IPS Academy, Institute of Engineering & Science

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme Based on AICTE Flexible Curriculum

Department of Computer Science & Engineering

Bachelor of Technology (B.Tech.) [Computer Science & Engineering]

V Semester

S.No.	Subject Code	Category	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
				Theory			Practical						
				End Sem	Mid Sem. Exam.	Quiz/ Assignment	End Sem	Term work / Lab Work & Sessional		L	T	P	
1.	**PCC-CS501**	PCC	**Database Management System**	70	20	10	60	40	**200**	2	1	2	**4**
2.	**PCC-CS502**	PCC	**Theory of Computation**	70	20	10	60	40	**200**	3	–	2	**4**
3.	**PCC-CS503**	PCC	**Operating System**	70	20	10	60	40	**200**	2	1	2	**4**
4.	**PCC-CS504**	PCC	**Computer Peripherals**	–	–	–	60	40	**100**	–	–	4	**2**
5.	**PEC-CS501**	PEC	**Elective-I**	70	20	10	–	–	**100**	4	–	–	**4**
6.	**OEC-CS501**	OEC	**Open Elective-I**	70	20	10	–	–	**100**	3	–	–	**3**
7.	**PROJ-CS501**	PROJ	**Seminar-I**	–	–	–	–	50	**50**	–	–	2	**1**
8.	**–**	PROJ	**Internship-I**	To be completed during semester break. Its Evaluation / Credit to be added in Sixth Semester.									
			Total	**350**	**100**	**50**	**240**	**210**	**950**	**14**	**2**	**12**	**22**

Electives-I	**Open Electives-I**
PEC-CS501(A) Software Engineering & Project Management	OEC-CS501(A) Stress Management
PEC-CS501(B) Advanced Computer Architecture	OEC-CS501(B) Business Communication
PEC-CS501(C) Agile Software Development	OEC-CS501(C) Foreign Language (German/ French)
PEC-CS501(D) Computer Graphics & Multimedia	OEC-CS501(D) Digital Marketing & SEO

1 Hr Lecture	1 Hr Tutorial	2 Hr Practical
1 Credit	1 Credit	1 Credit

IPS Academy
Institute of Engineering & Science
Department of Computer Science & Engineering

V-Semester

PCC-CS501	Database Management System	2L: 1T: 2P (5 hrs.)	4 credits

Course Objective:

The main objective of this course is to understand fundamental of database management system.

Course Contents: (45 hrs.)

Module 1: **(06 hrs.)**

DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach, Advantages, of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Overall Database Structure, Functions of DBA and designer, ER data model: Entitles and attributes, Entity types, Defining the E-R diagram, Concept of Generalization, Aggregation and Specialization. transforming ER diagram into the tables. Various other data models object- o r i e n t e d data Model, Network data model, and Relational data model, Comparison between the three types of models.

Module 2: **(08hrs.)**

Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Relational Query languages: SQL-DDL, DML, integrity con straints, Complex queries, various joins, Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union. Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations.

Module 3: **(14 hrs.)**

Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies. Query O p t i m i z a t i o n : Introduction, steps o f optimization, various algorithms to implement select, project and join operations of relational algebra, optimization methods: heuristic based, cost estimation based.

Module 4: **(09 hrs.)**

Transaction Processing Concepts: -Transaction s ystem , Testing of Serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency

Control Techniques: Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction.

Module 5: **(08 hrs.)**

Study of Relational Database Management Systems through Oracle/PL SQL

QL/MySQL: Architecture, physical files, memory structures, background process. Concept of table spaces, segments, extents and block. Dedicated server, multi threaded server. SQL queries, Data extraction from single, multiple tables equi- join, non equi-join, self - join, outer join. Usage of like, any, all, exists, in Special operators. Cursor management: nested and parameterized cursors, Oracle exception handling mechanism. Stored procedures, in, out, in out type parameters, usage of parameters in procedures. User defined functions their limitations. Triggers, mutating errors, instead of triggers.

Course Outcomes:

1. Describe basic concepts of DBMS and Explain ER model.
2. Solve queries using Relational Algebra, Relational Calculus and SQL.
3. Explain database schema and discuss the Query optimization methods.
4. Describe transaction processing, concurrency control and recovery technique.
5. Analyze the Various DBMS software like Oracle, SQL/PL SQL etc.

List of Text / Reference Books:

1. Date C J, “An Introduction to Database System”, Pearson Educations, 8th Edition,2003.
2. Korth, Silbertz,Sudarshan, “Fundamental of Database System”, McGraw Hill,5th Edition,2006.
3. Peter Rob, “ Data Base System:Design Implementation & Management”, Cengage Learninig 4th Edition,2000.
4. Elmasri, Navathe, “Fundamentals of Database Systems”, Pearson Educations,7th Edition 2017.
5 . Atul Kahate ,“ Introduction to Database Management System”, Pearson Educations,2004.
6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press, TMH.
7. Paneerselvam,”DataBase Management System”, PHI Learning,3rd Edition,2018.
8. J. D. Ullman, “Principles of Database and Knowledge – Base Systems”, Computer Science Press,2nd Edition 1988.
9. Serge Abiteboul, Richard Hull, Victor Vianu,“Foundations of Databases”, Addison-Wesley,1995.

