
7. ikWoj ,.M bfUMLVªh;y bysDVªksfuDl ¼fgUnh½ tykU/kjk] ekFkqj
8. Industrial Electronics & Control Biswanth Paul
9. Power Electronics P.C. Sen
10. Power Electronics P.S. Bhimbhara

*****

Code	Name of Paper	Lecture	Tutorial	Practical
EF53	**COMPUTER ARCHITECTURE AND ORGANISATION**	3	-	3

EL 53/IE 53 3 -- 3

CONTENTS

3.1.1 Instruction sequencing
3.1.2 Instruction interpretation

3.2 Hard wired control (Basic Concept)
3.3 Micro programmed Control

3.3.1 Microinstruction
3.3.2 Micro programme
3.3.3 Basic concept of micro programmed control unit
3.3.4 Wilkes's design

4. Memory and its Organizations :

4.1 Types of Memory

4.1.1 Magnetic tape, floppy disk, hard disk, and bubble memory
4.1.2 Optical
4.1.3 CCD
4.1.4 Semiconductor
4.1.5 Flash memory

4.2 Memory Mapping

4.2.1 Virtual
4.2.2 Associative and set-associative
4.2.3 Cache mapping

5. IO Devices :

5.1 Keyboard and Mouse
5.2 Floppy drive
5.3 CD ROM drive
5.4 Printer - Dot Matrix, inkjet, Laser
5.5 Monitor and Plotter

6. Parallel Processing :

6.1 Introduction of pipeline structure
6.2 Introduction of RISC processor and CISC processor

REFERENCE BOOKS :

1. Computer System Architecture Morris Mano
2. Computer Architecture & Organisation John P. Hayes
3. Computer Architecture & Organisation Stalling (PHI)
4. Structure Computer Organisation Tanenbaum (PHI)

5. Computer Organisation & Design Paul Choudhary (PHI)
6. Computer Architecture & Organisation Hamacher & Zaky

*****

Code	Name of Paper	Lecture	Tutorial	Practical
EL54	**COMMUNICATION SYSTEM**	3	-	2

CONTENTS

1. Telephony :

1.1 Basic idea of automatic exchange
1.2 Various tone used in automatic telephone exchange
1.3 Electronic telephone hand set
1.4 Block diagram of cordless phone system
1.5 Brief idea of EPABX

2. PLCC System :

2.1 Concept of PLCC
2.2 Coupling equipments
2.3 Mode of coupling to power lines
2.4 Power level
2.5 Modulation method
2.6 Frequency assignment
2.7 Advantage and limitations of PLCC

3. Pulse Modulation :

3.1 General description of PAM, PWM, PPM
3.2 Pulse code modulation

3.2.1 Sampling and sampling theorem
3.2.2 Quantization - uniform and non uniform (definition, different between them)
3.2.3 Quantization noise
3.2.4 PCM reconstruction

3.3 Basic principle and block diagram of Delta modulation

4. Digital Communication :

4.1 Block diagram of Digital Communication system
4.2 Multiplexing - FDM, TDM

4.2.1 Basic concept of synchronisation

4.3 Basic idea of digital modulation techniques

4.3.1 ASK
4.3.2 FSK
4.3.3 PSK, QPSK

4.4 Simple idea of MODEM
4.5 Circuit switching and packet switching
4.6 Brief idea of ISDN
4.7 Comparison of analog and digital communication

5. Facsimile System :

5.1 Introduction
5.2 Use of facsimile
5.3 Facsimile transmitter
5.4 Facsimile receiver

5.4.1 Synchronization
5.4.2 Phasing
5.4.3 Photographic recording
5.4.4 Directing recording

6. Phase Locked Loop :

6.1 Block diagram, working and uses of PLL
6.2 Application for frequency multiplication translation and division
6.3 FM demodulation

PRACTICALS

1. Study of various parts of electronic telephone set
2. Study of EPABX
3. Verification of various tones of automatic telephony system
4. Study of cordless phone system
5. Visit of station employing PLCC system
6. Visit of local telephone exchange
7. Study of multiplexing techniques
8. Study of PCM generation and reconstruction
9. Study of FAX machine
10. Study of MODEM.

