Swami Ramanand Teerth Marathwada University, Nanded

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

CLASS: B. Sc. THIRD YEAR

Subject: Electronics - Semester V&VI

(W. e. f. June 2018)

Sem ester	Paper No	Name of Course	Instruction Hours/ Week	Total periods	CA	ESE	Total Marks	Credits
V	DECE-I (Section A)	Communication Electronics-I (P-XII) (Compulsory)	03	45	10	40	50	02
	DECE-I [(Section B) Elective]	Power Electronics-I (P-XIII- A) OR Introduction to Microcontroller(8051) (P-XIII-B)	03	45	10	40	50	02
	SEC-III	SEC-III(A): Linear Circuit Designing SEC-III(B): PCB Designing	3	45	25	25	50	02
VI	*DECE-II (Section A)	Communication Electronics-II (P-XIV) (Compulsory)	03	45	10	40	50	02
	DECE-II [(Section B) Elective]	Power Electronics-II(P-XV-A) OR Microcontroller 8051 Programming and Interfacing (P- XV-B)	03	45	10	40	50	02
	SEC-IV	SEC-IV(A): Digital Logic Design SEC-IV(B): Programming Skill in 'C'	3	45	25	25	50	02
V & VI	DECEP-I Section A)	P-XVI	03	24	05	20	25	1
		Practicals based on P-XII						
		Practicals based on P-XIV	03	24	05	20	25	1
	DECEP II (Section B)	P-XVII	03	24	05	20	25	1
		Practicals on P- XIII (A or B)						
		Practicals on P-XV(A or B)	03	24	05	20	25	1
Total credits								16

*DECE – Discipline Specific Elective Course in Electronics

Outline of B. Sc. Third Year Electronics Course:

As Electronics has been consistently growing in terms of new technologies, ideas, principles and applications, the course is tailored to meet the demands of industry and market. The course is focused on industrial electronics where use of electric power, efficiency, power control, and automatic power control is of great importance. The wireless communication is now part of everybody's life. So, part of the syllabus is allocated to communication electronics. Some part is designated to practical techniques of creating and handling versatile and improved implements, such as microcontrollers, interfacing and embedded systems. The course is well-crafted to play as a bridge between basic sciences, applied sciences and technological disciplines.

The Couse consists of :

1. TWO compulsory Courses (papers) on Communication Electronics as Discipline Specific Electives (DECEs), one for each semester.
2. The students have to choose ONE of the following options:
    (i) TWO courses (papers) on Power Electronics as DECEs
    (ii) TWO courses (papers) on Microcontrollers, ALP and Interfacing as DECEs.
3. FOUR Skill Enhancement Courses (SECs) have been designed for the students of Electronics as well as from other allied disciplines. The SECs are designed to train the students to acquire skills in related field and to increase the employability. SECs impart lot of hands on practice and handling of testing and measuring instruments. Each student has to opt one SEC for each semester.
4. The four SECs are as follows:
    (i) Linear Circuit Designing
    (ii) PCB Designing
    (iii) Digital Logic Designing
    (iv) Programming Skill in C
5. The Lab Courses (Practicals) are designed such that it improves the understanding of theory courses DECEs and SECs.

Learning Objectives:

The learning objectives are given in the beginning of syllabus for each course (paper).

Utility of the course:

1. Upon completion of this course students will acquire in-depth understanding of Communication Electronics, Industrial Electronics, Microcontrollers, Assembly Language Programming, and Interfacing.
2. The students can be employed in the field of power sector, defence services, TV and music industry, automisation, IT, optical communication.
3. They can work as :
    - Electronic Circuit Designer
    - Electronic Consultant (Installation and maintenance of Electronic consumer Products)
    - An Entrepreneur
4. They readily can compete for advanced courses like M. Sc. (Electronics), M. Phil.(Electronics), MBA.