List of Experiments

1. Introduction to Oracle and SQL
2. Write the queries for Data Definition language (DDL)
3. Write the queries for Data manipulation language (DML)
4. Use of various types of Integrity Constraints
5. Write the queries for Data Control language (DCL)
6. Use of SELECT command with different clauses.
7. Write SQL queries using logical operation (AND, OR, NOT)
8. Write SQL queries for aggregate functions (Max, Min, Sum, Avg, and Count)
9. Write SQL queries for group by and having
10. Write SQL queries for sub queries and nested queries
11. Write an SQL query to implement JOINS
12. Write SQL queries to create views
13. Write program by the use of PL/SQL
14. Design and implementation of any Data base system (like Banking, University etc).

IPS Academy
Institute of Engineering & Science
Department of Computer Science & Engineering

V-Semester

PCC-CS502	Theory of Computation	3L: 0T: 2P (5 hrs.)	4 credits

Prerequisite: Discrete structure

Course Objective:

The main objective of this course is to understand fundamental of Theory of Computation.

Course Contents: (40 hrs.)

Module 1: **(08 hrs.)**

Introduction of Automata Theory: Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and mealy machines, composite machine, Conversion from Mealy to Moore and vice versa.

Module 2: **(08 hrs.)**

Types of Finite Automata: Non-Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Meaning of union, intersection, concatenation and closure, 2-way DFA.

Module 3: **(08 hrs.)**

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Module 4: **(08 hrs.)**

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

Module 5: **(08 hrs.)**

Turing Machine: Techniques for construction. Universal Turing machine Multitap, multihead and multidimensional Turing machine, N-P complete problems. Decidability and Recursively Enumerable Languages, decidability, decidable languages, undecidable languages, Halting problem of Turing machine & the post correspondence problem.

Course Outcomes

1. Explain the basic concepts of switching and finite automata theory & languages.
2. Relate practical problems to languages, automata, computability and complexity.
3. Construct abstract models of computing, check their power to recognize the languages and analyze the grammar, its types, simplification and normal form.
4. Interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.
5. Develop an overview of how automata theory, languages and computation are applicable in engineering application.

List of Text / Reference Books:

1. Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India, 2nd Edition,2003.

2. John E Hopcroft, Jeffrey D. Ullman and Rajeev Motwani, "Introduction to Automata Theory, Languages and Computation", Pearson Education, 2nd Edition,2001.

3. K.L.P Mishra & N.Chandrasekaran,"Theory of Computer Science", PHI Learning, 3rdEdition,2006.

4. Peter Linz, "Introduction to Automata Theory and Formal Languages", Narosa Publishing. 3rdEdition,2007.

5. John C Martin, "Introduction to languages and the theory of computation", TATA McGraw Hill, 3rd Edition 2013.

6. Harry R. Lewis and Christos H. Papadimitriou, "Elements of the Theory of Computation", Pearson Education Asia,2nd edition, 1998.

7. Dexter C. Kozen, "Automata and Computability", Undergraduate Texts in Computer Science, Springer,1st edition,2012.

8. Michael Sipser, "Introduction to the Theory of Computation", PWS Publishing., 3rd edition,2012.

List of Experiments:

Design a Program for:

1. Creating machine that accepts three consecutive one.
2. Creating machine that accepts the string always ending with 101.
3. Mode 3 Machine
4. Accepting decimal number divisible by 2.
5. Creating a machine which accepts string having equal no. of 1's and 0's.
6. Creating a machine which count number of 1's and 0's in a given string.
7. Find 2's complement of a given binary number.
8. Increment the given binary number by 1.
9. Convert NDFA to DFA.
10. PDA machine that accept the well-formed parenthesis.
11. PDA to accept WCWR where w is any string and WR is reverse of that string and

C is a Special symbol.

12. Turing machine that’s accepts the following language an b n c n where n>0.

IPS Academy
Institute of Engineering & Science
Department of Computer Science & Engineering

V-Semester

PCC-CS503	Operating System	2L: 1T: 2P (5 hrs.)	4 credits

Prerequisite: Computer Organization & Architecture

Course Objective:

This Course provides a comprehensive introduction of Operating System, Process Management, Memory Management, File Management and I/O management.

Course Contents: (40 hrs.)

Module 1: **(06 hrs.)**

Introduction to Operating Systems: Function, Evolution, Different Types, Desirable Characteristics and features of an O/S, Operating Systems Services: Types of Services, Different ways of providing these Services – Utility Programs, System Calls, Operating System Structure, and Spooling & Buffering.

