Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya (Autonomous), Latur

Department of Physics and Electronics

B.Sc.-II (Electronics)

Syllabus

Academic Year: 2018-19

Rajarshi Shahu Mahavidyalaya (Autonomous), Latur

Department of Physics and Electronics (w.e.f. 2018-19)

Structure of B.Sc. II Electronics Syllabi

Sr. No.	Course Code	Title	Credits	Periods /Week	Marks		
		Semester-III			In Sem	End Sem	Total
7	U-ELE-347	Oscillators, Multivibrators and Sweep Circuits-V	2	3	20	30	50
8	U-ELE-348	Power Electronic Devices -VI	2	3	20	30	50
9		Domestic Electrical Appliances and their Maintenance (SEC)	2	2	20	30	50
10	U-PHY-337	Electronics Laboratory Course III	2	3		50	50
11	U-PHY-338	Electronics Laboratory Course IV	2	3		50	50
		Semester-IV					
12	U-ELE-447	Fundamentals of Digital Electronics-VII	2	3	20	30	50
13	U-ELE-448	Power Electronic Device Applications-VIII	2	3	20	30	50
14		PCB Designing (SEC)	2	2	20	30	50
13	U-ELE-449	Electronics Laboratory Course V	2	3		50	50
14	U-ELE-450	Electronics Laboratory Course VI	2	3		50	50

SEC: Skill Enhancement Course

B.Sc. II Year Sem-III

Course Code - U-ELE-347

Oscillators, Multivibrators and Sweep Circuits-V

Credits: 2 No. Of Periods/Wk: 3 Periods: 45

Marks: 50 –End Sem.: 30 & In Sem.: 20 (UT: 15 & AT: 05)

Learning Objectives:

(1) To familiarize students about types of oscillators, LC and RC such as Hartley, Colpitts Phase shift and Wien bridge, determination of frequency and condition for oscillations,

(2) to develop understanding about Frequency stability and crystal oscillator,

(3) to inculcate the concept of Radio (High Frequency) and Audio (Low frequency) oscillators,

(4) To develop problem solving ability among the students on oscillators i. e to calculate frequency of oscillation and calculation of values of either L or C or R also condition for oscillations,

(4) to make awareness about Multivibrators for the generation of square waves (timing waves) various states in respective types of Multivibrators such as (monostable, Bistable and Astable Multivibrators). Generation of square wave with the help of Schmitt trigger without regenerative feedback.

Course Outcomes:

After successfully completion of the curriculum of above course student must know about

(1) The generation of signal having desired frequency, low frequency and high frequency oscillators and their uses in communication,

(2) Need of frequency stability of signals in various day to day application or use such as electronic communication, Lab equipment's etc. How frequency stability is achieved with the help of crystal oscillator,

(3) Use of Multivibrators in generation of timing signals used in timing circuits as a timer,

(4) Uses of sweep circuits or time base generators in TV, CRO, ECG. Solving problems on sweep time, fall time, frequency of sweep voltage,

(5) Altogether use of oscillators, Multivibrators and sweep circuits for sine, square and triangular wave signal generation.

Unit I: L-C Oscillators: [11 Periods]

Introduction, Classification of an Oscillator, Requirement of an Oscillator, and Feedback (Barkhausen) Condition for Oscillators, Hartley Oscillator: Working / Action, Derivation of Frequency and Condition for Oscillations, Colpitts Oscillator: Working/Action, Derivation of

Frequency and Condition for Oscillations, Numerical Problems. **[Book-1 Ch.4 and Book-2, Ch. 31]**

Unit II: R-C Oscillators: [11 Periods]

Introduction, Basic Principle of R-C Oscillators, R-C Ladder Network and its Analysis, Transistor Phase-Shift Oscillator: Working/Action, Derivation of Frequency and Condition for Oscillations, Transistor Wien-Bridge Oscillator: Working/Action, Derivation of Frequency and Condition for Oscillations, Frequency Stability and Crystal Oscillators Using Transistor, Numerical Problems. **[Book-1, Ch.4, Book-2, Ch.31]**

Unit III: Multivibrators: [15 Periods]

Introduction, Switching Characteristics of Transistor, Switch ON and Switch OFF Transitions, Transistor Switching Time for Input and Output Pulses: Delay Time, Rise Time, Turn ON Time, Storage Time, Fall Time and Turn OFF Time, Pulse Width.

