SCHEME FOR EXAMINATION
B.TECH (FOUR YEAR) DEGREE COURSE
COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA
SECOND YEAR, SEMESTER - III & IV
W.E.F. SESSION 2021-22

Branch:- Computer Science & Engg. Year: II Sem:- III

S.No	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS203TES06	Digital logic & Design	3	1	0	30	70	100	4
2	CS203TPC01	IT workshop (C++ / python)	3	1	0	30	70	100	4
3	CS203TPC02	Computer Network	3	1	0	30	70	100	4
4	CS203TPC03	Computer Organization & Architecture	3	1	0	30	70	100	4
5	CS203TBS05	Mathematics III (Numerical Methods)	3	1	0	30	70	100	4
	PRACTICAL								
1	CS203PPC01	IT workshop (C++ / python) Lab	0	0	3	30	20	50	1.5
2	CS203PPC02	Computer Network Lab	0	0	3	30	20	50	1.5
3	CS203PES06	Digital Logic & Design Lab	0	0	3	30	20	50	1.5
		Total							**24.5**

Branch:- Computer Science & Engg. Year: II Sem:- IV

S.No	Code no.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS204TPC04	Discrete Mathematics	3	1	0	30	70	100	4
2	CS204TES07	Electronic Device & Circuits	3	0	0	30	70	100	3
3	CS204TPC05	Operating System	3	1	0	30	70	100	4
4	CS204TPC06	Data Structure & Algorithms	3	1	0	30	70	100	4
5	CS204THS02	MANAGEMENT I-MANAGEMENT PROCESS AND ORGANIZATIONAL BEHAVIOUR	3	0	0	30	70	100	3
	PRACTICAL								
1	CS204PPC03	Operating System Lab	0	0	3	30	20	50	1.5
2	CS204PPC04	Data Structure & Algorithms Lab	0	0	3	30	20	50	1.5

3	CS204PES07	Electronic Device & Circuits Lab	0	0	3	30	20	50	1.5
							Total		**22.5**

Sub Title: COMPUTER ORGANIZATION & ARCHITECTURE		
Sub Code: CS203TPC03	**No. of Credits : 4=3: 1: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. Conceptualize the basics of organizational and architectural issues of a digital computer.
2. Analyze processor performance improvement using instruction level parallelism.
3. Learn the function of each element of a memory hierarchy.
4. Study various data transfer techniques in digital computer.
5. Articulate design issues in the development of processor or other components that satisfy design requirements and objectives.

UNIT No	Syllabus Content	No of Hours
1	**Basic of Computer Organization & Architecture:** Introduction, Computer Organization vs. Computer architecture, Von Neumann Architecture vs. Harvard Architecture. **Input & Output Organization:** Introduction, Simple Bus Architecture, Types of Buses, I/O Communication Methodologies: Programmed I/O (Polling), Interrupt-driven I/O & Direct Memory Access (DMA), I/O channel & I/O Processor, Accessing I/O device: Memory Mapped I/O, Isolated or I/O Mapped.	10
2	**Computer Arithmetic:** Introduction, Addition & Subtraction: Addition & Subtraction with Signed-Magnitude Data, Hardware Implementation & Algorithm, Addition & Subtraction with Signed-2′s Complement Data, Multiplication Algorithm: Hardware Implementation for Signed-Magnitude Data, Hardware Algorithm, Booth Multiplication Algorithm, Array Multiplier, Division Algorithms: Hardware Implementation for Signed-Magnitude Data & Algorithm , Carry Look Ahead Adder.	10
3	**Memory Organization:** Introduction, Types of Memory, Memory Hierarchy, Main Memory, Cache Memory, Virtual Memory, Associative Memory. Processor Organization: Introduction, Control Unit: Hardwired Control Unit, Micro programmed Control Unit, Instruction Set Computer: Reduced Instruction Set Computer (RISC) vs. Complex Instruction Set Computer(CISC).	10

4	**Pipelining:** Introduction, Concept of Instruction Pipeline, Design Problems with Pipeline: Structural Hazard, Data Hazard & Control Hazard, Extension in Pipeline Designed: Super Pipelining, Superscalar Processor, Very Long Instruction Width (VLIW) Architecture.	**8**
5	**Multiprocessor System:** Introduction, Shared Memory Multiprocessor, Distributed Memory Multiprocessor, Flynn's Classification: Single Instruction Single Data (SISD), Single Instruction Multiple Data (SIMD), Multiple Instruction Single Data (MISD), Multiple Instruction Multiple Data (MIMD), Cache Coherence, Message Passing Model, Cluster Computing, Distributed Computing.	**7**

COURSE OUTCOMES: The students would have learnt

CO1: Understand the computer architecture concepts.
CO2: Understand and apply different number systems and codes.
CO3: Understand memory hierarchy and its impact on computer cost/performance.
CO4: Design a pipeline for consistent execution of instructions with minimum hazards.
CO5: Understand the concepts of multiprocessor.

Text Books:

1. Computer System Architecture, M. Morris Mano, Pearson Education India.
2. Computer Organization & Architecture, W. Stalling, Pearson Education India.