Pre-Requisites for the Course:

1. The student seeking admission to B. Sc. TY Electronics Course must have completed successfully B. Sc. FY and B. Sc. SY Electronics Courses, where they are exposed to the basic electronic principles, components, devices and their characteristics.
2. They must be competent to handle various testing and measuring instruments of electronics labs.
3. They must have skills of constructing, soldering and de-soldering of given circuits.
4. TWO Skill Enhancement Courses (SECs) are designed(one for each semester) such that any student of B. Sc. TY from any other science discipline can choose from.

Paper-XII: Communication Electronics-I

Credit :02 Periods: 45	Maximum Marks: 50 C.A. (Internal): 10 ESE : 40

Learning objectives:

1. To study basics of communication systems.
2. To study and understand the analog modulation techniques (Amplitude and Frequency).
3. To study and understand the basics of Analog pulse modulation.
4. To study the Digital pulse modulation.

Unit I: Basics of Communication Systems (07 periods)

Introduction, Block diagram of Communication System, Classification of Communication Systems: Direction, Nature of signal and Technique of transmission, Need for Modulation, Types of Modulation, Bandwidth. (Numerical Problems)

Unit II: Amplitude Modulation (18 periods)

Amplitude Modulation Theory, Mathematical representation of AM wave, Modulation index, Frequency spectrum of AM wave, Bandwidth of AM, Power relations in AM wave, AM circuits: Basic circuit for BJT Collector modulation, Amplitude demodulator circuit. (Numerical Problems)

Unit III: Frequency Modulation (10 periods)

Theory of Frequency modulation, Mathematical Representation of FM wave, Band width,Generation of FM, Direct method for FM generation, Transistor reactance modulator, Varactor reactance modulator. (Numerical Problems)

Unit IV: Pulse Modulation (10 periods)

Introduction, Classification of Pulse modulation systems, Sampling theorem, Nyquist criteria, Basic principles of Pulse-Amplitude modulation (PAM), Pulse-Width modulation(PWM), Pulse-Position modulation (PPM),Generation and detection of PAM only, **Digital pulse modulation**: Pulse-Code modulation (PCM) PCM transmitter, PCM receiver and quantization process, quantization error, application, advantages and disadvantages of PCM. (Numerical Problems)

References:

1. Electronic Communications, Dennis Roddy and John Coolen (Fourth Edition),PHI Publication.
2. Electronic Communication Systems, George Kennedy, (Third Edition), Mc GrawHill International Edition.
3. Communication Engineering, J.S. Katre, Technova Educational Publications, Pune.

Paper XIII (A) Power Electronics – I

Credit :02 Periods: 45	Maximum Marks: 50 C.A. (Internal): 10 ESE : 40

Learning objectives:

1) To introduce Thyristor family,
2) To study construction and characteristics of SCR, DIAC, TRIAC, UJT, and MOSFETs
3) To study different triggering techniques for SCR.
4) To study SCRs connected in series and parallel.
5) To study static equalising network and dynamic equalising network.

UNIT -I : Thyristor : Principles and characteristics : (15 periods)

Principle of operation of SCR, Static Anode - Cathode Characteristics of SCR, The two transistor model of SCR, Thyristor Construction, gate characteristics of SCR, Turn on methods of a thyristor. [Numerical]

UNIT – II : Power semiconductor devices : **(**8 periods)

Power semiconductor devices, structure and V-I characteristics of DIAC, TRIAC, Power MOSFET & IGBT, Symbol and V-I characteristics of SUS, SBS, SCS & LASCR (Numericals)

UNIT – III : Gate triggering circuits : (10 periods)

Introduction, firing of thyristors, gate current amplitude and rise time, gate pulse duration, pulse waveforms, Pulse transformers, pulse transformer in triggering circuits, Gate trigger circuits, resistance firing circuits, resistance - capacitance firing circuit, resistor - Capacitor - full - wave trigger circuit, UJT as an SCR trigger [Numerical]

UNIT - IV: Series and parallel operation of Thyristors : (12 periods)

Introduction, series operation of Thyristors, need for equilising network, unequal distribution of voltage, difference in reverse recovery characteristics, equilising network design, static equilising network, dynamic equilising network, parallel operation of thyristors, methods for ensuring proper current sharing, string efficiency, derating (Numerical)