Multivibrators: Types of Multivibrators, Transistor Binary (Bistable Multi or Flip Flop), Circuit Action Using Double Source, Transistor Monostable Multivibrator: Circuit Action/Working, Expression for Gate Width and Frequency, Wave Forms. Astable Multivibrator: Circuit Action/Working, Expression for Gate Width and Frequency, Wave Forms, Schmitt's Trigger Using Transistor, Numerical Problems. **[Book-1, Ch.05 and Book-2, Ch.32]**

Unit-IV: Sweep Circuits (Time Base or Ramp Generators): [08 Periods]

Introduction, General Features of Time Base Signal, Types of Time Base Circuits, Exponential Sweep Circuits, Sweep Circuit Using Transistor Switch, UJT Sweep Circuits, Current Time Base Generator, Numerical Problems. **[Book-2, Ch.34]**

Recommended Books:

[1]. Introduction to Electronics -K.J.M. Rao Oxford and IBH Publishing, Pvt. Ltd.,(5th Printing.)

[2].Text Book of Applied Electronics- R.S. Shedha, S. Chand And Comp. Ltd. Reprint 2012

[3].Principle of Electronics- V. K. Mehta And Rohit Mehta S- Chand And Comp. Ltd., - Edition 2005

Reference Books:

[4]. Basic Electronics Solid State B.L. Thereja- S. Chand and Comp. Ltd.

[5]. Solid State Pulse Circuits -David A. Bell, PHI Ltd. 4th Edition

[6]. Pulse, Digital and Switching Wave Forms – Millman and Taub Mcgraw Hill Ltd.

[7]. Basic Electronics – Dr. J.P. Agrawal and Amit Agrawal, Pragati Prakashan Edition 2010.

B.Sc. II Year Sem-III

Course Code: U-ELE-348

Power Electronic Devices-VI

Credits: 2 No. of Periods/Wk: 3 Total Periods: 45

Marks: 50 –End Sem.: 30 & In Sem.: 20 (UT: 15 & AT: 05)

Learning Objectives:

(1) To make familiar students about power electronic devices like DIAC, TRIAC, UJT, SCR, and LASER etc.

(2) To develop understanding about power control of DC as well AC using phase control of Thyristors, so that power delivered to load is controlled properly,

(3) To equip the students with knowledge about the series and parallel combination of Thyristors to reach the practical requirements of lab-work,

(4) Students should learn the firing of Thyristors using different methods like AC triggering, DC triggering, SCR triggering (Gate), Pulsed triggering, UJT triggering etc,

(5) To develop the understanding about the full wave controlled rectifiers, half wave controlled rectifiers, Bridge controlled rectifiers with various types of load.

Course outcomes:

After completion of the course students will:

(1) Learn the different characteristics, Construction and working of DIAC, TRIAC, UJT, SCR, LASCR etc, which are the required components of the power electronic devices.

(2) Be able to know the power requirements of different voltage and current ratings using series and parallel combinations of thyristors easily available in market.

(3) Be able to explain the phase control of thyristors using different triggering methods like RC triggering, UJT triggering to reach different power requirements.

Unit- I: Thyristors: [10 Periods]

Introduction, Thyristors Family, Principle of Operations of SCR, Static Anode -Cathode Characteristics of SCR, Two Transistor Analogy of SCR, Thyristor Construction: Planer Diffused, Alloy Diffused, Methods of Triggering a Thyristor, Commutation of Thyristor. DIAC Construction and Working, TRIAC Construction and Working, UJT Construction & Working, UJT Relaxation Oscillator and Numerical Problems. **[Book-1 Ch-1, Book -2 Ch-4].**

Unit -II: Series & Parallel Operation Of Thyristors: [13 Periods]

Introduction , Series Operations of Thyristors, Need for Equalizing Network: Unequal Distribution of Voltage , Difference in Reverse Recovery Characteristics, Equalizing Network

Design: Static and Dynamic Equalizing Network , Triggering of Series Connected Thyristors, Parallel Operation of Thyristors , Methods for Ensuring Proper Current Sharing: Triggering of Thyristors in Parallel, String Efficiency, Derating, Numerical Problems.**[Book -1 Ch .3]**

Unit- III: Phase Controlled Rectifiers: [14 Periods]