Reference Books:

1. Computer Architecture & Organization, J. P. Hayes, McGraw-Hill India.
2. Computer System Organization, Naresh Jotwani, Mc Graw Hill, India.
3. Computer System Architecture, P. V. S. Rao, PHIIndia.
4. Advanced Computer Architecture, Rajiv Chopra, S. Chand India.
5. Computer Organization & Architecture, Lalit K. Arora, Anjali Arora, S. K. Kataria & Sons, India.
6. Computer Fundamentals Architecture & Organization, B Ram, Sanjay Kumar, New Age International, India.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	2	3	2						3	3	3	3
CO2	3	3	3	3	2	3						3	3	3	3
CO3	3	3	3	3	3	3						3	3	3	3
CO4	3	3	3	2	3	3						3	3	3	3
CO5	3	2	3	2	2	3						3	3	3	3

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: DIGITAL LOGIC & DESIGN		
Sub Code: CS203TES06	**No. of Credits : 4=3: 1: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. The concept of various components.
2. The concepts that underpin the disciplines of analog and digital electronic logic circuits.
3. Various Number system and Boolean algebra.
4. Design and implementation of combinational circuits.
5. Design and implementation of Sequential circuits.

UNIT No	Syllabus Content	No of Hours
1	**Binary System:** Binary Number , Number Base conversion , Octal and Hexadecimal Numbers Complements, Binary Codes Binary Storage and Registers , Binary Logic , Integrated Circuits. **Boolean Algebra and Logic Gates:** Basic Definitions Axiomatic Definition of Boolean algebra .Basic Theorems and Properties of Boolean algebra Boolean Functions Canonical and Standard Forms .Other Logic Operations Digital Logic Gates . IC Digital Logic Families. NAND, NOR, EOR gates.	10
2	**Boolean Functions Combination Logic:** The map method Two and Three Variable Maps, Four Variable Map Product of sums Simplification, NAND and NOR implementation, Don't Care Conditions, The Tabulation Method **Combinational Logic:** Introduction, Design procedure Adders, Sub tractors .Code Conversion, Analysis Equivalence Functions	10
3	**Combinational Logic with MSI and LSI:** Introduction Binary Parallel Adder, Decimal, Adder, Magnitude Comparator, Decoders, Multiplexers, Read – Only Memory (ROM), Programmable Logic Array (PLA) Concluding Remarks	10
4	**SEQUENTIAL LOGIC:** Introduction, Flip –Flops, triggering of Flips –Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment. Flip –Flop Excitation Tables Design Procedure. Design of Counters, Design with State Equations.	8
5	**Registers, Counters, Memory Unit & FPGA Programing:** Introduction, Registers, shift Registers .Ripple Counters, Synchronous Counters. Timing Sequences, The Memory Unit Examples of Random Access Memories, FPGA: Introduction, FPGA Programming	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the concepts of various components to design stable analog circuits.
CO2: Represent numbers and perform arithmetic operations.
CO3: Minimize the Boolean expression using Boolean algebra and design it using logic gates.
CO4: Analyze and design combinational circuit.
CO5: Design and develop sequential circuits.
CO6: Translate real world problems into digital logic formulations using VHDL.

Text Books:

1. Digital Logic & Computer Design PH1 M Mano
2. Switching Circuit & Finite automata –ZVI Kohavi (TMH)
3. Fletcher W.I.: An engineering approach to Digital design PH1

Reference Books:

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D.Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	1	2	1	2	1	1	3	3	3	2
CO2	3	3	2	3	2	1	2	1	2	1	1	3	3	3	2
CO3	3	3	2	3	2	1	2	1	2	1	1	3	3	3	2
CO4	3	3	2	3	3	1	2	1	2	1	1	3	3	3	2
CO5	3	3	2	3	3	1	2	1	2	1	2	3	3	3	2
CO6	3	3	2	3	3	1	2	1	2	1	2	3	3	3	2

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: IT WORKSHOP (C++ / PYTHON)		
Sub Code: CS203TPC01	**No. of Credits : 4=3: 1: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. To know different programming paradigms.
2. To study and understand the object oriented programming concepts and methodology.
3. To implement object oriented programming concepts in C++.
4. To direct and handling file streaming
5. To learn introductory Python environment and program structure

UNIT No	Syllabus Content	No of Hours
1	**Abstract Data Types And Programming Environment:** TC++ Environment, variables, Compilation and Linking steps, functions and parameters Object identity, concept of Classes. arrays, control statements. C++ in different plate forms DOSBOX etc.	10
2	**Object-Oriented Programming:** Programming using class and objects, functions, return types, pointer, concepts of encapsulation, default, parametric ,hybrid and copy constructors, destructors, memory management operators	10
3	**Advance Concepts of Object-Oriented Programming:** Polymorphism operator and function overloading, Inheritance in object oriented design, Brief concepts of Aggregation, Generalization, Specification. Design concepts Flowchart , Decision table, virtual class and virtual functions	10
4	**File Handling:** Input &output Streams and object handling in file, Ios family class, text& binary files ,Basic character operations, file opening modes ios flags , ,seekg(),tell(),seekp(),tellp(),command line arguments Streaming and File input and output handling	8
5	**Introduction to Python:** Introduction of Python Programming: python programming environment, research areas and applications of python, Data representation, introductory level programming in python.	7

COURSE OUTCOMES: The students would have learnt

CO1: Programming environment and basic elements
CO2: Key features of the object-oriented programming language.
CO3: Advance concepts of object-orientedconcepts.
CO4: Streaming concepts for file handling
CO5: Introduction of Python programming environment

Text Books:

1. Object Oriented Programming with C++ by E Balaguruswami, TMH 2019
2. Object Oriented Programming with C++ by Robert Lafore, Waite Group 2016
3. Machine Learning Tom M. Michell,Mc Graw Hill ,Indian addition
4. Applied Machine Learning by M. Gopal ,McGraw Hill Education

Reference Books:

1. Introduction to python by Bill Luboveni by O'Relly
2. Object Oriented Programming with C++ by M P Bhave S,A. Patekar, Pearson Education
3. The Complete reference by Herbit Schildt,Mc Graw Hill
4. C++ premier by F.B. Lippman, Addition Wesley
5. The C++ Programming Language,Bajanstroustrup ,Addition Wesley

Course Outcomes and their mapping with Programme Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	2	3	1	3	1	3	1	2	3	3	3	2
CO2	2	3	3	2	2	1	1	3	2	2	2	3	3	3	2
CO3	2	3	3	2	3	1	1	3	2	2	2	3	3	3	2
CO4	1	3	3	2	3	1	2	2	2	3	3	3	3	3	2
CO5	1	1	3	1	3	1	3	2	3	1	2	3	1	2	2

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: COMPUTER NETWORK		
Sub Code: CS203TPC02	**No. of Credits : 4=3: 1: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. Discuss the basic taxonomy and terminology of the computer networking.
2. Discuss the functionality of different layers of OSI Model.
3. Discuss different protocols of TCP/IP protocol suite.
4. Discuss the process of IP addressing and working of routing protocols.
5. Discuss the different challenges of Internetworking, Congestion control and Quality of services.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** **Data communications:** Components, Data representation, Direction of data flow(simplex, half duplex, full duplex) **Networks:** Distributed processing, Network criteria, Physical structure (type of connection, topology), categories of network (LAN, MAN,WAN);Internet: brief history, internet today, Protocols and standard **Reference models:** OSI reference model, TCP/IP reference model, their comparative study. **Physical Layer:** Transmission technology.	10
2	**Data Link Layer:** Types of errors, Error detection & correction methods, Framing(character and bit stuffing), Flow control, Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ **Medium access sub layer:** Point to point protocol, Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, Token ring, Reservation, Polling, FDMA, TDMA, CDMA.	10
3	**Network Layer:** **Internetworking devices**: Repeaters, Hubs, Bridges, Switches, Router, Gateway **Addressing**: IP addressing, classful addressing, subnetting. **Routing**: Techniques, Static vs. Dynamic routing, Routing table for classful address, Flooding, Shortest path algorithm, Distance vector routing, Link state routing. **Protocols:** ARP, RARP, IP, ICMP, IPV6.	10

4	**Transport Layer:** Process to process delivery, UDP: Services and applications, TCP: Stream Oriented Service, Segment, Timers, Congestion control techniques: Avoidance and Detection.	8
5	**Application Layer:** DNS, SMTP, FTP, HTTP & WWW, **Security:** Cryptography, User authentication, Security protocols in internet, Firewalls. Recent research topic on networking.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand the working of different internetworking devices.
CO2: Understand the working of Internet.
CO3: Understand the difference between OSI and TCP/IP.
CO4: Understand the security mechanism in Networking.
CO5: Understand core concept of IP addressing and routing.

Text Books:

1. Data Communications and Networking by B. A. Forouzan – TMH Publication.
2. Computer Networks by S. Tanenbaum – Pearson Education/PHI Publication.

Reference Books:

1. Internetworking with TCP/IP by Comer – Pearson Education/PHI byPublication.
2. Data and Computer Communications by W. Stallings – PHIPublication.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1									3	2	1
CO2	2	1	3	2									1	2	3
CO3	1	2	3	3									1	3	2
CO4	2	3	2	2									2	2	1
CO5	2	2	3	2									2	3	2

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: MATHEMATICS III (Numerical Methods)		
Sub Code: CS203TBS05	**No. of Credits : 4=3: 1: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.
2. To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data.
3. To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.
4. To deal with various topics like finding roots of equations, solving systems of linear algebraic equations, interpolation and regression analysis, numerical integration & differentiation, solution of differential equation, boundary value problems, solution of matrix problems.
5. To facilitate numerical computing.

UNIT No	Syllabus Content	No of Hours
1	Introduction of Errors and their Analysis, types of errors, numerical problems on error analysis, curve fitting: method of least squares, fitting of exponential curves , fitting of the curve , fitting of the curve .Method of moments	10
2	**Numerical Solution of Algebraic and Transcendental Equations:** Graphical method bisection Method, Secant Method, Regula-falsi Method, Newton Raphson Method, Solution of a system of simultaneous linear algebraic Equations Direct methods: Gauss elimination Method, Gauss Jordan method, Iterative methods .Jacobi Iterative Method, Gauss Seidel Iterative method.	10
3	**The Calculus of Finite Differences:** Finite differences, Difference formula, operators and relation between operators. Inverse Operator, Interpolation with equal intervals: - Newton's forward and backward interpolation formula. Interpolation with Unequal intervals: - Lagrange's interpolation Newton's difference formula, inverse interpolation.	10

4	**Numerical Differentiation and Integration:** Numerical Differentiation Newton's forward and Backward difference interpolation formula. Maxima and Minima of aTabulated function, Numerical Integration :-Trapezoidol rule, simpson's (1/3) rd and (3/8) th rule, Boole's rule, weddle rule. Difference Equations: Definition ,order and degree of a difference equation, Linear difference equations, Difference equations reducible to Linear form, simultaneous difference equations with constant coefficients	8
5	**Numerical solution of ordinary differential equation:** Taylor series method, Euler's method, Modified Euler method Runge's method Runge-Kutta method, numerical method for solution of partial differential equations. General linear partial differential equation.Laplace equation and Poisson equation.	7

COURSE OUTCOMES: The students would have learnt

CO1: Apply Numerical analysis, which has enormous application in the field of Science and some fields of Engineering.
CO2: Familiar with finite precision computation.
CO3: Familiar with numerical solutions of nonlinear equations in a single variable.
CO4: Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.
CO5: Familiar with calculation and interpretation of errors in numerical method.