Module 2: **(11 hrs.)**

CPU Scheduling : Process Concept, Scheduling Concepts, Types of Schedulers, Scheduling Criteria, Process State Diagram, Scheduling Algorithms, Operation on Process, Algorithms Evaluation, System calls for Process Management; Multiple Processor Scheduling; Concept of Threads. Concurrent Processes : Real and Virtual Concurrency, Mutual Exclusion, Synchronization, Inter- Process Communication, Critical Section Problem, Solution to Critical Section Problem : Semaphores – Binary and Counting Semaphores, WAIT & SIGNAL Operations and their implementation. Deadlocks: Deadlock Problems, Characterization, Prevention, Avoidance, Recovery.

Module 3: **(11 hrs.)**

Memory Management: Different Memory Management Techniques – Partitioning, Swapping, Segmentation, Paging, Paged Segmentation, Comparison of these techniques, Techniques for supporting the execution of large programs: Overlay, Dynamic Linking and Loading, Virtual Memory – Concept, Implementation by Demand Paging etc., Page replacement algorithms.

Module 4: **(06 hrs.)**

File Systems: File Concept, User's and System Programmer's view of File System, Disk Organization, Tape Organization, Different Modules of a File System, Disk Space Allocation Methods – Contiguous, Linked and Indexed. Directory Structures, File Protection, System Calls for File Management, Disk Scheduling Algorithms.

Module 5: **(06 hrs.)**

Introduction to Network, Distributed and Multiprocessor Operating Systems. Case Studies: Unix/Linux, WINDOWS and other Contemporary Operating Systems.

Course Outcomes:

1. State the core concepts of operating system, evolution and types of operating system.
2. Illustrate various input output concepts, interprocess communication and deadlock
3. Illustrate process scheduling and memory management techniques.
4. Describe the concept of file and disk management.
5. State the core concepts of network, distributed and multiprocessor operating system.

List of Text / Reference Books:

1. Avi Silberschatz, Peter Galvin, Greg Gagne, "Operating System Concepts Essentials", Wiley Asia Student Edition, 10th Edition, 2018.
2. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall of India, 5th Edition, 2005.
3. Charles Crowley, "Operating System: A Design-oriented Approach", Irwin Publishing, 1st Edition.
4. Gary J. Nutt, "Operating Systems: A Modern Perspective", Addison-Wesley, 2nd Edition.
5. Maurice Bach, "Design of the Unix Operating Systems", Prentice-Hall of India, 8th Edition.
6. Daniel P. Bovet, Marco Cesati, "Understanding the Linux Kernel", O'Reilly and Associates, 3rd Edition.
7. Andrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall, 3rd Edition,2007.
8. Bovet & Cesati, "Understanding the Linux Kernel", O'Reily, 3rd Edition.

List of Experiment:

Write a program:

1. To implement FCFS CPU scheduling algorithm.
2. To implement SJF CPU scheduling algorithm.
3. To implement Priority CPU Scheduling algorithm.
4. To implement Round Robin CPU scheduling algorithm.
5. To compare various CPU Scheduling Algorithms over different Scheduling Criteria.
6. To implement classical inter process communication problem (producer consumer).
7. To implement classical inter process communication problem (Reader Writers).
8. To implement classical inter process communication problem (Dining Philosophers).
9. To implement & Compare various page replacement algorithms.
10. To implement & Compare various Disk & Drum scheduling Algorithms
11. To implement Banker's algorithms.
12. To implement Remote Procedure Call (RPC).
13. Write a Devices Drivers for any Device or peripheral.

.

IPS Academy
Institute of Engineering & Science
Department of Computer Science & Engineering

V-Semester

PCC-CS504	Computer Peripherals	0L: 0T: 4P (4 hrs.)	2 credits

Course Objective:
To learn the functional and operational details of various Computer peripheral devices.

Course Contents: (20 hrs.)

Module 1: **(04 hrs.)**
Hardware Organization of PC: Types of motherboard and their details (Form Factor, Chipset), types of processors (INTEL, AMD etc) and their compatibility with motherboards.
Input and Output Devices: Overview of input devices like keyboard, mouse, scanner. Overview of output devices like printer, impact and non-impact printer etc. Study of various display monitors like CRT (Cathode Ray Tube), LCD (Liquid Crystal Display), LED (Light-Emitting Diodes), and Plasma.

Module 2: **(04hrs.)**
Ports: PS/2 port and its specification, PCI Ports,VGA Port and its specification, Serial port and its specification and applications, Parallel Ports and its specification, USB Port and its specification,RJ45 connector, DVI ports and connectors, Modem ,RJ-11 port.
Module 3: **(04 hrs.)**
Cables: Ethernet Connection Cables, USB cable, Unshielded Twisted Pair (UTP) Cable, Shielded Twisted Pair (STP), Coaxial Cable, Fiber Optic Cable, Molex connector
Module 4: **(04 hrs.)**
Storage Devices: Types of Hard Disk Drives. Constructional features and working of hard disk drive, optical (CD, DVD, Blue Ray) disk drive and Flash Drive, Logical structure of Hard Disk and its organization, boot record, Cache Memory, Virtual Memory. Types of RAM and ROM. Concept of BIOS. Function of BIOS
Module 5: **(04 hrs.)**
Power Supplies: Working of SMPS, On-Line/Off-Line/Line-Interactive/uninterrupted power supplies (UPS), basic principle of working their importance and maintenance

Course Outcome:

1. Differentiate various types of Processor's and Motherboard.
2. Overview different kinds of input and output devices.
3. Distinguishing various types of ports and cables.
4. Explain various types of storage devices.
5. Overview of Computer power supply.