Introduction, Phase Control Of SCR; Firing by UJT , One UJT Fires Two SCR Alternately, Phase Control by Pedestal & Ramp, SCR Phase Control By Temperature or Light, Phase Angle Control, Single Phase Half Wave Controlled Rectifier(One Quadrant): With Resistive Load, With Inductive Load, Effect of Freewheeling Diode ,Single Phase Full Wave Controlled Rectifier (Two Quadrants): With Resistive Load, With Inductive Load, Effect Of Freewheeling Diode, Bridge Configurations: Fully Controlled Bridge Circuit With Inductive Load (R-L Load), Numerical Problems.**[Book- 1 Ch.4, Book -3 Ch. 9]**

Unit-IV: Photoelectric Devices: [08 Periods]

Introduction, Light Dependent Resistor (LDR), Light Emitting Diode (LED), Photodiodes, Phototransistor, Photovoltaic Cell, Photoconductive Cell, Photoelectric Emission, Photoelectric Relay, Opto- Coupler, Numerical Problems. **[Book-2, Ch.9]**

Recommended Books:

[1] Power Electronics – M. D. Singh and K.B. Kahanchandani, Tata McGraw Hill Publishing Company Ltd, 10 th Reprint 2003

[2] Industrial Electronics & Control - S. K. Bhattacheharya, S. Chttergee. TTTI Chandigrah., Tata McGraw Hill Publishing (7th Reprint 2002)

[3] Electronics in Industry- George, M. Chute, Robort .D. Chute, 5th Edition Mcgraw Hill Book Company

Reference Books:

[4] Industrial and Power Electronics –G. K. Mitthal, Dr Manisha Gupta, Khanna Publishers.

[5] Power Electronics -P.C. Sen. Tata McGraw Hill Publishing Comp.

[6] Principles of Electronics – A P Malvino (For Opto-Coupler).

Rajarshi Shahu Mahavidyalaya Latur (Autonomous)

Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. II (Semester – III)

Semester Pattern (w.e.f June -2018)

Electronics

CCESI (Section A)

Skill Enhancement Course SEC I

Domestic Electrical Appliances and their Maintenance

Credits: 02 (Marks: 50) **Periods: 30**

Skill Enhancement Course-I (Credit: 2) B. Sc. II (III SEM)

Maintenance Skill **Credit: 02** **30 Lectures (Theory + Lab)**	**Maximum Marks: 50** **C. A. (Internal): 20** **ESE OR Skill Exam:30**
Maintain project file or Dissertation to check Analytical skills/ problem solving skill in exam	

Learning Objectives:

i) To understand the construction, working and types of Domestic Electrical Appliances.
ii) To understand maintenance details of Domestic Electrical Appliances.

Course Outcomes:

After completion of Course, the students will be able to

i) Develop detailed knowledge about few Domestic Electric Appliances.
ii)Enhance maintenance skill of Domestic Electric Appliances.

UNIT-I: Domestic Electric Appliances

Construction, Working and Types of: Electric Iron, Water Heaters, Electric Kittle, Coffee maker, Electric Mixer, Egg beaters, Electric Fan, Hair Drier. **(08 Lectures)**

UNIT-II Safety Precautions and Maintenance

Introduction, Tools for maintenance: Electric Tester, Screw driver, Nut driver, Benches, Wrenches, Hammers, Pliers, Cutters Safety precautions while handling tools and repairing appliances.etc. **(07 Lectures)**

Hands on Exercises: **(15 Lectures)**

1. Dismantling and reassembling of Ordinary type and Automatic/Thermostat control type Electric Iron.
2. Testing and repair of Ordinary type and Automatic/Thermostat control type Electric Iron.
3. Testing and repair of Electric Kittle.
4. Testing and repair of Electric Fan.
5. Testing and repair of Egg Beater.
6. Testing and repair of Coffee Maker.
7. Testing and repair of Electric Mixer.
8. Testing and repairs of Hair Drier.
9. Testing and repairs of Water Heater.

Books :

1. Troubleshooting and Repair of Appliances-Eric Kleinert, 3rd Edition, 2012, Mc-Graw Hill Publishers.
2. Study of Electrical Appliances & Devices **-** K.B. Bhatia (ISBN: 978-93-87394-22-3).
3. Fundamentals of Maintenance of Electrical Equipments- K.B. Bhatia (ISBN: 978-93-87394-31-5).
4. Electrical machines and Appliances theory- Tamilnadu Textbook corporation, College Road, Chennai - 600 006.