Text Books:

1. Jain & Iyngar Numerical Methods for Scientific and Engineering Computations.
2. Rao G.S. Numerical Anlysis.
3. Grewal B S Numerical Methods In Engineering and Science.
4. Das K K Advance Engineering Methods.
5. Rajaraman V Computer Oriented Numerical Methods
6. P. Kandasamy K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
7. S. S. Sastry, Introduction methods of Numerical Analysis, PHI, 4th Edition, 2005.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Computer Networks by S. Tanenbaum – Pearson Education/PHIPublication.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1							2	1	2	1
CO2	3	2	2	2	1							2	3	2	2
CO3	3	3	2	3	2							2	1	2	1
CO4	3	3	3	3	3							2	3	3	2
CO5	3	3	3	3	3							2	3	3	2

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: IT WORKSHOP (C++ / PYTHON) LAB	
Sub Code: CS203PPC01	**No. of Credits : 1.5=0: 0: 1.5(L-T-P)**
Exam Duration : 3 hours	**IA+ESE =30+20**

Lab OBJECTIVE:

1. To discuss Turbo C++ environment
2. To discuss the various basic object oriented programming constructs like functions, properties and application.
3. To discuss advanced programming concepts and program designing.
4. Discussion Programming on file input output handling
5. To discuss basic environment of python programming

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• To implement various datatypes and their memory requirement in TC++ programming • To implement various in classes and members functions. • To show matrix operation • To implement functions function and argument passingmethods • To implement different function return types. • To implement concept of polymorphism. • To implement concept of virtual function and virtual class. • To implement the concept file handling. • To implement the concept of file importing in python environment. • To implement the concept of coding and execution of introductory program.	18

LAB OUTCOMES: The students would have learnt

CO1: TC++ programming Environment and programming IDE
CO2: Implementation of basic object oriented operations
CO3: Implementation of advanced programming concepts.
CO4: Implementation of file input output streams and file handling operations.
CO5: Implementation of introductory python programming language

Text Books:

1. Object Oriented Programming with C++ by E Balaguruswami, TMH
2. Object Oriented Programming with C++ by Robert Lafore, Waite Group
3. Introduction to python by Bill Luboveni by O'Relly

Reference Books:

1. Object Oriented Programming with C++ by M P Bhave S,A. Patekar, Pearson Education
2. The Complete reference by Herbit Schildt,Mc Graw Hill
3. The C++ Programming Language, Bajanstroustrup ,Addition Wesley
4. Machine Learning Tom M. Michell,Mc Graw Hill ,Indian addition
5. Applied Machine Learning by M. Gopal ,McGraw Hill Education

Course Outcomes and their mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	3				2	1	2	3	3	3	2
CO2	3	3	3	2	2				2	2	2	3	3	3	2
CO3	3	3	3	2	3				2	2	2	3	3	3	2
CO4	3	3	3	2	3				2	3	3	3	3	3	2
CO5	1	1	3	1	3				1	1	2	3	1	1	1

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: DIGITAL LOGIC & DESIGN LAB	
Sub Code: CS203PES06	**No. of Credits : 1.5=0: 0: 1.5(L-T-P)**
Exam Duration : 3 hours	**IA+ESE =30+20**

Lab OBJECTIVE:

1. To discuss the fundamental concepts of digital logic design
2. Identify various ICs and their specification.
3. To discuss various logic Gates
4. Design and implementation of combinational circuits.
5. Design and implementation of Sequential circuits

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Implement 3 input AND gate using 2 input AND gates and 3 input OR gate using 2 input OR gates. • Implement NAND gate using AND gates and NOR using OR gates. • Design a circuit that evaluates the determinant of a 2 X 2 binary matrix (Note: State any assumptions made about input and output representations). • Design a circuit that takes two unsigned 2-bit numbers (a and b), and displays one of greater (a > b), lesser (a < b) or equal (a == b) signals. • Half Adder, Full Adder and Ripple Carry Adder Implementation. • Add two 2 digit BCD numbers. Display using 7-segment displays. • Subtract two 2-digit BCD numbers. • Design Master Slave J-K Flip flop. • Design a 2-bit Synchronous up counter using D flip flop IC's. Display the output on a 7-segment LED display • Sequence generator using shift registers • Design and verify 4-bit synchronous counter.	18

LAB OUTCOMES: The students would have learnt

CO1: Understand the concepts of various components to design stable analog circuits.
CO2: Represent numbers and perform arithmetic operations.
CO3: Minimize the Boolean expression using Boolean algebra and design it using logic gates.
CO4: Analyze and design combinational circuit.
CO5: Design and develop sequential circuits

Text Books:

1. Digital Logic & Computer Design PHI M Mano
2. Switching Circuit & Finite automata –ZVI Kohavi (TMH)

Reference Books:

1. An engineering approach to Digital design PHI Fletcher W.I

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	2	1	2	1	2	1	1	3	3	3	2
CO2	3	3	2	3	2	1	2	1	2	1	1	3	3	3	2
CO3	3	3	2	3	2	1	2	1	2	1	1	3	3	3	2
CO4	3	3	2	3	3	1	2	1	2	1	1	3	3	3	2
CO5	3	3	2	3	3	1	2	1	2	1	2	3	3	3	2
CO6	3	3	2	3	3	1	2	1	2	1	2	3	3	3	2

