Faculty of Computer Science & Application

P.K.University

Shivpuri (MP)

Evaluation Scheme & Syllabus
M.Sc Computer Science
(I Year)

Master of Science (Computer Science)
(Faculty of Computer Science& Application)
P.K. University, Shivpuri (MP)

Course Structure, Scheme of Examination & Syllabus

Exam Scheme:

Theory 70

Internal 30

Practical (Internal +External)=25+25=50

I Semester

Subject Code	Subje	Internal	External	Total
CSC -1.1	Computer System and Programming in C	30	70	100
CSC -1.2	Computer Architecture	30	70	100
CSC -1.3	Discrete Mathematical Structures	30	70	100
CSC -1.4	Theory of Computation	30	70	100
CSC -1.5	Advanced Database Management Systems	30	70	100
Practical				
Subject	**Subject Name**			
CSL -1.6	Programming using C Lab	25	25	50
CSL -1.7	Advanced Database Management Systems Lab	25	25	50

II Semester

Subject	Subject	Internal	External	Total
CSC -2.1	Operating System	30	70	100
CSC -2.2	Object Oriented Programming using C++	30	70	100
CSC -2.3	Software Engineering	30	70	100
CSC -2.4	Computer Graphics	30	70	100
CSC -2.5	Java Programming	30	70	100
Practical				
CSL -2.6	OOPS lab C++	25	25	50
CSL -2.7	Java Programming Lab	25	25	50

Master of Science (Computer Science)
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P.K. University, Shivpuri (MP)

I SEMESTER (I Year)
CSC -1.1 Computer Systems and Programming in C

Unit1:
Basics of Computer:
Introduction to digital computer, basic c operations of computer, functional components of computer, Classification of computers.
Introduction to operating system: [DOS, Windows, Linux and Android]
purpose, function, services and types.
Number system : Binary, octal and hexadecimal number systems, their mutual conversions, Binary arithmetic.
Basics of programming: Approaches to Problem Solving, Concept of algorithm and flow charts, Types of computer languages:- Machine Language, Assembly language and High Level Language, Concept of Assembler, Compiler, Loader and Linker.
Unit2:
Standard I/O in C, Fundamental data types- Character type, integer, short, long, unsigned, single and double floating point, Storage classes- automatic, register, static and external, Operators and expression using numeric and relational operators, mixed operands, type conversion, logical operators, bit operations, assignment operator, operator precedence and associability. Fundamentals of C programming: Structure of C program, writing and executing the first C program, components of C language.
Unit3 : Conditional program execution: Applying if and switch statements, nesting if and else, use of break and default with switch ,program loops and iterations: use of while, do while and for loops, multiple loop variables, use of break and continue statements . Functions: Introduction, types of functions, functions with array, passing values to functions, recursive functions.
Unit 4
Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays. Structure, union, enumerated data types
Unit 5 Pointers: Introduction, declaration, applications File handling standard C preprocessors, defining and calling macros, conditional compilation, passing values to the compiler.

Text Books:
1. Problem Solving and Program Design in C, by Jeri R.Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.
2.Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition [India Edition], 2007.
3.Programming in ANSI C by EBalaguruswami
4. Computer System and Programming in C By Dr.Anand K.Tripathi, Dr.Monika Tripathi, Laxmi Publication Delhi.

1.6 Programming C Lab:

1. WAP that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.
2. WAP that calculates the Simple Interest and Compound Interest. The Principal , Amount, Rate of Interest and Time are entered through the keyboard.
3. WAP to calculate the area and circumference of a circle.
4. WAP that accepts the temperature in Centigrade and converts in to Fahrenheit using the formula

$$C/5=(F-32)/9.$$

5. WAP that swaps values of two variables using a third variable.
6. WAP that checks whether the two numbers entered by the user are equal or not.
7. WAP to find the greatest of three numbers.
8. WAP that finds whether a given number is even or odd.
9. WAP that tells whether a given year is a leap year or not.
10. WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria:

        Between 90-100%--------------Print 'A'
        80-90%--------------------------Print 'B'
        60-80%------------------------Print 'C'
        Below 60%--------------------Print 'D'