11. Calculate the free running frequency of a 565 PLL and measure its lock range and capture range
12. Study a PLL 565 as a FM demodulator

REFERENCE BOOKS :

1. Telegraphy N.N. Biswas
2. Telephony N.N. Biswas
3. Telephony P.N. Das
4. Telegraphy J. Atkinson
5. Communication System George Kennedy
6. Radio Engineering G.K. Mithal
7. Electronic Communication Roddy & Coolen
8. Principle of Electronic Communication Taub, Schilling
9. Communication System Simon Haykin
10. Model Communication System B.P. Lathi
11. Telecommunication Switching Networks Thyagarajan

*****

Code	Name of Paper	Lecture	Tutorial	Practical
EF55	**LINEAR INTEGRATED ELECTRONIC CIRCUITS**	3	-	3

EL 55

CONTENTS

1. IC Fabrication :

1.1 Basic monolithic integrated circuit
1.2 General IC processing steps

1.2.1 Epitaxial growth
1.2.2 Masking and etching
1.2.3 diffusion of impurity
1.2.4 Metallization

1.3 Transistor for monolithic circuit
1.4 Monolithic diode
1.5 Integrated resistor
1.6 Integrated capacitor
1.7 Concept of SSI, MSI, LSI and VLSI

2. Operational Amplifier :

2.1 OP AMP, symbol, equivalent circuit and characteristics.
2.2 Differential amplifier and its configurations
2.3 Working of emitter coupled differential amplifier
2.4 Characteristics of ideal and practical OP-AMP
2.5 Block diagram of OP AMP
2.6 Inverting and non-inverting OP AMP
2.7 OP AMP parameters and their measurements
2.8 Off set null techniques
2.9 OP AMP applications as :

2.9.1 Adder, subtractor, differential amplifier and instrumentation amplifier
2.9.2 Differentiator and integrator
2.9.3 Peak detector, precision rectifier
2.9.4 Log and anti log amplifier
2.9.5 Wein bridge and RC phase-shift oscillator
2.9.6 Pulse, square, triangular and sawtooth wave generator
2.9.7 Comparator and Schmitt trigger
2.9.8 Active filters (single order) - LPF and HPF
2.9.9 Sample and hold circuit
2.9.10 Frequency selective amplifiers

3. Timer Chip 555 :

3.1 Functional block diagram and working
3.2 555 Applications as :

3.2.1 Saw tooth generator
3.2.2 BMV, AMV and MMV
3.2.3 PWM and PPM

4. Voltage Regulation :

4.1 Need of voltage stabilisation
4.2 Transistor series voltage regulator - open loop and close loop
4.3 Short circuit and overload protection circuit
4.4 Functional diagram of IC voltage regulator chip (fixed and variable) 723 and 78XX, 79XX
4.5 Voltage regulator using OP-AMP

PRACTICALS

1. Study of IC 741 OP AMP
2. Design and test the null circuit for OP AMP
3. Design and test an adder and subtractor circuits using OP AMP
4. Design and test an integrator and differentiator circuit using OP AMP
5. Wein bridge and RC phase shift oscillator using OP AMP
6. Design and test a Schmitt trigger circuit using OP AMP
7. Assemble and test a square wave generator and pulse generator circuit using OP AMP
8. Assemble and test a triangular wave generator circuit using OP AMP
9. Design and test a BMV and Schmitt trigger circuits using 555
10. Design and test a MMV and precision timing circuit using 555.
11. Design and test a AMV and a square wave generator circuit using 555
12. Assemble and test high and low voltage regulator using 723 IC
13. Assemble and test a fixed positive and negative voltage regulator using 78XX, 79XX ICs.

REFERENCE BOOKS :

1. OP AMP & Linear ICs Gyakwar
2. Integrated Circuits Botkar
3. Interested Circuits Millman Halkias
4. OP AMP & Linear ICs Caughlin & Driscoll
5. Pulse Circuit Rajul Singhal
6. Linear Integrated Circuit & Application Dr. Y. Venkataramani (ISTE)

Code	Name of Paper	Lecture	Tutorial	Practical
EL561	**MICROWAVE ENGINEERING**	3	2/2	-

CONTENTS

1. Microwave :

1.1 Introduction
1.2 Microwave region and bands
1.3 Advantage and applications

2. Microwave Vacuum Tube Devices :

2.1 Construction, working principle and application of :

2.1.1 Klystron
2.1.2 Reflex klystron
2.1.3 Magnetron
2.1.4 Travelling wave tube

3. Microwave Solid State Devices :

3.1 Construction, working principles and application of :

3.1.1 PIN Diode
3.1.2 Tunnel Diode
3.1.3 Gunn Diode
3.1.4 IMPATT Diode

4. Microwave Components :

4.1 Rectangular and circular wave guides
4.2 T junction
4.3 Magic TEE
4.4 Couplers
4.5 Duplexer
4.6 Rotating joints
4.7 Wave guide terminations
4.8 Attenuators
4.9 Wave guide bends, Corners and Twist
4.10 Wave guide irises
4.11 Post and tuning screws
4.12 Coupling probes and coupling loops