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: COMPUTER NETWORK LAB	
Sub Code: CS203PPC02	**No. of Credits : 1.5=0: 0: 1.5(L-T-P)**
Exam Duration : 3 hours	**IA+ESE =30+20**

Lab OBJECTIVE:

1. To discuss the fundamental concepts of Networking.
2. To discuss the different devices used in Computer Network.
3. To discuss IP addressing concept like Subnetting and Supernetting.
4. To design Virtual LAN concept using port based and subnet based method.
5. To design WiFi System using Wireless Access Point and Adapter

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Study of different addresses (MAC, IP, Port and URL) used in computer network. • Study of different types of transmission media. • To implement point to point network using UTP cable and RJ-45 connector. • Study of different commands used in Computer Network. • Study of different networking devices used in Computer Network. • To implement Local Area Network using Unmanaged Switch. • To implement Local Area Network using Managed Switch. • To implement the Virtual LAN using port based method of Managed Switch. • To implement the Virtual LAN using subnet based method of Managed Switch. • To implement Wireless LAN using Wireless Access Point and Wireless Adapter.	18

LAB OUTCOMES: The students would have learnt

CO1: Understand the basic concept of Networking.
CO2: Understand the functionality of different devices.
CO3: Understand the designing of local Area Network using networking devices.
CO4: Understand addressing concept of networking.
CO5: Understand the designing of Wireless LAN.

Text Books:

1. Data Communications and Networking by B. A. Forouzan – TMH Publication.
2. Computer Networks by S. Tanenbaum – Pearson Education/PHIPublication

Reference Books:

1. Internetworking with TCP/IP by Comer – Pearson Education/PHI byPublication.
2. Data and Computer Communications by W. Stallings – PHIPublication

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	1							2	1	2	1
CO2	3	2	2	2	1							2	3	2	2
CO3	3	3	2	3	2							2	1	2	1
CO4	3	3	3	3	3							2	3	3	2
CO5	3	3	3	3	3							2	3	3	2

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: DISCRETE MATHEMATICS		
Sub Code: CS204TPC04	**No. of Credits : 4=3: 1: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contrapositives using truth tables and the properties of logic.
2. Express a logic sentence in terms of predicates, quantifiers, and logical connectives
3. Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.
4. Determine the domain and range of a discrete or non-discrete function, graph functions, identify one-to-one functions, perform the composition of functions, find and/or graph the inverse of a function, and apply the properties of functions to application problems.
5. Describe binary relations between two sets; determine if a binary relation is reflexive, symmetric, or transitive or is an equivalence relation; combine relations using set operations and composition.

UNIT No	Syllabus Content	No of Hours
1	**Sets, Relation and Function:** Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.	10
2	Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination. Principle of Mathematical Induction, The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor, Euclidean Algorithm, The Fundamental Theorem of Arithmetic.	10
3	**Propositional Logic:** Basic Connectives and Truth Tables, Logical Equivalence, The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. **Proof Techniques:** Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.	10

4	**Algebraic Structures and Morphism:** Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups. Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form	**8**
5	**Graphs and Trees:** Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Four colour conjecture, trees and rooted trees, binary trees.	**7**

COURSE OUTCOMES: The students would have learnt

CO1: Students completing this course will be able to express a logic sentence in terms of predicates, quantifiers, and logical connectives.

CO2: Students completing this course will be able to applythe rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.

CO3: Students completing this course will be able to use tree and graph algorithms to solve problems.

CO4: Students completing this course will be able to evaluate Boolean functions and simplify expressions using the properties of Boolean algebra

Text Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw– Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It′s Application to Computer Science″, TMG Edition, TataMcgraw-Hill
3. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum′s Outlines Series, Seymour Lipschutz, Marc Lipson,
4. Discrete Mathematics, Tata McGraw – Hill

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	3	1							3	2	2	2
CO2	3	3	2	1	2							3	3	2	3
CO3	3	3	2	2	1							3	3	2	3
CO4	3	3	3	2	3							3	3	3	3
CO5	3	2	3	3	3							3	3	2	2

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: ELECTRONIC DEVICE & CIRCUITS		
Sub Code: CS204TES07	**No. of Credits : 3=3: 0: 0(L-T-P)**	**No of lecture hours/week :03**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:36**

COURSE OBJECTIVE:

1. To understand practical applications of PN junction diode.
2. To study basic principle of BJT, JFET and MOSFET their characteristics and amplifiers.
3. To understand working of BJTs at low and high frequencies.
4. To understand the working of different types of feedback amplifiers.
5. To understand the working of different types of oscillators.

UNIT No	Syllabus Content	No of Hours
1	**Junction Diode And Its Application:** Properties of P-N Junction, Open Circuited P-N Junction, Current component of PN Diode, V-I Characteristics, Temperature dependence of V-I Characteristics, Diode resistance, Diode as a rectifier-Half wave & Full wave rectifier, Clipper, Clamper.	8
2	**Bipolar Junction Transistor and FET:** Introduction to Bipolar Junction Transistor, Transistor current components. Transistor as an amplifier, Transistor construction, Transistor Circuit Configuration (Common Base , Common Emitter, Common Collector) and Characteristics CE current gain, Analytical expression for transistor characteristics. Introduction to JFET, MOSFET, V-I and Transfer characteristics of JFET.	7
3	**Low Frequency Transistor Amplifier**: Graphical Analysis of CE amplifier, h-parameter Models, Transistor hybrid model, Analysis of Transistor amplifier using H-Parameter for CB, CE, CC configurations, Comparison of Transistor Amplifier Configuration, Darlington Pair. **High Frequency:** CE hybrid-pi model: Validity and parameter Variation, Current Gain with Resistive load, frequency response of a single stage CE Amplifier, Gain-Bandwidth product.	7
4	**Feedback Amplifier**: Classification of feedback amplifier, Feedback concept, Properties of feedback amplifier, Effect of feedback on gain and impedance, Emitter and Source follower. **Oscillator:** Barkhausen criteria, Wien bridge, Tuned, Hartley, Colpitt and RC Phase shift oscillators.	7