B.Sc. II Year, Sem-III
Course Title: Electronics Laboratory Course-III
Course Code: U-ELE-349
Credits: 2 No. Of Periods/Wk: 3
Marks: 50 –End Sem.: 30 & In Sem.: 20

Learning Objectives:

(1) To design and built the circuits of Hartley, Colpitts, Phase shift and Wien-bridge oscillators and determine the frequency of oscillation in each case. Also to measure the amplitude of generated output signal,

(2) To design and build the Multivibrators and calculate pulse width, space width, period and hence frequency of the generated pulse. Also to show waveforms at input and output and say which transistor is ON and which one is OFF,

(3) To design and build the simple ramp generator and UJT ramp generator and hence study its waveforms also measure sweep voltage, sweep time fall time and output generated frequency,

(4) To design and build the Astable Multivibrator using IC 555 and study its waveforms and measure pulse width, space width, period and hence frequency,

(5) To design and build Schmitt's Trigger circuit using transistor and hence study its waveforms.

Course Outcomes:

After successful completion of the syllabus students may get better knowledge about

(1) More details of handling CRO and function generators,

(2) High frequency (L, C) and low frequency (RC) oscillators. Calculation of period, frequency and output voltage of generated signal,

(3) The different types of Multivibrators, calculations of gate width and frequency of generated square waves. Different waveforms at different terminals and ON and OFF states the transistors (Both using transistor and IC 555),

(4) The generation of ramp waveforms,

(5) Measurement of Vo, Ts and Fs with simple ramp and UJT circuits,

(6) More about the Schmitt Trigger circuit without regenerative feedback, how it generates timing pulses (Square waves).

List of Experiments

1) Study of Hartley Oscillator.

2) Study of Colpitt's Oscillator.

3) Study of Phase Shift Oscillator.

4) Study of Astable Multivibrator Using Transistor.

5) Study of Monostable Multivibrator.

6) Study of RC Ramp Generator.

7) Study of UJT Ramp Generator.

8) Study of Astable Multivibrator Using IC-555

9) Study of Wein Bridge Oscillator.

Note- Each student has to perform minimum 6 experiments.

B.Sc. II Year, Sem-III
Course Title: Electronics Laboratory Course-IV
Course Code: U-ELE-350
Credits: 2 No. Of Periods/Wk: 3
Marks: 50 –End Sem.: 30 & In Sem.: 20

Learning Objectives:

(1) To study characteristics of various power electronic semiconductor devices such as UJT, SCR, DIAC, TRIAC.

(2) To study triggering of SCR using only resistor and R-C circuits.

(3) Firing of SCR using UJT relaxation oscillators.

(4) Half and full wave controlled rectifiers using SCR.

Course Outcomes:

After successfully completion of above said lab work students got the knowledge about

(1) Characteristics of power electronic semiconductor devices such as UJT, SCR, DIAC, TRIAC. Also know the difference between low power and high power semiconductor devices.

(2) How SCR is fired with the help of UJT relaxation oscillators.

(3) Know the different types of triggering of SCR using resistor and RC circuits.

(4)In power circuits how rectification is achieved and how it can be controlled (phase and hence power).

List of Experiments

1) UJT characteristics.
2) SCR characteristics.
3) DIAC characteristics.
4) TRIAC characteristics.
5) Resistance Triggering of SCR.
6) R-C Triggering of SCR.
7) Half Wave Controlled Rectifier.
8)Full Wave Controlled Rectifier.
9) Study of Photo Relay using LDR.

Note- Each student has to perform minimum 6 experiments.

B.Sc. II Year Sem-IV

Course code: U-ELE-448

Fundamentals of Digital Electronics -VII

Credits: 2 No. Of Periods/Wk: 3 Periods: 45

Marks: 50 –End Sem.: 30 & In Sem.: 20 (UT: 15 & AT: 05)

Learning Objectives:

(1) To acquire the basic knowledge of digital logic levels and application of this to understand digital electronic circuits.

(2) To prepare students to perform the analysis and design of various digital electronic circuits.

(3) To demonstrate the concept of number system, reduction of logic expressions using K-map and Boolean's algebra.