11. WAP that takes two operands and one operator from the user and perform the operation and prints the result by using Switch statement.
12. WAP to print the sum of all numbers up to a given number.
13. WAP to find the factorial of a given number.
14. WAP to print sum of even and odd numbers from 1 to N numbers.
15. WAP to print the Fibonacci series.
16. WAP to check whether the entered number is prime or not.
17. WAP to find the sum of digits of the entered number.
18. WAP to find the reverse of a number.
19. WAP to print Armstrong numbers from 1 to 100.
20. WAP to convert binary number into decimal number and vice versa.
21. WAP that simply takes elements of the array fro m the user and finds the sum of these elements.
22. WAP that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and prints them.
23. WAP to find the minimum and maximum element of the array.
24. WAP to search an element in a array using Linear Search.
25. WAP to sort the elements of the array in ascending order using Bubble Sort technique.
26. WAP to add and multiply two matrices of order nxn.
27. WAP that finds the sum of diagonal elements of a mxn matrix.
28. WAP to implement strlen (), strcat (),strcpy () using the concept of Functions.
29. Define a structure data type TRAIN_INFO. The type contain

    Train No.: integer type
    Train name: string
    Departure Time: aggregate type TIME
    Arrival Time : aggregate type TIME
    Start station: string
    End station: string

The structure type Time contains two integer members: hour and minute. Maintain a train timetable and implement the following operations:

(i)   List all the trains (sorted according to train number) that depart from a particular section.

ii)   List all the trains that depart from a particular station at a particular time.

iii)   List all he trains that depart from a particular station within the next one hour of a given time.

(iv)   List all the trains between a pair of start station and end station.

30.WAP to swap two elements using the concept of pointers.

31.WAP to compare the contents of two files and determine whether they are same or not.

32.WAP to check whether a given word exists in a file or not. If yes then find the number of times it occurs.

Master of Science (Computer Science)
(Faculty of Computer Science& Application)
P.K. University, Shivpuri (MP)

I SEMESTER (I Year)

CSC - 1.2 Computer Architecture

Unit I

Information Representation: Number systems, Binary numbers, Sign Magnitude & 2s complement representation. Fixed and Floating point, IEEE-754 Single Precision format, IEEE-754 Double Precision format, Floating-Point Arithmetic, IEEE Standard for Binary Floating-Point Arithmetic , Precision and range, BCD code, ASCII and EBCDIC

Digital Electronics: Boolean algebra, Logic gates, Truth Tables, Combinational circuits, Karnaugh map, Flip-flops, Sequential circuits

Unit II

Combination RTL Components : Integrated circuits, Multiplexer, Demultiplexers, Decoder, Encoder, Registers, Shift Registers, Binary Counters, Memory Unit - RAM, ROM. Parity generators and checkers, Error detection and correction : Hamming Code, Binary Adder-Subtracter, Decimal adder, Binary multiplier, magnitude comparator, Programmable Logic Devices- PLA, PAL, ROM. Sequential RTL components : Registers counters

Unit III

Central Processing Unit : General Register Organization, Stack Organization, Reverse Polish Notation, Machine Language instructions, Addressing modes, Instruction formats, Instruction set selection, Instruction cycle and execution cycle, RISC vs CISC

8085 Microprocessor: Block diagram, System Bus, Addressing modes, Instruction Set, Instruction Set Classification, Instruction Format, Simple assembly language Programming using 8085 microprocessor

Unit IV

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures: Time shared common bus, Multiport memory, Crossbar switch, Multistage switching network, Hypercube system. Interprocessor Arbitration, Interprocessor communication and Synchronization, Cache Coherance

Unit V

Pipeline and Vector Processing: Parallel processing, Flynn's classification, Pipelining, Arithmetic Pipeline, Instruction pipeline, RISC Pipeline, Pipelining in CPU design, Superscalar processors, Vector Processing, Array Processing.

Quantitative principles of Computer Design : Clock cycle, Clock cycle time, Clock speed, CPU time, Instruction count, Instructions per clock, Cycles per second, Clock cycles per instruction, CPU clock cycles, Amdahl's Law,

Text Books:

1. Mano M, Computer System and Architecture (3rd Ed) (PHI)

2. J.L.Hennessy&D.A.Patterson – Computer Architecture – A Quanative approach 2nd Edition – Mergan Kaufman Pub – 1996

3. V.C.Hammacher, Z.G.Vranesic, S.G.ZAky – Computer Organization McGraw Hill 1996

Reference Books:

1. K.Hwang – Advanced Computer Architecture, McGraw Hill, 1993

2. D.Sima, T.Fountation, P.Kacsak – Advanced Computer Architecture – A design space Approach, Addison Wesley, 1997

Master of Science (Computer Science)
(Faculty of Computer Science& Application)
P.K. University, Shivpuri (MP)

I SEMESTER (I Year)

CSC-1.3 Discrete Mathematical Structures

Unit I
Sets and Functions:

Sets, Relations, Functions, Pigeonhole principle, Inclusion - Exclusion Principle, Equivalence and Partial orderings, Elementary counting techniques, relation of partial order partitions, binary relations.