5. Microwave Measurements :

5.1 Introduction
5.2 Measurement of frequency and wavelength
5.3 Measurement of power

5.3.1 Calorimeter
5.3.2 Bolometer

5.4 Measurement of VSWR
5.5 Q Measurement
5.6 Noise Figure measurement

6. Introduction of Propagation modes in wave-guides.

REFERENCE BOOKS :

1. Microwave Engineering Chatterjee
2. Microwave Engineering A. Das & S.K. Das
3. Microwave Devices & Circuits Liao
4. Microwave Principles Herbert J. Reich
5. Microwave Components & Measurement A.J. Wheller
6. Electronic Communication System G. Kennedy
7. Microwave Engineering Collins
8. Introduction to Radar System Skolnik

*****

Code	Name of Paper	Lecture	Tutorial	Practical
CH571	**'C' PROGRAMMING**	2	-	2

Common for All Branches of Engineering except CS & IT

CONTENTS

1. Introduction :

1.1 Scope of 'C' Language
1.2 Distinction and similarities with other HLLs
1.3 Special features and Application areas

2. Elements of 'C' :

2.1 Character set
2.2 Key words
2.3 Data types
2.4 Constants and Variables
2.5 Operators: unary, binary, ternary
2.6 Operator precedence

3. Console Input-Output :

3.1 Types of I-O
3.2 Console I-O
3.3 Unformatted console I-O: getchar(),putchar(), gets(), puts(), getch(),getche()
3.4 Formatted I-O: scanf(), printf()

4. Control Flow :

4.1 Statements and blocks
4.2 if
4.3 switch
4.4 Loops: for, while, do-while
4.5 goto and labels
4.6 break, continue, exit
4.7 Nesting control statements

5. Arrays :

5.1 Basic concepts
5.2 Memory representation
5.3 One dimensional array
5.4 Two dimensional array

6. Functions :

6.1 Basic concepts
6.2 Declaration and prototypes
6.3 Calling
6.4 Arguments
6.5 Scope rules
6.6 Recursion
6.7 Storage classes types
6.8 Library of functions: math, string, system

7. Pointers :

7.1 Basic concepts
7.2 &, * operator
7.3 Pointer expression: assignment, arithmetic, comparison
7.4 Dynamic memory allocation
7.5 Pointer v/s Arrays

8. Structure and Enumerated Data Types :

8.1 Basic concepts
8.2 Declaration and memory map
8.3 Elements of structures
8.4 Enumerated data types : typedef, enum
8.5 Union

PRACTICALS

1. Problems based on arithmetic expression, fixed mode arithmetic.
2. Problems based on conditional statements and control structures.

3. Problems based on arrays (1-D, 2-D), functions and pointers.
4. Problems based on Engineering applications.

REFERENCE BOOKS :

1. 'C' Programming Stephen Kochan
2. Programming with 'C' Schaum's Series
3. 'C' Programming V.Balguru Swami
4. 'C' Programming Kernighan & Ritchie
5. Let us 'C' Yashwant Kanetkar

*****

*****

Semester – VI

Code	Name of Paper	Lecture	Tutorial	Practical
EL61	**TELEVISION ENGINEERING**	3	2	-

CONTENTS

1. Picture Scanning :

1.1 Scanning Process.
1.2 Number of Scanning Lines.
1.3 Flicker
1.4 Inter lace scanning
1.5 Fine Structure
1.6 Contrast Ratio
1.7 Aspect ratio and viewing distance

2. Composite Video Signal for 625 Line System :

2.1. Video signal dimensions.
2.2. Horizontal sync details.
2.3. Vertical Sync details.
2.4. Scanning sequence and Function of sync pulse train.
2.5. TV standards

3. T.V. Signal Transmission :

3.1. Modulation technique for picture and sound with reason of preferences
3.2. Concept of Vestigial Side Band (VSB)
3.3. VSB band width and transmission efficiency
3.4. TV channel B.W.
3.5. Positive and Negative modulation
3.6. Block diagram of TV transmitter
3.7. Interference suffered by carrier
3.8. TV transmitting antenna

4. Monochrome Picture Tube :

4.1. Monochrome Picture Tube construction

4.1.1 Electron gun
4.1.2 Deflection unit
4.1.3 Screen and face plate

4.2. Picture Tube Circuit Controls.

5. T.V. Receiver :

5.1 Principle of TV Receiver.
5.2 VSB reception
5.3 Block diagram of B/W T.V. Receiver and function of each stage
5.4 Circuit of following stages using transistor / I.C.