5	**Operational Amplifiers:** OPAMP Symbol and terminal characteristics, Block Schematic of OPAMP, Ideal OPAMP Characteristics, Practical OPAMP Characteristics, Inverting Amplifier, Non-Inverting Amplifier, Voltage Follower, Adder, Substractor, Comparator, Integrator, Differentiator, IC Timer-555, Introduction to Multivibrators, Monostable, Bistable, Astable Multivibrator.	7

COURSE OUTCOMES: The students would have learnt

CO1: Learn the design practical circuit using diodes.
CO2: Learn the Characteristics of BJT, FET and MOSFET
CO3: Evaluate frequency response to understand behavior of Electronics circuits.
CO4: Analyze important types of integrated circuits and demonstrate the ability to design practical circuits that perform the desired operations.
CO5: Learn the Designing of different oscillator circuits for various frequencies.
CO6: Gain knowledge about Differential amplifier and operational amplifier and Designing circuits for op-amp applications.

Text Books:

1. Electronic Devices and Circuit Theory, Robert L. Boylestad & L. Nashelsky, K. L. Kishore, 9th Edition, PHI
2. Integrated Electronics: Analog & Digital Circuit Systems, Jacob Millman & Halkias, Tata McGraw Hill.
3. Microelectronics, Millman and Grabel, Tata McGraw Hill.
4. Integrated Circuits by K. R. Botkar, 9th Ed., Khanna Publications

Reference Books:

1. Electronic Devices & Circuits, Allen Mottershead, PHI.
2. Microelectronic Circuits, Sedra and Smith, 5th Edition, Oxford UniversityPress.
3. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1							2	2	1	1
CO2	3	3	2	2	1							2	2	1	1
CO3	3	3	2	2	2							2	2	2	1
CO4	3	3	3	2	3							2	2	2	1
CO5	3	3	3	2	3							2	2	1	1
C06	3	3	3	2	3							2	2	2	1

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: OPERATING SYSTEM		
Sub Code: CS204TPC05	**No. of Credits : 4=3: 1: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. To understand the main components of an OS & their functions.
2. To study the process management and scheduling.
3. To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.
4. To understand the concepts and implementation Memory management policies and virtual memory.
5. To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS
6. To study the need for special purpose operating system with the advent of new emerging technologies

UNIT No	Syllabus Content	No of Hours
1	Introduction to Operating System objective and function. System components system services, system structure, batch interactive, time –Sharing and real time operating system, Protection. The introduction of window NT,DOS, Window 07, Unix ,Linux (Red hat)	10
2	**Concurrent Process:** Process concepts, principal of concurrency. The producer consumer problem, the critical section problem, semaphore, classical problem in concurrency, inter process communication, process generation, process scheduling.	10
3	**CPU Scheduling:** Scheduling concepts, performance criteria scheduling algorithms. Algorithm evaluation, multiprocessor scheduling. I/O management and Disk scheduling I/O devices and organization of the I/O functions. I/O buffering disk I/O operating system design issues.	10
4	Dead Locks system models, deadlock characterization, prevention, avoidance and detection recovery from deadlock, combined approach.	8

5	**Memory Management:** Base machine , Residence monitor , multiprogramming with fixed partition , multiprogramming with variable partitions, multiple base register , paging , segmentation , paging segmentation, virtual memory concepts , demand paging performance , page replacement algorithms , allocation of frames, thrashing , cache memory organization impact on performance .	7

COURSE OUTCOMES: The students would have learnt

CO1: Describe the important computer system resources and the role of operating system in their management policies and algorithms.
CO2: Understand the process management policies and scheduling of processes by CPU
CO3: Evaluate the requirement for process synchronization and coordination handled by operating system
CO4: Describe and analyze the memory management and its allocation policies.
CO5: Identify use and evaluate the storage management policies with respect to different storage management technologies.
CO6: Identify the need to create the special purpose operating

Text Books:

1. Milenkovic M. , Operating System concepts , MGH
2. Tanenbaubm A. S. Operating System design and implementation, PHI
3. Silberschartz A.and Patterson J.I. , " Operating system concepts ", Wisley.

Reference Books:

1. Stilling William, Operating System, Maxwell McMillan International Edition 1992.
2. Dectel H.N., An introduction to operating system, Addision Wisley.

Course Outcomes and their mapping with Programme Outcomes:

3.