Course outcomes:

After completion of this course, students will be able to:

(1) To represent numerical values in various binary codes and perform code conversions between different number systems,

(2) have a thorough understanding of the fundamental concepts and techniques used in digital electronics,

(3) understand the basic logic gates and various variable reduction techniques of digital logic circuits,

(4) Perform binary arithmetic and reduce Boolean expression by using K-map,

(5) Have skill to build and troubleshoot digital circuits,

(6) Conduct experiments using digital IC's for a given application/problem statement.

Unit I: Binary Codes: [11 Periods]

Introduction , Straight Binary Code, Binary Coded Decimal (Natural BCD8421) and its Conversions, Excess-3 Code and its Conversions, Gray Code, Binary to Gray Code Conversion and Vice Versa, Code Comparison, Error Detecting Parity Codes, Alphanumeric (Alphanumeric) Code , 8-Bit EBCDIC Code ,ASCII Code. **[Book -1 Ch.3]**

Unit II: Logic Gates: [11 Periods]

Introduction, Basic Gates, AND Gate: Symbol, Truth Table, Diode and Transistor AND Gate Circuits OR Gate: Symbol, Truth Table, Diode and Transistor OR Gate Circuits.

Disadvantage of Diode OR Gates, Multi-Inputs (FAN-IN), NOT Gate (Inverter): Symbol, Truth

Table and Single Transistor NOT Gate Circuit, Loading Effect (FAN-OUT), Positive and Negative Gates, NAND Gate: Symbol, Truth Table, NOR Gate: Symbol, Truth Table, Bubble Gates: NAND and NOR as Universal Gates, XOR and XNOR Gates: Symbols and Truth Table. **[Book-1, Ch.4]**

Unit III: Boolean Algebra: [12 Periods]

Introduction, Basic Concept of Boolean Algebra, Boolean Algebra, Boolean Operations, Laws and Theorems of Boolean Algebra, Proof of Boolean Laws, Demorgan's Theorems: Proof of Demorgan's Theorems, Physical Significance of Demorgan's Theorems, Simplification of Boolean expressions using Boolean Algebra techniques, Duality of Boolean Algebra, Evaluation (Solving) of Boolean Expressions, Sequence of Operations, Synthesis of Boolean Expressions – SOP and POS Standard Products and Sums, Physical Significance of SOP and POS. **[Book-1, Ch.5]**

Unit IV: Karnaugh Map [11Periods]

Introduction, Simplification by Algebraic Method, Simplification by Karnaugh Map: 2-Variable, 3- Variable, 4- Variables, 5 and 6 variable K-Maps, Karnaugh Map to Obtain Simplified SOP and POS Solutions, Don't Care Conditions, Code conversion by K-map (Gray to 8421), Analysis of logic circuits, Implementation of Boolean Expressions, NAND and NOR Implementation. **[Book-1 Ch.5]**

Recommended Books:

[1].Digital Principles and Circuits- Dr. C.B. Agarwal. (Himalaya Publishing House)

[2].Digital Principles and Applications- Donald P. Leach, A.P. Malvino and Goutum(Tata Mcgraw Hill Education Pvt. Ltd. Saha)

[3].Digital Electronics – William H. Gothmann (Prentile- Hall Of India)

Reference Books:

[1].Digital Electronics with Practical Approach- Dr. G.N. Shinde (Shivani Publications, Nanded)

[2].Digital Fundamentals – Floyd and Jain (Pearson Edition)

[3].Modern Digital Electronics- R.P.Jain (Tata Mcgrow Hill Education PVT)

B.Sc. II Year Sem-IV

Course: U-ELE-448

Power Electronic Device Applications -VIII

Credits: 2 No. Of Periods/Wk: 3 Periods: 45

Marks: 50 –End Sem.: 30 & In Sem.: 20 (UT: 15 & AT: 15)

Learning Objectives:

(1) This course covers different applications of the power electronic devices. Students should know the phase control for regulating temperature illumination control, light activated turn off, using DIAC and TRIAC off at dark water level indicator ,battery charger automatic street lighting, SCR alarms, Timer circuits using Thyristors,

(2) Students should know the construction and working of inverters, choppers and voltage commutation process,

(3) Students should learn high frequency heating like induction heating, eddy current heating and dielectric heating,

(4) Students should learn resistance welding and its details such as ignitron control and efficiency of welding.