5..4.1 RF and IF Section.
5.4.2 Video detector
5.4.3 Video Amplifier, B.W. and Contrast Control
5.4.4 AGC and noise Cancellation Circuit.
5.4.5 Sync Separation Circuit.
5.4.6 Sync processing and AFC Circuit
5.4.7 Vertical deflection Circuit
5.4.8 Horizontal deflection Circuit
5.4.9 Sound signal separation
5.4.10 Sound section
5.4.11 Power Supply - EHT.

5.5 Balun and its construction

6. Colour T.V. :

6.1 Colour T.V. Essentials.
6.2 Compatibility.
6.3 Colour perception and three colour theory
6.4 Luminance, hue, saturation, chroma
6.5 Colour difference signal
6.6 Colour picture tube

6.6.1 Delta gun
6.6.2 Precision in line (PIC)
6.6.3 Trinitron

6.7 Colour Signal Transmission (frequency inter leaving technique)
6.8 Band width for Colour Signal Transmission.
6.9 Modulation of Colour Signals
6.10 Weighting factor
6.11 Elementary idea for NTSC, PAL, SECAM systems, their merits and demerits.

7. Concept of Alignment and troubleshooting procedure.

PRACTICALS

1. Installation and study of different TV receiving antennas.
2. Study of controls of monochrome and colour TV.
3. Study of picture tubes for monochrome and colour TV.
4. Study of different sections of monochrome TV.
5. Study of different sections of Colour TV and observe the waveform.
6. Study of setting up and alignment/adjustment of following using pattern generator.

6.1 Sound IF, picture IF
6.2 Vertical height adjustment, vertical linearity adjustment
6.3 Horizontal linearity and size adjustment
6.4 Tuner adjustment

7. I.F. alignment of TV receiver using Wobbuloscope
8. Trouble shooting of monochrome and colour TV receiver
9. Study of UHF to VHF converter.
10. Colour adjustment of Colour TV
11. Visit of TV studio/Telecasting station.
12. Various faults of colour and B/W receivers and their remedies

---

REFERENCE BOOKS :

1. Monochrome & Colour TV System R.R. Gulati.
2. Colour TV Principle & Practice R.R. Gulati.
3. T.V. Engineering A.M. Dhake
4. T.V. Engg. Theory & Service Kiver Kaufman
5. Basic TV Principles Bernard Grob

*****

Code	Name of Paper	Lecture	Tutorial	Practical
EL62	**ADVANCED MICROPROCESSOR**	3	-	3

CONTENTS

1. 8086 Microprocessor :

1.1 Internal architecture - Bus interface unit, execution unit, internal registers and flags.
1.2 Instruction execution sequence
1.3 Addressing modes
1.4 Modes of operation
1.5 Comparison with 8088

2. 8086 Instructions and Programming :

2.1 Data transfer instructions
2.2 Arithmetic instructions
2.3 Logic, shift and rotate instructions
2.4 Processor control instructions
2.5 String operation instructions
2.6 Writing simple assembly language programs
2.7 System bus timing

3. I/O Data Transfer Schemes :

3.1 Classification of IO schemes
3.2 Programmed data transfer - IO mapped and memory mapped IO
3.3 Asynchronous data transfer and synchronous data transfer
3.4 Interrupt driven data transfer

3.4.1 Interrupt process
3.4.2 Multiple interrupts and priorities
3.4.3 Enabling, disabling and masking of interrupts

3.5 DMA data transfer scheme
3.6 Serial data transfer scheme

4. Peripheral Devices and their Interfacing with 8085 :

4.1 Programmable peripheral interfaces - 8255 and its applications.
4.2 DMA controller - 8257
4.3 Programmable interrupt controller - 8259
4.4 Programmable communication interface - 8251
4.5 Programmable TIMER - 8253.
4.6 Programmable keyboard and display interface 8279
4.7 Brief idea of CRT controller, dot-matrix printer controller and floppy disk controller