Unit II
Graph Theory:

Definition, Walks, Paths, Directed and Undirected graphs, connected graphs, regular and bipartite graphs, Eulerian chains and cycles. Hamiltonian chains and cycles, planar graphs, Trees and rooted tree, Spanning trees, Chromatic number Connectivity and other graphical parameter application.

Unit III
Combinatorial Mathematic:
Basic counting principles Permutations and combinations, Recurrence relations, generating Function, Application.

Rings and Boolean algebra: Rings Subrings morphism of rings ideals and quotient rings. Euclidean domains Integral domains and fields Boolean Algebra direct product morphisms Application of Boolean algebra in logic circuits and switching functions.

References

1.   Ehrig, H., Mahr, B. Fundamentals of Algebraic Specification I, EATCS Monographs on
        Theory. Comp. Sc. Vol. 6 spinger, Berlin 1985.
2.   Gersting J. Mathematical Structures for Computer Science, W.H. Freman, New York, 1987.
3.   Gibons, A. Algorithmic Graph theory Cambridge University Pres, 1985.
4.   Knuth, D.E. The art of Computer Programming Vol. I: Fundamental Algorithms. 2nd ed.
        Reading, Mas, Adison Wesley 1973.
5.   Kolman B. Busby R. Discrete Mathematical Structures for Computer Science, Prentice Hall
        Englewod Clifs. 1987.
6.   Sahni, S. Concepts in Discrete Mathematics Fridley MN., Camelot Publ. Comp., 1981.
7.   Schmidt G. Strohlein T. Relations Graphs Program, EATS Monograph on Theor. Comp. Sc.

Master of Science (Computer Science)
(Faculty of Computer Science& Application)
P.K. University, Shivpuri (MP)
I SEMESTER (I Year)

CSC -1.4 Theory of Computation

Unit I

Introduction to finite automata, Central concepts of automata theory, Informal picture of finite automata, Deterministic finite automata, Non-deterministic finite automata, Application, Formal Language

Unit II

Regular expressions, Finite automata and Regular expressions, Applications of regular expressions, Algebraic laws of regular expressions, Pumping Lemma and its application for regular languages, Closure and Decision properties of regular languages

Unit III

Context-Free Grammars, Parse trees, Ambiguity in Grammar & Languages, Pushdown automation. The language of PDA, Equivalence of PDA‟s and CFG‟s, Deterministic pushdown automata, Chomsky Normal form, The pumping Lemma for context free languages, Decision properties of CFL‟s

Unit IV

The Turing machine, Programming techniques for Turing machines, Extension to the basic Turing machine, Restricted Turing machine, Turing machines and computers.

Unit V

Non-Recursively enumerable languages, Undecidable problem that in recursively enumerable, Undecidable problem about Turing machines, Post‟s correspondence problem, other undecidable problems.

Text Books

1. Introduction to Automata Theory, Languages and Computation- J.Hoperoft, R.Motwani, J.D.Ullman – Pearson Education
2. Mishra, Chandrashekharan, "Theory of Computer Science", PHI

Reference Books

1. Introduction to Theory of Computation – M.Siper, Thomson Learning
2. P. Linz, "An Introduction to formal Languages and Automata", Norasa, 2000
3. LewishPapadimitra: theory of Computations, Prentice Hall of India, New Delhi

Master of Science (Computer Science)
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P.K. University, Shivpuri (MP)

I SEMESTER (I Year)

CSC -1.5   Advanced Database Management Systems

Unit 1

Introduction: Introduction to File and Database systems- History- Advantages, disadvantages- Data views – Database Languages – DBA – Database Architecture – Data Models -Attribute types – Keys -ER diagram–EER Diagram- Overview of Network and Hierarchical models.

Unit 2

Relational Model: The relational data model, Relational constraints, Relational calculus. The domain relational calculus, Relational algebra .ER and ERR to relational mapping

Query languages – SQL – Data definition – Queries in SQL – SQL: Basic queries .Complex queries, Insert delete and update statement in SQL, Views, Constraints and assertion, Updates

Unit 3

Database Design: Design Phases – Pitfalls in Design –Functional Dependence – Amstrong Axioms, Normalization (1NF, 2NF, 3NF, BCNF, 4NF,
5NF).