References:

1) Power Electronics, M.D. Singh & K.B. Khanchandani (2^{nd} Edition), Mc Graw Hill - education.
2) Power Electronics, Muhammad H. Rashid (4^{th} edition), Pearson.
3) Power Electronics (Revised edition), K. Haribabu, Scitech Publication.
4) Industrial Electronics & Control, S.K. Bhattacharya, S. Chatterjee, TTTI, Chandigarh
5) Power electronics, P.C. Sen, Mc Graw Hill – education

Paper-XIII (B) Introduction to Microcontroller 8051

Credit :02 Periods: 45	Maximum Marks: 50 C.A. (Internal): 10 ESE : 40

Learning Objectives:

1. To know the difference between a microprocessor and a microcontroller.
2. To study architecture of microcontroller 8051
3. To study the instruction set of 8051
4. To study structure of Assembly Language Program for 8051

Unit-I: **Microprocessors to Microcontrollers** (03 Lectures)

Block Diagram of a microprocessor, Block Diagram of a microcontroller, Comparison between microprocessor and microcontroller.

Unit-II: **Introduction to Microcontroller 8051** (15 Lectures)

Features, Pin diagram, functional pin diagram and pin description, Architecture, Reset, Memory organization, CPU timings.

Unit-III: Instruction Set of Microcontroller 8051 (15 Lectures)

Addressing modes, Data transfer Instructions, Arithmetic Instructions, Logical Instructions, Branch Instructions, Bit Manipulation Instructions

Unit-IV: **Assembly Language Programming For Microcontroller 8051** (12 Lectures)

Introduction to 8051 Assembly programming, Assembling and running an 8051 program, The Program Counter and ROM space in 8051, 8051 Data types and Directives, Simple Assembly Language Programs for 8051.

Reference Books:

1. The 8051 Microcontroller - Kenneth Ayala – Cengage Learning India Private Limited - (3/e)
2. Microprocessors and Microcontrollers - U. S. Shah - Tech-Max Publications, Pune (Revised 2/e)
3. 8051 Microcontroller: Hardware, Software and Applications
   V. Udayshankara and M. S. Mulikarjun Swamy – McGraw Hill
4. The 8051 Microcontroller and Embedded Systems Using Assembly and C
   -M. A. Mazidi, J. G. Mazidi and R. D. McKinlay – Pearson – (2/e)

Skill Enhance Course –III (A): Linear Circuit Designing

Credit :02 Periods: 45 (Theory + Lab)	Maximum Marks: 50 C.A. (Internal): 25 ESE or Skill Exam : 25

Objectives:

1) To know basics of some electronic components and circuits of practical importance.
2) To equip the students with skill of circuit designing for a given requirement.
3) To impart hands on practice: circuit assembling, testing and troubleshooting.

Unit I: **(Periods: 10)**

LED interfacing to given source, designing of buffer for LED interfacing with ICs such as 7476, 8255 etc., voltage clipper, voltage clamper, designing of single stage C-E amplifier (class A).

Unit II: **(Periods: 20)**

Designing of Colpitt's oscillator, Phase-shift oscillator, designing of fixed voltage regulators using ICs 78XX and 79XX, study of load regulation and line regulation of a given power supply, designing of constant current source.

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

1) Design the circuit to interface LED of Vd = ….V, to a voltage source V = ….V. Take maximum LED current 10 mA.
2) Design the buffer amplifier to interface LED to some TTL chip operating at 5 V and can source only 40 micro ampere. Take Vd = …..V and Id = 10 mA.
3) Design voltage clipper to clip the given waveform at V = +….V or – …V.
4) Design waveform clamper to clamp the given waveform at V = +2V
5) Design single stage RC coupled CE amplifier for the gain of A = - 10.
6) Design and build the fixed voltage regulator for Vo = +5V / 1 A, using IC 7805
7) Design and build the split-power supply for Op-Amp = +12V n -12V using ICs 7812 and 7912.
8) Study the load regulation of given power supply.
9) Study the line regulation of given power supply.
10) Design and build the constant current source of 1 mA, operating at =12V for the load which varies over 0 - 5 Kohms.
11) Design and build the Colpitt's oscillator / RC Phase shift oscillator for a given frequency.