5. Bus Standards :

5.1 RS 232 C
5.2 IEEE 488

PRACTICALS

1. Study of 8086 trainer kit
2. Assembly language programming in 8086

2.1 Storing an immediate operand in a register/memory
2.2 Copying contents of a register to memory location and vice-versa
2.3 Exchanging controls of two memory locations
2.4 Addition/subtraction of two numbers
2.5 Sorting of odd/even no.
2.6 Arrange data arrays in ascending and descending.
2.7 Programs using stack subroutine.
2.8 Convert ASCII code into packed BCD
2.9 Program for case conversion of letters

3. Interfacing 8255 with 8085
4. Interfacing ADC with 8085
5. Interfacing DAC with 8085
6. Interfacing stepper motor with 8085.
7. Temperature monitoring system using 8085 microprocessor

REFERENCE BOOKS :

1. The 8086 Microprocessor Walter A. TriebelArchitecture
2. Software & Interfacing Techniques Avtar Singh2. Micro Computer Systems Liu & Gibson The 8086/8088 Family

3. An Introduction to Microprocessors A.P. Mathur
4. Microprocessor Architecture & Gaonkar Organization
5. Introduction to 8086/8088 Microprocessor Douglus V. Hall

*****

Code	Name of Paper	Lecture	Tutorial	Practical
EL63	**BIO - MEDICAL INSTRUMENTATION**	3	-	2

IE 63

CONTENTS

4. Electro Cardiograph (E.C.G.) :

4.1 Electrical activity of heart and its construction
4.2 Block diagram of E.C.G. machine
4.3 ECG electrodes
4.4 Lead configuration
4.5 ECG electronics
4.6 ECG controls
4.7 Heart rate measurement
4.8 Artefacts and troubleshooting
4.9 Principle of recording other bioelectric events like EEG and EMG

5. Pace Makers :

5.1 Need
5.2 Classification
5.3 Block diagram of Demand pacemaker
5.4 Basic circuit of fixed rate and synchronous pacemaker

6. Blood Pressure Monitoring :

6.1 Blood circulation system
6.2 Blood pressure waveform
6.3 Blood pressure measurement techniques

6.3.1 Direct
6.3.2 Indirect

6.4 Circuit diagram of B.P. processor to indicate diastolic - systolic blood pressure

7. Defibrillator :

7.1 Need
7.2 Types of defibrillator

7.2.1 A.C. defibrillator
7.2.2 D.C. defibrillator

7.3 Basic defibrillator circuits and control circuits
7.4 Lawn waveform and its synchronization
7.5 Operating controls and precautions

8. Biomedical Instructions :

8.1 Blood Gas analyser
8.2 Densitometer
8.3 Flame photometer
8.4 Blood flow meter

8.5 Skin and systemic body temperature measurement
8.6 X- Ray machine

8.6.1 Tube construction and housing
8.6.2 High voltage power source
8.6.3 Block diagram of X-Ray machine
8.6.4 Image intensifier

8.7 Concept of Sonography
8.8 Concept of CT Scan
8.9 Concept of Magnetic Resonance Indication (MRI)

9. Bed Patient Monitoring System :

9.1 Introduction
9.2 ICU/ CCU systems

10. Electrical Safety :

10.1 Types of Hazard
10.2 Safety precautions

PRACTICALS

1. Study of different types of electrodes
2. Study of different types of recorders
3. Study of ECG machine
4. Measurement of blood pressure using indirect method.
5. Study of blood pressure amplifier
6. Measurement of skin systemic temperature
7. Study of pacemakers
8. Visit to clinical laboratory or hospital
9. Visit to a hospital for X-ray machine / Sonography / CT scan.
10. Visit to ICU/ CCU of hospital

REFERENCE BOOKS :

1. Bio Medical Instrumentation K.R. Nahar
2. Bio Medical Instrumentation Chrompbell
3. Electronics for Medical Personnel Buckstein
4. Servicing Medical & Bioelectronics Equipments Carl J.J.
5. Medical Electronics Khandpur

*****

Code	Name of Paper	Lecture	Tutorial	Practical
EL64	**ADVANCE COMMUNICATION SYSTEM**	3	-	3

CONTENTS

1. Information Theory :

1.1 Amount of information
1.2 Average information
1.3 Entropy
1.4 Information rate
1.5 Channel capacity
1.6 Shannon Hartley theorem (No formula derivation)
1.7 Brief idea of coding