List of Text / Reference Books:

1. B. Govinda Rajalu "IBM PC and Clones :Hardware Trouble Shooting and Maintenance", Tata McGraw Hill,1991 .
2. Robert, S Lai Addison "The waite group writing MS DOS Device, Drives" Wesley Publishing Co,2nd Edition,2002.
3. SK Bose, "Hardware and Software of Personal Computers,"Wiley Eastern Limited, New Delhi, 3rd Edition, 1991.
4. Hall, Douglas "Microprocessors and Interfacing," McGraw Hill,2005.
5. Uffenbeck "Microprocessors and Interfacing" ,2011.
6. Sukhvir Singh "Fundamentals of Computers," Khanna Publishers, New Delhi.
7. Levis Hahensteu "Computer Peripherals for Micro Computers, Microprocessor and PC" .
8. Peter Norton "Inside the PC," (Eight Edition) Tech Media Publication, New Delhi,8th edition 1999.

List of Experiments:

1. To make the comparative study of various motherboards.
2. Study of Ethernet cables.
3. Study of various cables used in computer communication.
4. Study of Hard Disk Drive Partitioning and Formatting.
5. Study of various ports used in computer communication.
6. Study of various cards used in a Computer System.
7. Study rotational and loading mechanisms of the Hard disk, CD ROM, DVD recordable drives
8. Study of various display monitors.
9. Exercise on assembling a PC with peripherals and testing the same.
10. Installation of multiple Operating Systems on same hard-drive.

IPS Academy
Institute of Engineering & Science
Department of Computer Science & Engineering

V-Semester

PEC-CS501	Software Engineering & Project Management	4L: 0T: 0P (4 hrs.)	4 credits

Course Objective:

The purpose of this subject is to cover the underlying concepts and techniques used in Software Engineering & Project Management.

Course Contents: (40 hrs.)

Module 1: **(08 hrs.)**

The Software Product and Software Process

Software Product and Process Characteristics, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model, Evolutionary Process Models like Incremental Model, Spiral Model, Component Assembly Model, RUP and Agile processes. Software Process customization and improvement, CMM, Product and Process Metrics, Feasibility Analysis, Cost Estimation Model.

Module 2: **(08 hrs.)**

Requirement Elicitation, Analysis, and Specification

Functional and Non-functional requirements, Requirement Sources and Elicitation Techniques, Use case Modeling, System and Software Requirement Specifications, Requirement Validation, Traceability.

Module 3: **(08 hrs.)**

Software Design

The Software Design Process, Design Concepts and Principles, Software Modeling and UML, Architectural Design, Architectural Views and Styles, User Interface Design, Function- oriented Design, SA/SD Component Based Design and Design Metrics.

Module 4: **(08 hrs.)**

Software Analysis and Testing

Software Static and Dynamic analysis, Code inspections, Software Testing, Fundamentals, Software Test Process, Testing Levels, Test Criteria, Test Case Design, Test Oracles, Test Techniques, Black-Box Testing, White-Box Unit Testing and Unit, Testing Frameworks, Integration Testing, System Testing and other Specialized, Testing, Test Plan, Test Metrics, Testing Tools.

Module 5: **(08 hrs.)**

Software Maintenance & Software Project Measurement

Need and Types of Maintenance, Software Configuration Management (SCM), Software Change Management, Version Control, Change control and Reporting, Program Comprehension Techniques, Re-engineering, Reverse Engineering, Tool Support. Project Management Concepts, Project and Process Planning, Resources Allocations, Project Scheduling and Tracking, Risk Assessment and Mitigation, Software Quality Assurance (SQA). Project Plan, Project Metrics.

Course Outcomes:

1. Decompose the given project in various phases of a lifecycle.
2. Choose appropriate process model depending on the user requirements.
3. Perform various life cycle activities like Analysis, Design, Implementation, Testing & Maintenance.
4. Know various processes used in all the phases of the product.
5. Apply the knowledge, techniques, and skills in the development of a software product

List of Text / Reference Books:

1. Pankaj Jalote ,"An Integrated Approach to Software Engineering", Narosa Pub, 2005
2. Rajib Mall, "Fundamentals of Software Engineering" Second Edition, PHI Learning,Fouth Edition, 2014.
3. P, S. Pressman "Software Engineering. A Practitioner's Approach" New edition, McGraw Hills,7th edition,2010.
4. Sommerville,"Software Enginerring",Pearson Education, 9th Edition,2011.
5. Richard H.Thayer,"Software Enginerring & Project Managements", WileyIndia
6. Waman S.Jawadekar,"Software Enginerring", TMH,2004.
7. Bob Hughes, M.Cotterell, Rajib Mall "Software Project Management", McGrawHill,Sixth Edition,2017
8. Schwalbe, Kathy "Information Technology Project Management" 8th Edition, 2016.
9. Kieron Conway "Software project Management from concept to development Black Book" Dreamtech Press.
10. Deepak Jain, "Software Engineering principle and practices" Oxford University Press,2008.
11. Bell Douglas "Software Engineering for students" ,Pearson Education.,4th Edition,2005.
12. Kelkar "Software Project Management," PHI Learning,3rd edition 2012.