Unit 4

Transaction Management: Transaction concept – state- Serializability – Recoverability-Concurrency Control –Locks- Two Phase locking – Deadlock handling– Time stamp odering, File Organization – Organization of Records in files – Indexing and Hashing.

Query processing and Optimization: Basic algorithms for Query operations, Using heuristics selectivity & cost estimates in query optimization, semantic query optimization

Unit 5

Current Trends: Object-Oriented Databases- OODBMS- rules – ORDBMS- Complex Data types – Distributed databases – characteristics, advantages, disadvantages, rules-Homogenous and Heterogeneous-Distributed data Storage –Overview Data mining- Data warehousing

Text Book:

1. Rameez Elmasri, Shamkant B. Navathe, „Fundamentals of Database Sytems", 5th
   Ed., Pearson Education, 2009.

Reference Book:

1. Philip J. Pratt, Joseph J Adamski, „Database Management Systems", Cengage
   Learning, 2009.

2. Abraham Silberschatz, Henry F. Korth & S. Sudarshan, „Database System
   Concepts",. McGraw Hill International Edition, 2006

3. Arun K Majumdar, Pritimoy Bhattacharyya, „Database Management Systems", TMH,
   2009

4. ISRD group, „Introduction to Database Management Systems", TMH, 2008

5. Raghu Ramakrishnan, Johannes Gehrke, „Database Management Systems",
   McGraw Hill ,International Edition, 2003.

6. Ramon A Mata-Toledo, Pauline K Cushman, „Database Management Systems", TMH, 2008.

CSL -1.7 Advanced Database Management Systems Lab

01. Learning basic DDL and DML commands
02. Learning basic DCL and TCL commands.
03. Insertion, Deletion, Updating to a table using SQL commands
04. Working with dual table.
05. Data retrieval using Select & where clause.
06. Oracle inbuilt functions-Date, aggregate, group by etc.
07. Use of Joins and Sub queries.
08. Views, sequences and indexes.
09. Managing users, privileges and roles.
10. PL/SQL-Data types, control structures.
11. Creating procedures with PL/ SQL.
12. Error handling in PL/ SQL.
13. Cursor Management in PL/ SQL.
14. Writing Programs on Packages & triggers.

Master of Science (Computer Science)
(Faculty of Computer Science& Application)
P.K. University, Shivpuri (MP)

II SEMESTER (I Year)

CSC- 2.1 Operating System

Unit I

Introduction to System Programs & Operating Systems, Evolution of Operating System (mainframe, desktop, multiprocessor, Distributed, Network Operating System, Clustered & Handheld System), Operating system services, Operating system structure, System Call & System Boots, Operating system design & Implementations, System protection, Buffering & Spooling . Types of Operating System: Bare machine, Batch Processing, Real Time, Multitasking & Multiprogramming, time-sharing system.

Unit II

File: concepts, access methods, free space managements, allocation methods, directory systems, protection, organization ,sharing & implementation issues, Disk & Drum Scheduling, I/0 devices organization, I/0 devices organization, I/0 buffering, I/O Hardware, Kernel I/O subsystem, Transforming I/O request to hardware operations. Device Driver: Path managements, Sub module, Procedure, Scheduler, Handler, Interrupt Service Routine. File system in Linux & Windows

Unit III

Process: Concept, Process Control Blocks (PCB), Scheduling criteria Preemptive & non Preemptive process scheduling, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling, operations on processes, threads, inter process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock: Characterization, Methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Process Management in Linux.

Unit IV

Memory Hierarchy, Concepts of memory management, MFT & MVT, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, and paging combined with segmentation. Structure & implementation of Page table. Concepts of virtual memory, Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation

Unit V

Distributed operating system:-Types, Design issues, File system, Remote file access, RPC, RMI, Distributed Shared Memory(DSM), Basic Concept of Parallel Processing & Concurrent Programming Security & threats protection: Security violation through Parameter, Computer Worms & Virus, Security Design Principle, Authentications, Protection Mechanisms. introduction to Sensor network and parallel operating system. Case study of Unix, Linux & Windows,

List of Experiment

1. Write a program to implement FCFS CPU scheduling algorithm.
2. Write a program to implement SJF CPU scheduling algorithm.
3. Write a program to implement Priority CPU Scheduling algorithm.
4. Write a program to implement Round Robin CPU scheduling algorithm.
5. Write a program to compare various CPU Scheduling Algorithms over different Scheduling Criteria.