Course outcomes:

(1) Students are made familiar with different applications of Thyristors like temperature control, illumination control, light activated turn-Off at dark water level indicator, battery charger, SCR alarms, Timers etc,

(2) Students learnt resistance welding control and its applications,

(3) Students studied the different types of choppers and inverters. They are also made familiar about high frequency dielectric and induction heating.

Unit I: Thyristor Control Circuits: [11 Periods]

Introduction, Temperature Control: Phase Control Circuit for Regulating Temperature , Remote Temperature Controller, Illumination Control: Illumination Control Using SCR , DIAC and TRAIC, Light Activated Turn OFF Circuit Using DIAC , TRIAC, & LDR , Light Activated Turn OFF at Dark, Automatic Street Light Circuit Using SCR and LDR , Automatic Water Level Indictor Using SCR , Light Operated SCR Alarm, SCR-UJT Operated Timer Circuit, Numerical Problems. **[Book-1, Ch.7]**

Unit II: Inverters And Choppers: [11 Periods]

Inverters: Introduction, Working Principle of Inverter, Thyristor Inverter: Series Inverters and Parallel Inverters, Current Commutation Process, Voltage Commutation Process. Choppers: Introduction, D.C. Chopper, Single Thyristor Chopper and Two Thyristor Chopper, Step Up Chopper, AC Choppers, Morgon Chopper Circuit, Numerical Problems **[Book- 1, Ch.5]**

Unit III: High Frequency Heating: [12 Periods]

Introduction, Induction Heating: Eddy Current Heating, Merits of Induction Heating, Applications of Induction Heating, High Frequency Power Sources for Induction Heating, Principle of Dielectric Heating, Theory of Dielectric Heating, Dielectric Properties of Few Typical Materials, Electrodes Used in Dielectric Heating, Methods of Coupling of Electrodes to RF Generator, Applications of Dielectric Heating: Preheating of Plastic Preformed, Wood Gluing, Food Processing and Electronic Sewing. **[Book 2, Ch- 23]**

Unit IV: Resistance Welding: [11 Periods]

Introduction, Resistance Welding, Ignitron Contactor, Operating the Ignitron Contactor, Oscilloscope Pictures ff Circuit Operation, Operation with Welder Load , Percent Duty , Averaging Time , Formula for Percent Duty, Overloaded Ignitrons, Correct Tube Averaging Time , Ignitron Controls for Larger Load, Complete Control for Resistance Welding, Synchronous Timings , Slope Control , Resistance Welding with Direct Current, Numerical Problems. **[Book3, Ch 18]**

Recommended Books:

[1]. Industrial Electronics and Control - S. K. Bhattacheharya, S. Chttergee, TTTI Chandigarh. TATA.

[2].Industrial & Power Electronics –G. K. Mitthal, Dr Manisha Gupta, Khanna Publisher ,19th Edition .

[3].Electronics In Industry- George, M. Chute, Robort .D. Chute, 5th Edition McgrawHill Book Company.

Reference Books:

[4]. Industrial and Power Electronics –G. K. Mitthal, Dr Manisha Gupta, Khanna Publishers

[5]. Power Electronics -P.C. Sen. TATA Mcgraw Hill Publishing Company

[6].Principles of Electronics- A.P. Malvino.

Rajarshi Shahu Mahavidyalaya Latur (Autonomous)

Choice Based Credit System (CBCS) Course Structure (New scheme)

B. Sc. II (Semester – IV)

Semester Pattern (w.e.f. June -2018)

Electronics

CCESI (Section A)

Skill Enhancement Course SEC I

PCB Designing

Credits: 02 (Marks: 50) **Periods: 30**

Skill Enhancement Course-I (Credit: 2) B. Sc. II (IV SEM)

Designing Skill **Credit: 02** **30 Lectures (Theory + Lab)**	**Maximum Marks: 50** **C. A. (Internal): 20** **ESE OR Skill Exam:30**
Maintain project file or Dissertation to check Analytical skills/ problem solving skill in exam	

Learning Objectives:

The course aims to understand development of printed Circuit Boards for various Electronic experiments**.**

Course Outcomes:

On completion of this course, students will be able to acquire:

i) Experimental skill about preparation of Printed circuit boards.

ii) Skill enhancement related to Soldering of electronic components on PCBs.