List of Experiments:

1. Write down the problem statement for a suggested system of relevance.
2. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.
3. To perform the function oriented diagram: Data Flow Diagram (DFD) and Structured chart.
4. To perform the user's view analysis for the suggested system: Use case diagram.
5. To draw the structural view diagram for the system: Class diagram, object diagram.
6. To draw the behavioral view diagram : State-chart diagram, Activity diagram
7. To perform the behavioral view diagram for the suggested system : Sequence diagram,

Collaboration diagram

8. To perform the implementation view diagram: Component diagram for the system.
9. To perform the environmental view diagram: Deployment diagram for the system.
10. To perform various testing using the testing tool unit testing, integration testing for a sample code of the suggested system.
11. Perform Estimation of effort using FP Estimation for chosen system.
12. To prepare time line chart/Gantt Chart/PERT Chart for selected software project.

IPS Academy
Institute of Engineering & Science
Department of Computer Science & Engineering

V-Semester

PEC-CS501	**Advance Computer Architecture**	**4L: 0T: 0P (4 hrs.)**	**4 credits**

Prerequisite: Computer Organization & Architecture

Course Objective:

This subject aims to provide students with a fundamental knowledge of computer hardware and computer systems, with an emphasis on system design and performance

Course Contents: (42 hrs.)

Module 1: **(08 hrs.)**

Flynn's Classification, System Attributes to Performance, Parallel computer models - Multiprocessors and multicomputers, Multivector and SIMD Computers. Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Control flow, data flow and Demand driven mechanisms.
Static interconnection networks, Dynamic interconnection Networks: Bus Systems, Crossbar Switch, Multiport Memory, Multistage and Combining Networks

Module 2: **(08 hrs.)**

Instruction set architecture, CISC Scalar Processors , RISC Scalar Processors, VLIW architecture, Memory Hierarchy, Inclusion, Coherence and Locality, Memory capacity planning. Interleaved memory organization-memory interleaving, pipelined memory access, Bandwidth and Fault Tolerance. Backplane Bus System: Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt.

Module 3: **(08 hrs.)**

Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, pipeline hazards, Dynamic instruction scheduling - score boarding and Tomosulo's algorithm, Branch handling techniques, Arithmetic Pipeline Design, Static arithmetic pipeline, Multifunctional arithmetic pipelines. Superscalar pipeline design, Super pipeline processor design.

Module 4: **(10 hrs.)**

Cache coherence, Snoopy protocols, Directory based protocols. Message routing schemes in multicomputer network, deadlock and virtual channel. Vector Processing Principles, Vector

instruction types, Vector-access memory schemes. Vector supercomputer architecture, SIMD organization: distributed memory model and shared memory model. Principles of Multithreading: Multithreading Issues and Solutions, Multiple-Context Processors.

Module 5: (08 hrs.)

Parallel Programming Models, Shared-Variable Model, Message-Passing Model, Data-Parallel Model, Object-Oriented Model, Functional and Logic Models, Parallel Languages and Compilers, Language Features for Parallelism, Parallel Programming Environment, Software Tools and Environments.

Course Outcomes:

1. Discuss the classes of computers, and new trends and developments in computer architecture.
2. Study advanced performance enhancement techniques such as pipelines, dynamic scheduling branch predictions, caches.
3. Compare and contrast the modern computer architectures such as RISC, Scalar, and multi CPU systems.
4. Critically evaluate the performance of different CPU architecture.
5. Improve the performance of applications running on different CPU architectures.
6. Develop applications for high performance computing systems.

List of Text / Reference Books:

1. Kai Hwang, "Advanced computer architecture", TMH,2001.
2. J.P.Hayes, "computer Architecture and organization"; MGH,3rd edition.
3. V.Rajaranam & C.S.R.Murthy, "Parallel computer"; PHI Learning,7th edition,2006.
4. Kain,"Advance Computer Architecture: -A System Design Approach", PHI Learning,1st edition 2010.
5. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing,2011.
6. Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH,2017.
7. David E. Callav & Jaswinder Pal Singh Marge Kaufmann",Advance Computer Architecture", EIS India.
8. Sajjan G. Shiva, Taylar & Francis, "Advance Computer Architecture,2018.