6. Write a program to implement classical inter process communication problem(producer consumer).
7. Write a program to implement classical inter process communication problem(Reader Writers).
8. Write a program to implement classical inter process communication problem (Dining_ Philosophers).
9. Write a program to implement & Compare various page replacement algorithm.
10. Write a program to implement & Compare various Disk & Drum scheduling Algorithms
11. Write a program to implement Banker's algorithms.

Master of Science (Computer Science
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II SEMESTER (I Year)
CSC -2.2 Object Oriented Programming using C++

Unit I

Introduction to object oriented Programming, Features of OOPS. Getting started with C++ Data type, variables, expression, control structure, Concept of reference variable, I/O Stream class. Function: Definition, parameter passing, references, inline function, function overloading, function with arguments and reference, returning by reference.

Unit II

Class: Structure and class comparison Classes & objects , private, public & protected access specifies, data member and member function , static data member & member function, inline function ,friend function, constructor, types of constructor, destructor.

Unit III

Dynamic memory management (new and delete), pointer to object. Inheritance: What is inheritance? Types of inheritance, Member accessibility, function overriding, derived class by derived by different access specifiers, multipath inheritance and pointer to objects in inheritance. Polymorphism: Run time polymorphism & virtual function, abstract class, object slicing.

Unit IV

Operator Overloading: Overloading of unary & binary operators, overloading using member function & friend function, overloading of Stream operator, Copying object, Type Conversion
– Class to basic conversion, basic to class conversion

Unit V

Exception Handling - Exception and derived classes, try, catch, throw statement, catching all exception, unexpected exception, re-throwing an exception.
Templates - Function templates, class templates, Introduction to STL - Containers, algorithms, integrators

Reference Books:

1. A.N. Kamthane, "Object Oriented Programming with ANSI & Turbo C++", Pearson Education.

2. E. Balguruswamy, "Object Orientd Programming with C++", TMH Publisher.

3. K.R.Venugopal, Rajkumar,,TRavishankar, "Mastering C++", TMH Publisher

CSL -2.6 Object Oriented Programming using C++ Lab

01. Implementing classes and creation of objects.
02. Checking Precedence of operators & side effects.
03. Implementing various control structures & loops.
04. Making structured programming & stepwise refinement.
05. Implementing Procedural abstraction with functions.
06. Implementing Constructors and destructors.
07. Implementing Data abstraction & inheritance.
08. Implementing Multiple & hybrid inheritance.
09. Implementing Polymorphism concepts.
10. Implementing Operator overloading & friend"s functions.
11. Working with new & delete, object copying.
12. Implementing Object slicing, this operator.
13. Exception handling mechanisms.
14. Implementing class templates & function templates.
15. Creating files in C++ and file related operations.

Master of Science (Computer Science)
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II SEMESTER (I Year)
CSC -2.3 Software Engineering

Unit I

Introduction to software Engineering: Basic concepts about software and program and Evolution of Software Engineering, Basic concepts on process and life cycle models. Models: Waterfall, Prototype, Evolutionary, Incremental, Spiral, V Model, RADM.

Unit II

Requirements Engineering, Functional and Non-Functional Requirements, The Software Requirements Document, Requirements Specification, Software design: Methods and strategies, desirable design attributes, Concept of good design, Cohesion and coupling.

Unit III

Function-Oriented Software Design: Structured system analysis and structured design, formal approach design, data flow oriented design. Software Coding and Testing: Coding Standard and Guidelines, Code Review, Software Inspection, Testing: Unit, Integration, System Testing, Black box and White box testing, Incremental Testing, Formal Proof of Correctness, Software Matrix. Introduction to Software Verifications.

Unit IV

Overview of Object Oriented Concepts: Basic mechanisms, Key concepts, related technical terms, Advantages of OOD. Object oriented vs. function-oriented design, Object oriented modelling.

Context Models, Interaction Models, Structural Models, Behavioural Models, Model-Driven, Engineering, Architectural Design, Architectural Design Decisions, Architectural Views, Architectural Patterns, Application Architectures.

A Case Study: (Ex: - ATM, Trading System, Banking System, Library Information System, Student Information System etc.)