UNIT-I: PCB Designing

Introduction to PCB: Evolution & Classification, Manufacturing of PCB: Single sided and double sided, [Chpter1:1.2, 1.4, 1.5.1, 1.5.2], Layout planning and design: Reading drawings and diagrams, General PCB design considerations, Conductor patterns, Component placement Rules. **[Chapter 3]** **(07 Lectures)**

UNIT-II Soldering Methods

What is soldering, theory of soldering, Soldering variables, Soldering material, Soldering and Brazing, Soldering tools, Other hand soldering tools, Hand soldering: Requirements & steps, Health and safety Aspects, De-soldering techniques, Etching techniques: Immersion etching, drilling: drill bit geometry and its importance. **[Chapter10&13]** **(08 Lectures)**

Hands on Exercises: **(15 Lectures)**

1. Drilling and Soldering Practice.
2. Layout printing on copper clad.
3. Designing of PCB through etching.
   Preparing PCB for
   i. Half Wave Rectifier
   ii. Full wave Rectifier
   iii. Capacitor filter
   iv. Single stage CE amplifier
   v. NAND gate using 7400
   vi. NOR gate using 7402
   vii. Basic gates using NAND gate

Recommended Books:

1. Printed circuit boards: design, fabrication, assembly and testing- R.S.Khandpur
2. Electronic Product Design- Er.S.D.Mehta,Volume I,S. Chand Publications.

B.Sc. II Year, Sem-IV

Course Title: Electronics Laboratory Course-V

Course Code: U-ELE-449

Credits: 2 No. Of Periods/Wk: 3

Marks: 50 –End Sem.: 30 & In Sem.: 20

Learning Objectives:

(1) To build and study the basic gates (AND, OR and NOT),

(2) To build and study the basic gates from universal building gates (NAND and NOR),

(3) To study the basic theorems of Boolean algebra i.e. De Morgan's Ist and IInd theorems.

(4) To implement the given expression using K-map,

(5) To build and study the universal gates i.e. NAND and NOR using IC 7400 and 7408,

(6)To build and study the X-OR and X-NOR gates using NAND gates.

Course Outcomes:

After successfully completion of above said lab course students may get the knowledge about:

(1) Digital electronics, all basic gates (AND, OR, NOT) which perform basic mathematical operation such as addition, multiplication and complementation, also verified its truth table,

(2) Student also built and verified truth table of basic gates obtained from universal gates (NAND and NOR),

(3) Student have also verified truth tables of basic gates using PN junction diodes,

(4) To Construct X-OR and X-NOR gates using only NAND gates.

(5) After verification of truth tables of all types of gates student must know the digital signal levels .i.e. 0 V and 1 V (0 V = low and 1V = high).

List of experiments

1. Implementation of Boolean Expression Using K-Map.
2. Study of of X-OR gate using Nand gates.
3. Study of of X-NOR gate using Nand gates.
4. Construction of Basic gates using PN junction diode and its study.
5. Construction of Basic gates using transistor and its study.
6. Conversion of binary to Gray code.
7. Conversion of Gray code to 8421 code.
8. Verification of Demorgan's first theorem using IC7400.
9. Verification of Demorgan's second theorem using IC7400.

Note: All the practicals to be conducted on Bread Board.

B.Sc. II Year, Sem-IV
Course Title: Electronics Laboratory Course-VI
Course Code: U-PHY-450
Credits: 2 No. of Periods/Wk: 3
Marks: 50 – End Sem.: 30 & In Sem.: 20

Learning Objectives:

(1) Students should draw and assemble the circuits of power electronics like illumination control, Light activated turn off, automatic water level indicator, inverter, chopper etc.

(2) Students should tabulate the observations, predict the results and plot necessary graphs.

Course Outcomes:

Circuits were assembled by students, readings were tabulated and results were predicted.

List of Experiments:

1) Illumination Control Using SCR.
2) Illumination Control Using Dirac and TRIAC.
3) Light Activated Turn OFF Using DIAC, TRIAC & LDR.
4) Automatic Water Level Indicator Using SCR.
5) Light Operated SCR Alarm.
6) Series Inverter Using SCR and TRIAC.
7) Conversion of DC to AC Using Chopper.
8) Study of Step-Up / Down Chopper.
9) Timer Using SCR-UJT Control.
10) Automatic Street Light Circuit Using SCR and LDR.

Note: Each student has to perform minimum 6 experiments.