List of Experiments:

1. Write an assembly language code to implement data transfer instruction.
2. Write an assembly language code to store numbers in reverse order in memory location.
3. Write an assembly language code to implement arithmetic instruction.
4. Write an assembly language code to add two numbers using lxi instruction.
5. Write an assembly language code to add two 8 bit numbers stored in memory and also storing the carry.
6. Write an assembly language code to find the factorial of a number.
7. Design & Verify Half Adder & Full Adder Using VHDL code.
8. Design & Verify multiplexer & de-multiplexer Using VHDL code.

9. Simulation of ALU using VHDL code.
10. Simulation of simple Processor (CPU) using VHDL code

IPS Academy
Institute of Engineering & Science
Department of Computer Science & Engineering

V-Semester

PEC-CS501	Agile Software Development	4L: 0T: 0P (4 hrs.)	4 credits

Course Objective:

To learn best practices and methods of software development

Course Contents: (40 hrs.)

Module 1: **(08 hrs.)**

Fundamentals of Agile Process: Introduction and background, Agile Manifesto and Principles, Stakeholders and Challenges, Overview of Agile Development Models: Scrum, Extreme Programming, Feature Driven Development, Crystal, Kanban, and Lean Software Development.

Module 2: **(08 hrs.)**

Agile Projects: Planning for Agile Teams: Scrum Teams, XP Teams, General Agile Teams, Team Distribution; Agile Project Lifecycles: Typical Agile Project Lifecycles, Phase Activities, Product Vision, Release Planning: Creating the Product Backlog, User Stories, Prioritizing and Estimating, Creating the Release Plan; Monitoring and Adapting: Managing Risks and Issues, Retrospectives.

Module 3: **(08 hrs.)**

Introduction to Scrum: Agile Scrum Framework, Scrum Artifacts, Meetings, Activities and Roles, Scrum Team Simulation, Scrum Planning Principles, Product and Release Planning, Sprinting: Planning, Execution, Review and Retrospective; User story definition and Characteristics, Acceptance tests and Verifying stories, Burn down chart, Daily scrum, Scrum Case Study.

Module 4: **(08 hrs.)**

Introduction to Extreme Programming (XP): XP Lifecycle, The XP Team, XP Concepts: Refactoring, Technical Debt, Timeboxing, Stories, Velocity; Adopting XP: Pre-requisites, Challenges; Applying XP: Thinking- Pair Programming, Collaborating, Release, Planning, Development; XP Case Study.

Module 5: **(08 hrs.)**

Agile Software Design and Development: Agile design practices, Role of design Principles, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control; Agility and Quality Assurance: Agile Interaction Design, Agile approach to Quality Assurance, Test Driven Development, Pair programming: Issues and Challenges.

Course Outcome:

1. Describe the fundamental principles and practices associated with each of the agile development methods.
2. Explain the Agile project lifecycle.
3. Describe the Agile Scrum framework.
4. Apply core values and principles of Agile Methods in software development.
5. Apply core values and principles of Agile Methods in software development.

List of Text / Reference Books:

1. Robert C. Martin, "Agile Software Development- Principles, Patterns and Practices, Prentice Hall, 2013.
2. Kenneth S. Rubin, "Essential Scrum: A Practical Guide to the Most Popular Agile Process", Addison Wesley, 2012.
3. James Shore and Shane Warden, "The Art of Agile Development", O'Reilly Media, 2007.
4. Craig Larman, "Agile and Iterative Development: Amanager's Guide", Addison-Wesley,2004.
5. Ken Schawber, Mike Beedle, "Agile Software Development with Scrum", Pearson, 2001.
6. Cohn, Mike, "Agile Estimating and Planning", Pearson Education, 2006.
7. Cohn, Mike, "User Stories Applied: For Agile Software Development "Addison Wisley,2004.

Online Resources:

1. IEEE Transactions on Software Engineering
2. IEEE Transactions on Dependable and Secure Computing
3. IET Software
4. ACM Transactions on Software Engineering and Methodology (TOSEM)
5. ACM SIGSOFT Software Engineering Note

List of Experiments

1. Understand the background and driving forces for taking an Agile Approach to Software Development.
2. Understand the business value of adopting agile approach.
3. Understand agile development practices
4. Drive Development with Unit Test using Test Driven Development.
5. Apply Design principle and Refactoring to achieve agility
6. To study automated build tool.
7. To study version control tool.
8. To study Continuous Integration tool.
9. Perform Testing activities within an agile project.

IPS Academy
Institute of Engineering & Science
Department of Computer Science & Engineering

V-Semester

PEC-CS501	Computer Graphics & Multimedia	4L: 0T: 0P (4 hrs.)	4 credits

Course Objective:

To equip students with the fundamental knowledge and basic technical competence in the field of computer graphics.

Course Contents: (40 hrs.)

Module 1: **(06 hrs.)**

Introduction to Raster Scan displays, Pixels, Frame buffer, Vector & Character generation, Random Scan systems, Display devices, Scan Conversion techniques, Line Drawing algorithms: simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms: Midpoint Circle drawing and Bresenham's Algorithm, Polygon fill algorithm: Boundary-fill and Flood-fill algorithms.