Unit V

Software Reliability and Quality Management: S/W and H/W Reliability, Reliability Matrices, S/W Quality, ISO9000. Software Engineering Management: Introduction to Capability Maturity Model, Quality Assurance and Software Cost Estimation (Delphi, COCOMO), Introduction to Computer Aided Software Engineering, Software Reuse and Maintenance.

Reference Books:

1. Rajib Mall, "Introduction to S/W Engineering", PHI.

2. Rohit Khurana, "Software Engineering Principles and Practices" 2nd Ed.

3. R.S. Pressman, "Software Engineering, A practitioner's approach", McGraw Hill.

4. Grady Booch, Rambaugh, IvarJacohson, "Unified Modeling Language", User Guide Pearson.

5. H. Srimathi, H. Sriram, A. Krishnamurthy, Scitech, "Object Oriented Analysis & Design Using UML"

6. Craig Larman , "Applying UML and Patterns".

7. Satzinger, Jackson, Burd, "Object-Oriented Analysis & Design with the Unified Process" Cengage Learning.

Master of Science (Computer Science)
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II SEMESTER (I Year)
CSC -2.4 Computer Graphics

Unit I A survey of computer graphics: Computer Aided Design, Presentation graphics, Computer Art, Entertainment, Education and training, Visualization, Image processing, Graphical User Interfaces.
Overview of graphics Systems: Video display devices, Raster Scan Displays, Random Scan Displays, Input devices, Hard-copy devices, Graphics software. Output Primitives: Points and Lines, Line drawing Algorithms (DDA and Bresenham"s Line algorithm), Mid-point circle algorithm, Ellipse generating algorithms, Filled-Area Primitives. Attributes of Output Primitives: Line Attributes, Curve Attributes, Color and Grayscale Levels, Area-Fill Attributes and Character Attributes, Bundled attributes and anti-aliasing.

Unit II Two dimensional geometric Transformation: Basic Transformation(Translation, Rotation, Scaling), Matrix representation and Homogenous Coordination, Composite Transformation, Reflection Shear, Transformation between coordinate systems, Two dimensional viewing: The Viewing Pipeline, Viewing coordinate reference frame, window to viewport coordinate transformation, Line Clipping: (Cohen-Sutherland & Liang-Barsky algorithm) and Polygon Clipping (Sutherland-Hodgeman Algorithm).

Unit III Three dimensional object Representation: Polygon Surfaces, Quadratic Surfaces, Spline Representation, Beizer Curves and Surfaces, B-Spline Curves and Surfaces, Fractal Geometry Methods: Fractal Generation Procedures, Classification of Fractals, Fractal Dimension, Geometric Construction of Deterministic Self Similar Fractals, Self Squaring fractals.

Unit IV Three Dimensional Geometric and Modeling Transformations: Translation, Rotation, Scaling. Reflections, Shears, Composite Transformations, Modeling and coordinate Transformations.
Three Dimensional Viewing: Viewing Pipeline, Viewing Coordinates, Projections (Parallel and Perspective) Clipping.

Unit V Visible Surface Detection Methods: Classification of Visible-Surface Detection Algorithms, Back-Face Detection, Depth-Buffer Method, A-Buffer Method, Scan line and Depth Sorting,
Illumination Models and Surface-Rendering Methods: Basic Illumination Models, Displaying Light Intensities, Halftone Patterns and Dithering Techniques, Polygon-Rendering Methods (Gouroud Shading, Phong Shading),

Text Books:

1. Donald Hearn & M. Pauline Baker, "Computer Graphics with OpenGL", Third Edition, 2004, Pearson Education, Inc. New Delhi.

Reference Books:

2. J.D. Foley, A.Dam, S.K. Feiner, J.F. Hughes: Computer Graphics Principle and Practice Addision Wisely.

Master of Science (Computer Science)
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P.K. University, Shivpuri (MP)
II Semester (I Year)
CSC -2.5 Java Programming

Unit I

Introduction to Java Programming Language, Data Types and Operations, Structured Programming, Selection Statements, Loops, Methods, Method Abstraction and Stepwise Refinement, Arrays, Object-Oriented Programming: Classes and Objects, Constructors, Implementing & Designing Classes.

Unit II

Use of Keywords: static, final, this, Class Abstraction and Encapsulation, Strings and Text I/O, Inheritance and Polymorphism, use of super keyword, Overriding vs. Overloading, Object: The Cosmic Superclass, Abstract Classes and Interfaces, Packages, Object- Oriented Design and Patterns.