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	1	1	1	1	1	1	2	3	2	1
CO2	2	2	3	2	2	1	1	1	1	1	1	3	3	3	1
CO3	2	2	2	3	2	1	1	1	1	1	1	2	3	2	1
CO4	3	2	2	2	2	1	1	1	1	1	1	2	2	2	1
CO5	2	2	3	2	2	1	1	1	1	1	1	2	2	1	1
CO6	3	3	2	3	2	1	1	1	1	1	1	2	2	1	1

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: DATA STRUCTURE & ALGORITHMS		
Sub Code: CS204TPC06	**No. of Credits : 4=3: 1: 0(L-T-P)**	**No of lecture hours/week :04**
Exam Duration : 3 hours	**IA+ESE=30+70**	**Total no of contact hours:45**

COURSE OBJECTIVE:

1. Understand and remember algorithms and its analysis procedure.
2. Introduce the concept of data structures through ADT including List, Stack, Queues.
3. To design and implement various data structure algorithms.
4. To introduce various techniques for representation of the data in the real world.
5. To develop application using data structure algorithms.
6. Compute the complexity of various algorithms.

UNIT No	Syllabus Content	No of Hours
1	String algorithms, pattern search and editing, Arrays algorithms, development simple examples of algorithm development, complexity, Divided & conquer, binary search, selection sort, insertion sort, merge sort, quick sort complexity of sorting.	10
2	Linear list: Stacks, application of Stacks, arithmetic notations, recursion, queues and circular queues, Linked list definition, insertion and deletion of nodes, circular and doubly linked list, Header nodes.	10
3	Trees, AVL trees, Threaded trees, Heap sort, B-tress.	10
4	**Graph and representation:** graph algorithms, optimization and Greedy methods, minimum spanning tree, shortest path, DFS, BFS search, examples of backtracking sets UNION and FIND operations tables and information retrievals, hashing.	8
5	Files: File organization, sequential file, direct file organization, index sequential file organization, Data storage and management.	7

COURSE OUTCOMES: The students would have learnt

CO1: Select appropriate data structures as applied to specified problem definition.
CO2: Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
CO3: Students will be able to implement Linear and Non-Linear data structures.
CO4: Implement appropriate sorting/searching technique for given problem.
CO5: Design advance data structure using Non- Linear data structure.
CO6: Determine and analyze the complexity of given Algorithms.

Text Books:

1. Data Structures and Algorithm Analysis in C++, 2/e by Mark Allen Weiss, Pearson Education
   Wirth Niclaus , Algorithm Data Structure Programs PHI
2. Horwitz E. and Sahani S. Fundamentals and Data Structure , Computer Science Press.
3. Knuth D. Threat of Computer Programming ", Vol 1-2 Addision -Wesley
4. Aho A.V.Hopcraft and Ullman J.E. "Data Structure and Algorithms, addsion Wesley.

Reference Books:

1. Tanonbaum , A. M. and Augenstein , M.J. "Data Structure with Pascal" PHI.
2. Trambley and Sorenson "Data Structure using Pascal, MGH.
3. Stubbs D. Data Structure with Abstract Data Type and Modula 2, Brooks & Cole Publication
   Comp.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO2	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO3	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO4	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO5	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO6	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: DATA STRUCTURE & ALGORITHMSLAB	
Sub Code: CS204PPC03	**No. of Credits : 1.5=0: 0: 1.5(L-T-P)**
Exam Duration : 3 hours	**IA+ESE =30+20**

Lab OBJECTIVE:

1. Understand and remember algorithms and its analysis procedure.
2. Introduce the concept of data structures through ADT including List, Stack, Queues.
3. To design and implement various data structure algorithms.
4. To introduce various techniques for representation of the data in the real world.
5. To develop application using data structure algorithms.
6. Compute the complexity of various algorithms.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• To implement the CPP program for Insert the valuesin Array. • To implement the CPP program for Delete the values in Array. • To implement the CPP program for Update the values in Array. • To implement the CPP program for Addition, Subtraction and Multiplications of the integer values in Array. • To implement the CPP program for String algorithms. • To implement the CPP program for pattern matching instrings. • To implement the CPP program for insertion, deletion in one way LINK LIST. • To implement the CPP program for insertion, deletion in two way LINK LIST. • To implement the CPP program for insertion, deletion in circular LINK LIST. • To implement the CPP program for insertion, deletion in doubly LINK LIST. • To implement the CPP program for insertion, deletion in header LINK LIST. • To implement the CPP program for insertion, deletion in header doubly LINK LIST. • To implement the CPP program for TREE structure. • To implement the CPP program for pre-order, in-order, post-order of any Binary TREE. • To implement the CPP program for Binary search. • To implement the CPP program for Quick short. • To implement the CPP program for insertion sort. • To implement the CPP program for Bubble short etc	18

LAB OUTCOMES: The students would have learnt

CO1: Select appropriate data structures as applied to specified problem definition.
CO2: Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.
CO3: Students will be able to implement Linear and Non-Linear data structures.
CO4: Implement appropriate sorting/searching technique for given problem.
CO5: Design advance data structure using Non- Linear data structure.
CO6: Determine and analyze the complexity of given Algorithms.

Text Books:

1. Data Structures and Algorithm Analysis in C++, 2/e by Mark Allen Weiss, Pearson Education Wirth Niclaus , Algorithm + Data Structure Programs, PHI
2. Fundamentals and Data Structure, by Horwitz E. and Sahani S., Computer Science Press.
3. Threat of Computer Programming, by Knuth D., Vol 1-2 Addision - Wesley
4. Data Structure and Algorithms, by Aho A.V.Hopcraft and Ullman J.E., addsion Wesley.