2. Satellite Communication :

2.1 Concept of satellite communication
2.2 Idea of satellite orbits
2.3 Operating frequency consideration
2.4 Basic idea of transponder
2.5 Path loss calculation
2.6 Multiple access techniques - basic idea
2.7 Simple block diagram of earth station
2.8 Advantage and limitations of satellite communication
2.9 Application of satellite communication

3. Optical Fibre Communication :

3.1 Block diagram of optical fibre communication
3.2 Guided light system
3.3 Acceptance angle
3.4 Numerical aperture
3.5 Attenuation in optical fibre
3.6 Dispersion in optical fibre (BW consideration)
3.7 Type of optical fibre

3.7.1 Single mode
3.7.2 Multi mode

3.8 Light source - basic principle and working

3.8.1 LED
3.8.2 Laser diode

3.9 Light detector - basic principle and working

3.9.1 PIN diode
3.9.2 Avalanche photo diode

3.10 Brief idea of coupler and splicer
3.11 Advantage and disadvantage of optical fibre communication system

4. Mobile Communication :

4.1 Limitation of conventional mobile telephone system
4.2 Basic concept of cellular telephone system
4.3 Operating frequency consideration of cellular telephone system
4.4 Basic concept of frequency reuse technique
4.5 General formula for mobile radio propagation (Path characteristics - no derivation)
4.6 Hand off mechanism
4.7 Consideration of the components of cellular system

PRACTICALS

1. Study of satellite receiver.
2. Visit of satellite earth station.
3. Study of various types of optical fibres
4. Plot the characteristics of LED.
5. Study of laser diode.
6. Study of PIN diode.
7. Study of Avalanche photo diode.
8. Study of optical fibre bench.
9. Study of cellular telephone hand set.
10. Visit of Cellular Base station.

REFERENCE BOOKS :

1. Electronic Communication Roddy & Coolen
2. Electronic Communication A.B. Carlson
3. Analog & Digital Communication B.P. Lathi
4. Satellite Communication Prett & Bostian
5. Communication Satellite System J. Martin
6. Optical Communication System C.P. Sandbank
7. Optical Communication System Subir Kumar Sarkar
8. Optical fibre Communication System Senior

9. Mobile Cellular Telecommunication C.Y. Lee
10. Communication System II IMPACT (TTTI,Chandigarh)
11. Information Theory Hancock

*****

Code	Name of Paper	Lecture	Tutorial	Practical
EF65	**ELECTRONICS CIRCUITS DESIGN**	3	-	3

CONTENTS

1. Power Supply Design for Rated Voltage, Current and Regulation :

1.1 Using Zener diode
1.2 Emitter follower
1.3 Transistorised series feed back regulator with short circuit protection

2. Design of Transistor biasing circuits for the various class - A,B, AB,C

3. Design of Transistor Amplifiers

3.1 CE amplifier (with & without emitter bypass capacitor)
3.2 Direct coupled CE Amplifier (two stages)
3.3 R-C coupled CE Amplifier (two stages)
3.4 Emitter follower
3.5 Push Pull Amplifier

4. Design of Time Delay Relay Circuits :

4.1 Using transistor and SCR
4.2 Using IC 555
4.3 Using IC 741
4.4 Design of long duration timer using suitable ICs

5. Design of Wave Generator :

5.1 Wein bridge oscillator using transistor and IC (741)
5.2 Phase shift oscillator using transistor and IC (741)
5.3 Square wave and triangular wave generators using IC (741 and 555)

6. Design of Digital Circuits :

6.1 2 bit simultaneous analog to digital converter
6.2 Multi range DVM using suitable IC
6.3 Design of Digital Clock
6.4 Design of 2-digit low frequency counter
6.5 Design of traffic light controller using ICs

PRACTICALS

Note : Assemble and test all the designed circuit mentioned in theory.

REFERENCE BOOKS :

1. Integrated Electronics Milliman Halkias
2. Electronic Devices & Circuits Allen Mottershed
3. Transistor Design Williams
4. Digital Principles & Applications Malvino Leach
5. Digital Electronics Practice Using IC's R.P. Jain
6. Integrated Electronic K.R. Botkar
7. Data Manual of Diode, Transistor & IC's A. K. Maini
8. Data Manual of Different Devices
9. Electronics Devices & Circuits Cherlin
10. Basic Electronics & Linear Circuits Bhargava, Kulsherstha & Gupta

*****