Unit III

GUI Programming: GUI Basics, Graphics, Event-Driven Programming, Creating User Interfaces, Applets and Multimedia, Exception Handling, Binary I/O.

Unit IV

Files & Streams, Recursion, Dynamic Binding, Generics & Generic Programming, Java Collections Framework, Algorithm Efficiency, Searching & Sorting.

Unit V

Multithreading, Networking, JDBC, Internationalization, Advanced GUI Programming: MVC, JavaBeans and Bean Events, Containers, Layout Managers, and Borders, Menus, Toolbars, Dialogs and Swing Models, JTable and JTree, New Features of Java.

Reference Books:

1. Y. Daniel Liang, "Introduction to Java Programming: Comprehensive Version", 7th Edition, 2009, Pearson Education Inc., New Delhi. (Book Chapters: 1 to 24, 26, 29 to 37)

2. Herbert Schildt, "Complete reference of Java" 7th edition, TMH, New York

3. Richard A. Johnson, "An Introduction to Java Programming and Object Oriented Application Development", First Edition, 2007, CENGAGE Learning India Pvt. Ltd., New Delhi.

4. E. Balagurusamy, "Programming with Java: A Primer", 3rdEdition, 2008, McGraw-Hill Education (India), New Delhi.

5. Harvey M. Deitel& Paul J. Deitel, "Java How to Program", 8thEdition, 2009, PHI Learning Pvt. Ltd., New Delhi.

6. Mahesh P. Bhave& Sunil A. Patekar, "Programming with Java", First Edition, 2009, Pearson Education, Inc. New Delhi.

CSL -2.7Java Programming Lab

01. Introduction to java, Compiling & executing a java program.
02. Program with data types & variables.
03. Program with decision control structures: if, nested if etc.
04. Program with loop control structures: do, while, for etc.
05. Program with classes and objects.
06. Implementing data abstraction & data hiding.
07. Implementing inheritance.
08. Implementing and polymorphism.
09. Implementing packages.
10. Program with modern features of java.
11. Implementing interfaces and inner classes
12. Implementing wrapper classes
13. Working with files.
14. Working with AWT
15. Working with JDBC

Faculty of Computer Science & Application

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Evaluation Scheme & Syllabus
M.Sc Computer Science
(II Year)

Master of Science (Computer Science)
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Course Structure, Scheme of Examination & Syllabus
Exam Scheme:

Theory 70

Internal 30

Practical (Internal +External)=25+25=50

III Semester

Subject Code	Subject Name	Internal	External	Total
CSC -3.1	Optimization Techniques	30	70	100
CSC -3.2	Design and Analysis of Algorithms	30	70	100
CSC -3.3	Advanced Data Structure using C/C++	30	70	100
CSE -3.4	Compiler Design	30	70	100
CSE -3.5	Artificial Intelligence	30	70	100
Practical				
CSL -3.7	Data Structure Lab	25	25	50

IV Semester

Subject Code	Subject Name	
CSP - 4.1	Project Work & Viva	250

Master of Science (Computer Science)
(Faculty of Computer Science& Application)
P.K. University, Shivpuri (MP)
III Semester (II year)
CSC - 3.1 Optimization Techniques

UnitI

Graphical solution of linear programming problems, The Simplex Method: Computational procedure, .Artificial variable techniques, Two-phase simplex method.

Duality in linear programming: Concept of duality. Formulation of primal dual pairs, Duality and simplex method, Dual simplex method and algorithm, Computational procedure of the revised simplex method

UnitII

Transportation Problems: Mathematical formulation, Vogel's method with optimality test - MODI method, Unbalanced transportation problem. Assignment problem - Mathematical formulation, Hungarian assignment method, the travelling salesman's problem

UnitIII

Sequencing problems: Problems with n jobs & 2 machines, n jobs and k machines, 2 jobs and k machines

Integer Programming: Gomory's methods, Branch & Bound method.

Network Scheduling: Basic terms, Critical path methods, PERT

UnitIV

Queuing Theory: Characteristics of queuing systems, Poisson process and exponential distribution, Steady state M/M/1, M/M/C (Models I, II, IV, V)

UnitV

Inventory Control: Inventory Costs, Economic order quantity, Deterministic inventory problems, EOQ problems with no shortage, With shortage, Production problem with no shortage, with shortage

Replacement Problem: Replacement of items that deteriorate, Replacement of items that fail - Group and individual replacement, Recruitment and promotion problems.