Reference Books:

1. *Electronic Principle* -by Albert Malvino, David J. Bates, 7th Edition, TMH, 2007 (5th Reprint,2008)
2. *Grob's Basic Electronics* -by Mitchel E. Schultz, 10th Edition, TMH, New Delhi, Rs 585/-
3. *Electronic Devices and Circuits* -by I. J. Nagrath, PHI, 2007, Rs 325/-
4. *Electronic Devices* -by Thomas Floyd, 6th Edition(4th Reprint), PEARSON Education, 2005

Web Resources:

1. https://www.electronics-tutorials.ws/diode/diode_8.html
2. https://www.elprocus.com/types-of-clipper-and-clamper-circuits-and-application/
3. https://www.electronics-tutorials.ws/amplifier/amp_2.html
4. https://www.engineersgarage.com/contribution/ambhatt/how-to-design-regulated-power-supply
5. http://www.radio-electronics.com/info/circuits/transistor/active-constant-current-source.php

Skill Enhance Course –III (B): PCB Designing

Credit :02 Periods: 45 (Theory + Lab)	Maximum Marks: 50 C.A. (Internal): 25 ESE or Skill Exam : 25

Learning Objectives:

1. To equip students with circuit drawing.
2. To know various steps involved in PCB production.
3. To know and handling of various tools and software used for PCB designing.

Utility of the Course :

On completion of this course, students can -

1. work as PCB Designer for a given circuit.
2. assemble, solder, de-solder on PCB.
3. start his own business as PCB manufacturer or supplier.

Prerequisites:

1. Any B.Sc. TY student from any science discipline.
2. TY students having knowledge of electronic circuits and components.

UNIT-I: PCB Designing (15 Lectures)

Introduction to PCB: Evolution & Classification, Manufacturing of PCB: Single sided and double sided, Layout planning and design: Reading drawings and diagrams, General PCB design considerations, Conductor patterns, Component placement Rules.

UNIT-II Soldering Methods (15 Lectures)

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.

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

Paper-XIV: Communication Electronics-II

Credit :02 Periods: 45	Maximum Marks: 50 C.A. (Internal): 10 ESE : 40

Learning objectives:

1. To study basics of Radio Receivers.
2. To understand the basics about the Microwaves.
3. To learn the RADAR systems
4. To Study the concepts in Mobile communication
5. To understand the optical fibres and study the optical fibre communication systems.

Unit I: Radio Receivers (10 periods)

Introduction, Basic block diagram of communication receiver, Tuned Radio Frequency (TRF) Receiver, Super Heterodyne Receiver, Characteristics of Radio receivers, Sensitivity, Selectivity, Fidelity, Image frequency and its rejection, Double spotting. (Numerical Problems)

Unit II: Microwaves & Radar Systems (15 periods)

Introduction to microwave properties and applications of microwaves, Basic principles of radar system, Block diagram of basic pulsed radar system, Radar range equation, Moving target indication, CW Doppler radar. (Numerical Problems)

Unit III: Introduction to Mobile Communication (5 Periods)

Historical perspectives, Cellular Systems, Third Generation (3G) Systems, Fourth-Generation (4G) Systems.

Unit IV: Introduction to Optical Fibres (15 periods)

Fibre Optics, Structure of Optical Fibres, Classification of Optical Fibres, Propagation of Light, Refraction and Snell's law, Total Internal Reflection, Light Propagation through an Optical Fibre, Acceptance Angle and Numerical Aperture, Dispersion, Intermodal Dispersion, Fibre Characteristics, Fibre Losses, Calculation of Losses, Choice of Wavelength, Fibre Optic Communications, Applications of Fibre Optic Communication, Advantages of Optic Fibres, Disadvantages of Optic Fibres.(Numerical Problems)

References:

1. Electronic Communications, Dennis Roddy and John Coolen (Fourth Edition), PHI Publication.
2. Electronic Communication Systems, George Kennedy, (Third Edition), McGraw Hill International Edition.
3. Microwave Engineering-Sanjeeva and Gupta
4. Optical Fibres and Fibre Optic Communication Systems, S.K. Sarkar, S.Chand and Company Ltd., New Delhi.
5. Optical Fiber Communications: Principles & Practice – John M Senior, III edition PHI
6. Communication Engineering, J.S. Katre, Technova Educational Publications, Pune.
7. Basic Electronics (Solid State) [Multicolour Illustrative Edition] B.L. Theraja (S. Chand &Co. Ltd.)
8. Mobile Satellite Communication Networks: Ray E. Sherrif& Y. Fun Hu (Wiley India)
9. Wireless & Cellular Telecommunications: -Wiliam C. Y. Lee (3/e, McGraw Hill)
10. Wireless Communications, Andrea Goldsmith, Cambridge University Press, 2015.
11. Web Reference: 1G, 2G, 3G, 4G, 5G –by Simon Johansen (http://its-wiki.no/images/c/c8/From_1G_to_5G_Simon.pdf)

Paper XV (A) Power Electronics – II

Credit :02 Periods: 45	Maximum Marks: 50 C.A. (Internal): 10 ESE : 40

Learning Objectives:

1) To understand the operation of single phase half controlled and fully controlled converters.
2) To understand working of choppers and inverters.
3) To construct & study working of some power control circuits used in industry.

UNIT – I : Phase controlled Converters (17 periods)

Introduction, control techniques, phase angle control, extinction angle control, pulse width modulation control, Single-phase fullwave controlled rectifier (Two-quadrant Converters) :Mid-point converters (M-2 Connection) with resistive lead, with inductive load, effect of freewheeling diode, Bridge configuration (B-2 connection) with resistive load, with inductive load (R-L load) Single-Phase half controlled Bridge rectifier: Half controlled bridge rectifier with resistive load (symmetrical configuration), Half controlled Bridge rectifier with R-L load. (Symmetrical configuration) [Numerical]

UNIT - II : Thyristor Control Circuits (10 periods)

Introduction, phase - control circuits for regulating temperature, remote temperature controller, Illumination control using DIAC & TRIAC, Light activated turnoff circuit using DIAC, TRIAC and LDR, OFF at dark circuit, emergency light using SCR, Automatic water level indicator using SCR

UNIT – III : Choppers (10 periods)

Introduction, Basic chopper classification, Basic chopper operation: Principle of step down chopper (buck converter), principle of step up chopper, Control Strategies : Time Ratio control (TRC) current limit control. [Numerical]

UNIT - IV : Inverters : (8 Periods)

Introduction, classification of Inverters, Series Inverters: Basic series inverter, modified series inverter, parallel inverter [Numerical]

References:

1) Power Electronics, M.D. Singh & K.B. Khanchandani (2nd Edition), Mc Graw Hill - education.
2) Power Electronics, Muhammad H. Rashid (4th edition), Pearson.
3) Power Electronics (Revised edition), K. Haribabu, Scitech Publication.
4) Industrial Electronics & Control, S.K. Bhattacharya, S. Chatterjee, TTTI, Chandigarh
5) Power electronics, P.C. Sen, Mc Graw Hill – education

Paper-XV (B) Microcontroller 8051 Programming and Interfacing

Credit :02 Periods: 45	Maximum Marks: 50 C.A. (Internal): 10 ESE : 40

Learning Objectives:

1. To study I/O Port programming of 8051.
2. To know Timer/Counter programming of 8051.
3. To study Serial Port programming of 8051.
4. To study interrupt programming of 8051.
5. To acquire basic knowledge of interfacing various peripheral devices to 8051.

Unit-I: **I/O Port Programming and Timer Programming** **(15 Lectures)**

I/O Port Programming: 8051 I/O Programming, I/O Bit Manipulation Programming, Programming Examples, Timer Programming: Programming 8051 Timers, Counter programming, Programming Examples.