Module 2: **(08 hrs.)**

2-D Transformation: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogeneous coordinate system, Matrice Transformation, Composite Transformation. Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping & Polygon Clipping Algorithms

Module 3: **(08 hrs.)**

3-D Transformations: Translation, Rotation and Scaling. Parallel & Perspective Projection: Types of Parallel & Perspective Projection, Hidden Surface elimination: Depth comparison, Back face detection algorithm, Painter's Algorithm, Z- Buffer Algorithm. Curve generation, Bezier and B-spline methods. Basic Illumination Model: Diffuse reflection, Specular reflection, Phong Shading, Gouraud shading, Ray Tracing, Color models like RGB, YIQ, CMY, HSV.

Module 4: **(08 hrs.)**

Visualization: Visualization of 2D/3D scalar fields: color mapping, ISO surfaces. Direct volume data rendering: ray-casting, transfer functions, segmentation. Visualization of Vector fields and flow data, Time-varying data, High-dimensional data: dimension reduction, parallel coordinates, Non-spatial data: multi-variate, tree/graph structured, text Perceptual and cognitive foundations, Evaluation of visualization methods, Applications of visualization, Basic Animation Techniques like traditional, key framing

Module 5: **(10 hrs.)**

Multimedia :Basic of multimedia, application of Multimedia, Text-Types, Unicode Standard ,text Compression, Text file formats, Audio Components, Digital Audio, Digital Audio processing, Sound cards, Audio file formats ,Audio Processing software ,Video- Video color spaces, Digital Video, Digital Video processing, Video file formats. Animation: Uses of Animation, Principles of Animation, Computer based animation, 3D Animation, Animation file formats, Animation software, Special Effects in animation, Storyboarding for Animation, Compression: Lossless/Lossy Compression techniques, Image, Audio & Video Compression, MPEG Standards ,Multimedia Architecture, Multimedia databases.

Course Outcome:

1. Understand the basic concepts of Computer Graphics.
2. Demonstrate various algorithms for scan conversion and filling of basic objects and their comparative analysis.
3. Apply geometric transformations, viewing and clipping on graphical objects.
4. Explore solid model representation techniques and projections.
5. Understand visible surface detection techniques and illumination models

List of Text / Reference Books:

1. Donald Hearn and M.Pauline Baker, “Computer Graphics C Version”, Pearson Education, 2003.
2. Foley, Van Dam, Feiner, Hughes, “ Computer Graphics: Principles and Practice” Pearson Education India, Third Edition,2013
3. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill
4. Ranjan Parekh “Principles of Multimedia”, Tata McGraw-Hill Education, 2006
5. Rajesh K Maurya, “Computer Graphics with Virtual Reality System “, Wiley India, 2009
6. Pakhira,”Computer Graphics, Multimedia & Animation”, PHI learning
7. Khalid Sayood , “Introduction to Data Compression”, Morgan Kaufmann, Fourth Edition,2012
9. Prabat K Andleigh and Kiran Thakrar, “Multimedia Systems and Design”, PHI Learning, 1996.

10. Tay Vaughan, “Multimedia making it work”, Tata McGraw Hill edition,8th edition 2010.
11. Amarendra N Sinha & Arun D Udai, “Computer Graphics”, McGraw Hill publication,1st edition,2008.
12. Mukherjee, “Fundamental of Computer Graphics and Multimedia”, PHI Learning.

List of Experiments:

1. Study of input output devices.
2. Explain working and principle of CRT display.
3. Program to Draw a Line using DDA Algorithm
4. Program to Draw a Line using Bresenham’s Algorithm
5. C Program implementing bresenham`s circle drawing algorithm
6. C program implementing midpoint circle drawing algorithm.
7. C program implementing polygon filling using seed fill (boundary fill/flood fill) algorithm.
8. C Program for 2D transformation.
9. C Program for Cohen Sutherland line clipping.
10. Program for Sutherland Polygon Clipping.
11. Program for 3-D Transformation.

IPS Academy
Institute of Engineering & Science
Department of Computer Science & Engineering

V-Semester

Open Elective-I

OEC-CS501	**Digital Marketing & SEO**	**3L: 0T: 0P (3 hrs.)**	**3 credits**

Course Objective:

The objective of subject is to facilitate students to understand digital marketing and its importance.

Course Contents: (40 hrs.)

Module 1: **(08 hrs)**

Digital Marketing: Introduction, Moving from Traditional to Digital Marketing, Integrating Traditional and Digital Marketing, Reasons for Growth. Need for a comprehensive Digital Marketing Strategy. Concepts: Search Engine Optimization (SEO); Concept of Pay Per Click

Module 2: **(08 hrs)**

Social Media Marketing: Introduction, Process - Goals, Channels, Implementation, Analyze. Tools: Google and the Search Engine, Facebook, Twitter, YouTube and LinkedIn. Issues: Credibility, Fake News, Paid Influencers; Social Media and Hate/ Phobic campaigns. Analytics and linkage with Social Media. The Social Community.