Reference Books:

1. Data Structure with Pascal, Tanonbaum , A. M. and Augenstein , M.J. PHI.
2. Data Structure using Pascal, by Trambley and Sorenson MGH.
3. Data Structure with Abstract Data Type and Modula by Stubbs D. 2", Brooks & Cole Publication Comp.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO2	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO3	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO4	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO5	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO6	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: OPERATING SYSTEM LAB	
Sub Code: CS204PPC04	**No. of Credits : 1.5=0: 0: 1.5(L-T-P)**
Exam Duration : 3 hours	**IA+ESE =30+20**

Lab OBJECTIVE:

1. To learn Unix commands and shell programming
2. To implement various CPU Scheduling Algorithms
3. To implement Process Creation and Inter Process Communication.
4. To implement Deadlock Avoidance and Deadlock Detection Algorithms
5. To implement Page Replacement Algorithms
6. To implement File Organization and File Allocation Strategies.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• Basics of UNIX commands • Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir • Write C programs to simulate UNIX commands like cp, ls, grep, etc. • Shell Programming • Write C programs to implement the various CPU Scheduling Algorithms • Implementation of Semaphores • Implementation of Shared memory and IPC • Bankers Algorithm for Deadlock Avoidance • Implementation of Deadlock Detection Algorithm • Write C program to implement Threading and Synchronization Applications	18

LAB OUTCOMES: The students would have learnt

CO1: Compare the performance of various CPU Scheduling Algorithms
CO2: Implement Deadlock avoidance and Detection Algorithms
CO3: Implement Semaphores
CO4: Create processes and implement IPC
CO5: Analyze the performance of the various Page Replacement Algorithms
CO6: Implement File Organization and File Allocation Strategies

Text Books:

1. Operating System concepts, Milenkovic M., MGH
2. Operating System design and implementation, Tanenbaubm A. S., PHI
3. Operating system concepts, Silberschartz A.and Patterson J.I. ,Wisley.

Reference Books:

1. Operating System, Stilling William, Maxwell McMillan International Edition 1992.
2. An introduction to operating system, Dectel H.N., , Addision Wisley.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3	2	2	1	1	1	1	1	1	3	3	2	1
CO2	2	3	3	3	1	1	1	1	1	1	1	2	2	2	1
CO3	2	2	2	3	3	1	1	1	1	1	1	3	2	2	1
CO4	2	3	2	2	2	1	1	1	1	1	1	1	2	1	1
CO5	2	2	3	2	3	1	1	1	1	1	1	2	2	1	1
CO6	2	2	2	2	2	1	1	1	1	1	1	2	2	1	1

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: ELECTRONIC DEVICE & CIRCUITS LAB	
Sub Code: CS204PES07	**No. of Credits : 1.5=0: 0: 1.5(L-T-P)**
Exam Duration : 3 hours	**IA+ESE =30+20**

Lab OBJECTIVE:

1. To identify and test various electronic components
2. To use DSO for various measurements
3. To plot the characteristics of diode and transistor
4. To design and implement feedback amplifier circuits.
5. To measure the frequency of oscillators.

Unit No.	Content	Teaching Hours
I, II, III, IV and V	• To draw the characteristics of a semiconductor p-n junction diode and to find cut-in voltage, reverse resistance, static resistance and dynamic resistance. • To design a half wave rectifier and to determine its efficiency and ripple factor. • To design a centre tap full wave rectifier and determine the ripple factor and efficiency. • To design a bridge full wave rectifier and determine the ripple factor and efficiency. • To draw the characteristics of CE configuration of a transistor amplifier. • To draw the characteristics of CB configuration of a transistor amplifier. • To draw the characteristics of CC configuration of a transistor amplifier. • To draw the characteristics of JFET (N-channel / P- Channel). • To draw the characteristics of MOSFET (Depletion Type / Enhancement Type). • To draw Static input and output characteristics curves of CE transistor and determine its h-parameter values. • To draw Static input and output characteristics curves of CC transistor and determine its h-parameter values.	18

	• Study of various topologies of feedback amplifier. • To Design Wein Bridge Oscillator and determine the frequency of Oscillation. • To Design RC phase shift oscillator and determine the frequency of Oscillation.	

LAB OUTCOMES: The students would have learnt

CO1: Understand the diode and transistor characteristics.
CO2: Verify the rectifier circuits using diodes and implement them using hardware.
CO3: Design various amplifiers like CE, CC, common source amplifiers and implement them using hardware and also observe their frequency responses
CO4: Understand the construction, operation and characteristics of JFET and MOSFET, which can be used in the design of amplifiers.
CO5: Know the concept of feedback amplifier and their characteristics
CO6: Design the different oscillator circuits for various frequencies

Text Books:

1. Lab Manual of Basic Electronics by Paul B Zbar, TMH
2. Laboratory Manual for Electronic Devices and Circuits, 4th Ed., David A. Bell, PHI
3. Electronic Devices and Circuit Theory, Robert L. Boylestad & L. Nashelsky, K. L. Kishore, 9th Edition, PHI
4. Integrated Electronics: Analog & Digital Circuit Systems, Jacob Millman & Halkias, Tata McGraw Hill.
5. Microelectronics, Millman and Grabel, Tata McGraw Hill.
6. Integrated Circuits by K. R. Botkar, 9th Ed., Khanna Publicationso

Reference Books:

1. Electronic Devices & Circuits, Allen Mottershead, PHI.
2. Microelectronic Circuits, Sedra and Smith, 5th Edition, Oxford UniversityPress.
3. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2							2	2	1	1
CO2	3	3	3	2	2							2	2	1	1
CO3	3	3	2	2	2							2	2	1	1
CO4	3	3	2	2	2							2	2	1	1
CO5	3	3	2	2	2							2	2	1	1
C06	3	3	3	2	2							2	2	1	1

Weightage: 1-Sightly; 2-Moderately; 3-Strongly