Unit-II: **Serial Port Programming** **(08 Lectures)**

Basics of Serial Communication, 8051 Connection to RS232, 8051 Serial Port Programming, Programming Examples

Unit-III: **Interrupt Programming** **(10 Lectures)**

8051 Interrupts, Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupt, Interrupt priority in 8051, Programming Examples.

Unit-IV: **Interfacing** **(12 Lectures)**

Interfacing of Switches, Relays, LEDs, LCDs, Stepper Motor, DAC 0808, ADC 0808, External Memory and IC8255 with Microcontroller 8051.

Reference Books:

1. The 8051 Microcontroller - Kenneth Ayala – Cengage Learning India Private Limited - (3/e)
2. Microprocessors and Microcontrollers - U. S. Shah - Tech-Max Publications, Pune (Revised 2/e)
3. 8051 Microcontroller: Hardware, Software and Applications
   V. Udayshankara and M. S. Mulikarjun Swamy – McGraw Hill
4. The 8051 Microcontroller and Embedded Systems Using Assembly and C
   -M. A. Mazidi, J. G. Mazidi and R. D. McKinlay – Pearson – (2/e)

Skill Enhance Course –IV(A): Digital Logic Design (DLD)

Credit :02 Periods: 45 (Theory + Lab)	Maximum Marks: 50 C.A. (Internal): 25 ESE or Skill Exam : 25

Learning Objectives:

1. To know fundamentals of Digital Logic Design.
2. To study designing of a given combinational logic circuit.
3. To study designing of a given sequential logic circuit.
4. To get fundamental knowledge of PLDs.

Unit-I: **Combinational and Sequential Logic Design** **(18 Lectures)**

Combinational Logic Design:

Overview of Logic Gates and Boolean Algebra, Forms of logic representation: SOP form, POS form, Truth table, Minterm form, Maxterm form, Logic diagram and their inter-conversions, Methods Logic Implementation: AOI, NAND, and NOR and their inter-conversions, Techniques of Minimization of Logic Expressions: K-Map Technique, Quine-McCluskey method, Exercises of Combinational logic Design.

*Sequential Logic Design***:**

Overview of Flip flops, Counters and Shift registers, Exercises of Sequential logic Design

Unit-II: **Programmable Logic Devices (PLDs)** **(12 Lectures)**

Introduction, Simple PLDs (SPLDs), Programmable Logic Array (PLA), Programmable Array Logic (PAL), Generic Array Logic (GAL), Complex PLDs (CPLDs), Field Programmable Gate Arrays (FPGAs)

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

1. Conversion of one form of logic into other forms
2. Conversion of AOI implementation into NAND implementation
3. Conversion of AOI implementation into NOR implementation
4. Minimization of a logic expression using K-Map techniques
5. Minimization of a logic expression using Quine-McCluskey method
6. Designing and AOI implementation of at least four combinational logic circuits
7. Designing and implementation of at least four sequential logic circuits

Reference Books:

1. Digital Fundamentals- Floyd & Jain- Pearson- (8/e)
2. Modern Digital Electronics- R P Jain- TMH- (3/e)
3. Digital Electronics with Practical Approach- G N Shinde- Shivani Publications- (1/e)

Skill Enhance Course –IV(B): Programming Skill in C

Credit :02 Periods: 45 (Theory + Lab)	Maximum Marks: 50 C.A. (Internal): 25 ESE or Skill Exam : 25

Learning Objectives:

1. To understand fundamentals of C language
2. To study the use of decision making & looping control structure.
3. To Study the functions, arrays, string in C language.
4. To develop software skill by writing programs in 'C' based on some problems.

Utility of the Course :

On completion of this course, students can -

1. Write C program for any given task.
2. Can develop his own software for a given problem, research work etc.

Prerequisites:

1. Any B.Sc. TY student from any science discipline.
2. TY student who is interested in computer programming, software development.

Unit –I Fundamentals of C (15 periods)

Introduction, Character set, 'C' Tokens, Keywords & Identifiers, Data types, Constant, Variables, Operators- Arithmetic, logical, relational, assignment, increment, decrement, conditional. Input/Output Statement, Structure of C program. **Decision & looping, control structure:** Statements - If, If-Else statement, Nested If-Else, Switch. Entry and exit controlled loops – While, Do-While and For loop.