Module 3: **(08 hrs)**

Email Marketing: Introduction, email marketing process, design and content, delivery, discovery. Mobile Marketing: Introduction and concept, Process of mobile marketing: goals, setup, monitor, analyze; Enhancing Digital Experiences with Mobile Apps. Pros and Cons; Targeted advertising. Issues: Data Collection, Privacy, Data Mining, Money and Apps, Security, Spam. Growth Areas.

Module 4: **(08hrs)**

Managing Digital Marketing: Content Production; Video based marketing; Credibility and Digital Marketing; IoT; User Experience; Future of Digital Marketing.

Module 5: **(08 hrs)**

SEO Analytics, Monitoring & Reporting : Google Search Console (GSC),Key Sections & Features of GSC; How to monitor SEO progress with Key Features of GSC: Overview, Performance, URL Inspection, Coverage, Sitemaps, Speed, Mobile Usability, Backlinks, Referring Domains, Security& Manual Actions, How to do SEO Reporting.

Course Outcome:

1. Understand the concept of digital marketing and its real-world iterations.
2. Articulate innovative insights of digital marketing enabling a competitive edge.
3. Understand how to create and run digital media based campaigns.
4. Identify and utilise various tools such as social media etc.
5. Understand how to do SEO Audit.

List of Text / Reference Books:

1. Dodson, Ian, " The Art of Digital Marketing - The Definitive Guide to Creating Strategic", Targeted, and Measurable Online Campaigns. Wiley, 2016.
2. Ryan, Damien, " Understanding Digital Marketing - Marketing Strategies for Engaging the Digital Generation", Kogan Page Limited, 2008.
3. Gupta, Sunil, "Driving Digital Strategy" Harvard Business Review Press, 2018.
4. Tuten, Tracy L. and Solomon, Michael R. "Social Media Marketing", Sage, 3rd edition 2017.
5. Bhatia, Puneet S." Fundamentals of Digital Marketing", Pearson, 2nd edition, 2019.
6. Kotler, Philip "Marketing 4.0: Moving from Traditional to Digital", Wiley, 1st edition, 2017.

IPS Academy
Institute of Engineering & Science
Department of Computer Science & Engineering

V-Semester

Open Elective-I

OEC-CS501	Stress Management	3L: 0T: 0P (3 hrs.)	3 credits

Course Objectives
The objective of this course is to enable students to understand and learn how to use various techniques and determine the most appropriate method to aid in managing reaction to stress.

Course Outcomes
Identify, describe and practice research-based coping strategies and relaxation techniques that contribute to managing life's stress.

Course Contents
Module-I
Introduction to Stress
Introduction to stress: Meaning, Definition, Eustress and Distress, Types of stress: Acute stress, Episodic Acute stress and chronic stress, Signs and Symptoms

Module -II
Sources of Stress across the Lifespan
Psychological, Social, Environmental, Academic, Family and Work stress, Adaptive and Maladaptive Behavior, Individual and Cultural Differences

Module - III
Impact of Stress
Physiological Impact of stress -Autonomic Nervous System Changes, Changes in Brain, General adaptive syndrome (GAD), Quality of sleep, Diet and Health effects (ii) Psychological Impact of stress - Impaired Mental functions, Poor memory (iii) Social Impact of stress - Stressful Life Events, Social support and health

Module - IV
Success over Stress
Understanding your stress level, Role of Personality Pattern, Self Esteem, Locus of Control, Role of Thoughts Beliefs and Emotions Coping Mechanisms: - Coping Mechanisms: Appraisal focus Use of Audio and Video Aids , Cultural Activities, Autogenic Training, Biofeedback, Relaxation, Yoga and Meditation Emotional focused and Problem focused , 'Fight or Flight' Response, Stress warning signals

Module –V
Project based learning
Project report on Stress Management (Students will prepare and submit a report under the guidance of the mentors)

Text Books:

1. Greenberg, J. S. (2017). Comprehensive Stress Management (14th edition). New York: McGraw Hill.
2. Roy, Sumita. (2005) Managing Stress: Handle, Control, Prevent Sterling Publisher
3. Davis M. (2000) *The Relaxation and Stress Reduction Work Book*, New Harbinger inc.
4. Simmons M., Daw W. (1994) *Stress, Anxiety, Depression: a Practical Workbook,* Winslow Press.
5. Tyler M. (1999) *Stress Management Training for Trainers Handbook*, Living with Stress Ltd
6. Udai, Y. (2015). Yogasan aur pranayam. New Delhi: N.S. Publications

Reference Books:

1. Cooper K. (1991) *Overcoming Hypertension*, Bantam Books.
2. Hambly K., Muir A. (1997) *Stress Management in Primary Care,* Butterworth Heinemann.
3. Jones H. (1997) *I'm too Busy to be Stressed,* Hodder and Stoughton
4. Payne R. (1995) *Relaxation Techniques: a Practical Handbook for Healthcare Professionals,* Churchill Livingstone.
5. Steinmetz J. (1980) *Managing Stress Before it Manages You,* Bull Publishing.