Unit –II Arrays and Functions (15 periods)

Introduction to Array, One-dimensional arrays: Declaration & Initialization, Two-dimensional arrays: Declaration & Initialization, **Functions:** Definition of function, function with arguments and without arguments, Strings in 'C', Standard Library string functions: strlen(), strcpy(),strcmp(), strcat().

Hands on Exercises (Practical): (15 periods)

1) Write, Compile and Run a programs in C to enter any two numbers and performs arithmetic operations (+, -, *, /).
2) Write Compile and Run a program in C to find Resistance of a circuit when two resistance are connected in a) series and b) parallel.
3) Write, Compile and Run a programs in C to determine simple interest using formula: S.I. = P * N * R/100 (P – Principal amount, N- No. of months, R- Rate of interest)
4) Write Compile and Run a program in C to find given integer number is odd or even.
5) Write Compile and Run a program in C to find factorial of given number.
6) Write Compile and Run a program in C to find summation of set of numbers.
7) Write Compile and Run a program in C to print Fibonacci series as follows:

   0,1,1,2,3,5,8,13,21,34,…….

   (Note: Every number in series is sum of preceding two numbers.)
8) Write Compile and Run programs in C to print an array in reverse order.
9) Write Compile and Run a program in C to find sum of array element.
10) Write Compile and Run a program in C to find maximum or minimum element from array.

Reference Books:

1. C programming by B. Gottfried, Schaum's outline series

2. Programming in ANSI C by E. Balaguruswamy, TATA MCGRAW Hill Publication.

3. Let US C by Yeshwant Kanetkar, BPB Publication.

4. The C-Programming language, Brian Kernighan, & Dennis Ritchie, Pearson Education India.

5. C the Complete Reference, Herbert Schildt, Osborne publication.

Web Resources:

1. www.spoken-tutorial.org
2. www.onlinecourses.nptel.ac.in
3. https://www.programiz.com/c-programming/examples
4. https://www.javatpoint.com/c-programs
5. https://www.tutorialspoint.com/cprogramming/index.htm

Paper-XVI: Practicals Based On P- XII and XIV

Credits: 02 **Marks: 50**

Note:

1. Every student must perform at least Ten experiments
2. Use graphs wherever necessary

List of Experiments:

1. Study of Class–C Amplitude Modulation and Measurement of Efficiency, Percentage
1. Modulation Index
2. Study of Linear Diode Detector and Measurement of Detection Efficiency
3. Study of Frequency Response of Two Stage IF Amplifier
4. Study of Frequency Response of Audio Amplifier.
5. Study of Class B Push–Pull Amplifier using Complimentary Symmetry and Determination of Efficiency
6. Study of RF Mixer using BF 194 Transistor
7. Study of FM Modulation using IC 566
8. Study of FM Demodulator.
9. Study of Pulse Amplitude Modulation
10. Study of Pulse Position Modulation
11. Study of Pulse Width Modulation
12. Study of Pulse Code Modulation
13. Measurement of Numerical Aperture of Optical Fiber
14. Study the Bending Loss of an Optical Fiber
15. Study of the Characteristics of Laser LED
16. Study of Photo-Diode Detector Characteristics (Use Avalanche Photo Diode)
17. Study of Transmission and Reception through Optical Fiber

Paper XVII (A): Practical Based On P-XIII (A) and XV (A)

Credits: 02 **Marks: 50**

Note:

1. Every student must perform at least Ten experiments.
2. Use graphs wherever necessary.

List of Experiments:

1. Uni-junction Transistor Characteristics
2. UJT relaxation oscillator
3. Firing characteristics of SCR.
4. Half wave gate controlled rectifier using one SCR
5. Firing of single SCR using UJT
6. Firing of two SCRs by a UJT.
7. Phase control circuit using SCR
8. Characteristics of DIAC.
9. Firing characteristics of a TRIAC
10. Illumination control using DIAC and TRIAC
11. Light activated turnoff circuit using LDR and SCR
12. Light activated turn off circuit using DIAC-TRIAC and LDR
13. Inverter using SCR and measurement of frequency, output power.
14. Study of simple Chopper circuit/step-up chopper circuit and measurement of on-time, off-time, output voltage.

Paper XVII (B): Practical Based On P- XIII (B) and XV (B)

Credits: 02 **Marks: 50**

Every student must perform at least Ten Experiments from the following List

List of Experiments (Assembly Language Programs: ALPs)

1. ALP to add two 8-bit numbers
2. ALP to add two 16-bit numbers
3. ALP to subtract two 8-bit numbers
4. ALP to subtract two 16-bit numbers
5. ALP to multiply two 8-bit numbers
6. ALP to divide two 8-bit numbers
7. ALP to determine 1's complement of an 8-bit number
8. ALP to determine 1's complement of a 16-bit number
9. ALP to determine 2's complement of an 8-bit number
10. ALP to determine 2's complement of a 16-bit number
11. ALP to logically AND two 8-bit numbers
12. ALP to logically OR two 8-bit numbers
13. ALP to logically XOR two 8-bit numbers
14. ALP to convert an 8-bit Binary number to Gray
15. ALP to convert an 8-bit Gray number to Binary
16. ALP to find smallest of two 8-bit numbers
17. ALP to find largest of two 8-bit numbers
18. ALP to unpack an unpacked BCD number
19. ALP to determine sum of a series of numbers
20. ALP to move a block of data from one area of memory to another area of the memory
21. ALP to create a square wave at $P_{1.0}$
22. ALP to flash an LED connected to $P_{3.1}$ with the time delay of 1 Sec using timer T_1 in Mode-2
23. ALP to interface a Relay and make it ON/OFF repeatedly with the time delay of 1 Sec
24. ALP to Interface 7-segment display unit to 8051 to generate desired character
25. ALP to interface Stepper motor to rotate CW/ACW with given number of steps per revolution
26. ALP to interface DAC 0808 / ADC 0808.

Question Paper Pattern for Practical Corse (Annual Exam)

Practical Paper Nos. P-XVI and P-XVII

Total Marks : 50

I) **CA (Internal Exam) : 10 marks (Separate Mark List be submitted by college Internal Examiner)**

(i) Test exam /Assignment : 05 marks

(ii) Record Book / Journal : 05 marks

II) **ESE: 40 marks (Awarded at the time of University Annual Practical Exam), Duration 3 Hrs :** Every student is required to perform one complete experiment. The scheme of marks is as follows:

(i)	Circuit diagram	: 10 marks
(ii)	Construction of circuit	: 10 marks
(iii)	Observations /Calculations/ Graphs/Result/Conclusion etc.	: 15 marks
(iv)	Viva-voce	: 05 marks

Question Paper Pattern for B.Sc. Third Year Exam(Semester V and VI), for all theory papers:

Time : 2 Hr Max Marks: 40

Note: ALL questions are compulsory and carry equal marks

Question 1 - Attempt any FOUR.(each of 2 marks) 8 marks

i)
ii)
iii)
iv)
v)
vi)

(Note: This question will be based on entire syllabus)

Question 2 - Attempt any TWO of the following (each of 4 marks) 8 marks

a.
b.
c.

(Note: This question will be based on Unit I and Unit II, with a minimum of 1 sub-question and a maximum of 2 sub-questions from each unit)

Question 3 - Attempt any ONE of the following (each of 8 marks) 8 marks

a.
b.

(Note: This question will be based on Unit I and Unit II, with one sub-question from each unit)

Question 4 - Attempt any TWO of the following (each of 4 marks) 8 marks

a.
b.
c.

(Note: This question will be based on Unit III and Unit IV, with a minimum of 1 sub-question and a maximum of 2 sub-questions from each unit)

Question 5 - Attempt any ONE of the following (each of 8 marks) 8 marks

a.
b.

(Note: This questions will be based on Unit III and Unit IV, with one sub-question from each unit)