Reference Books:

1. Operations Research - Kanti Swarup, P. K. Gupta & Man Mohan, Sultan Chand & Sons Pub.
2. Operations Research – S. D. Sharma, Kedar Nath Ram Nath Pub.

Master of Science (Computer Science)
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III Semester (II Year)
CSC- 3.2 Design and Analysis of Algorithm

Unit I

Introduction to design and analysis of algorithms, Growth of functions, Recurrences, Solution of recurrences by Substitution, Recursion tree and Master method, Worst case analysis of Merge sort, Quick sort and Binary search

Heapsort: Heaps, Building a heap, The Heapsort algorithm, Priority Queue, Lower bounds for sorting

Unit II

Dynamic Programming: Matrix-chain multiplication, Elements of dynamic programming, Longest common subsequence
Greedy Algorithms: An activity- selection problem, Elements of greedy strategy, Fractional knapsack problem, Huffman codes

Unit III

Data structures for Disjoint Sets: Disjoint set operations, Linked-list representation of disjoint sets, Disjoint-set forests.

Graph Algorithms: Elementary Graph Algorithms: Representations of graphs, Breadth-first search, Depth-first search, Minimum Spanning Trees: Kruskal and Prim's algorithms, Single- Source Shortest Paths: The Bellman-Ford and Dijkstra's algorithm, All-Pairs Shortest Paths: The Floyd-Warshall Algorithm

Unit IV

Maximum Flow: Flow Networks, The Ford-Fulkerson method, Polynomials and the FFT: Representation of polynomials, The DFT and FFT, String Matching: The naïve string- matching algorithm, The Rabin-Karp algorithm.

Unit V

NP-Completeness: Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-completeness proofs, NP-completeness problems, Approximation Algorithms: The vertex-cover problem, The travelling-salesman problem, The set-covering problem, The subset-sum problem

Reference Books:

1. Introduction to Algorithms: T. H. Cormen, C. E. Leiserson, R. L. Rivest (PHI), Second Edition.

2. E. Horowitz, S. Sahani, S. Rajsekharan, "Fundamentals of Computer Algorithms", Second Edition, Universities Press, 2007

3. Algorithm Design – Goodrich, Tamassia, Wiley India.

4. Algorithms By Sanjay Dasgupta, Umesh Vazirani – McGraw-Hill Education

Master of Science (Computer Science)
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P.K. University, Shivpuri (MP)
III Semester (II Year)
CSC -3.3 Advance Data Structure

Unit I

Basic Concepts of OOPs, Templates Function and class templates. Algorithms: performance analysis: time complexity and space complexity. ADT, List (Singly, Doubly and Circular) Implementation, Array, Pointer

Unit II

Stacks and Queues: ADT, Implementation and Applications. Trees: General Tree, Binary Search tree, Expression tree, AVL. Introduction to Red Black trees, B Trees, Implementations, Tree Traversals

Unit III

Priority Queue, Implementation, Graphs, Directed Graphs, Shortest Path Problem. Undirected Graph: Spanning Trees, Graph Traversals: BFS, DFS

Unit IV

Hash table representation: hash functions, collision resolution, separate chaining, open addressing, linear probing: quadratic probing, double hashing, rehashing, Garbage collection and Compaction,

Unit V

Searching Techniques , Sorting , Bubble Sort , Insertion Sort ,Quick Sort ,Heap Sort, Radix Sort ,Merge Sort , Introduction to Designing Techniques : Divide and Conquer , Dynamic Programming, Greedy Algorithm , Backtracking.

Text Books:

1. Mark Allen Weiss, ―Data Structures and Algorithm Analysis in C++‖, Pearson Education, 2002.

2. Aho Hopcroft Ullman, ―Data Structures and Algorithms‖, Pearson Education, 2002.

3. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition,

4. E. Balguruswamy. Object-Oriented Programming with C++, 3rdEdition, 2007, Tata McGraw-Hill (TMH) Publication Pvt. Ltd., New Delhi.

Reference Books:

1. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and Mount, Wiley student edition, John Wiley and Sons.

2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI

3. C++ Primer – Lippman, Addison Wesley

CSL - 3.7 Data Structure Lab

1. Write a tcl script for creating network animator.
2. Write a tcl script for creating a simple topology with two nodes and a link.
3. Write a tcl script for creating nodes, links and orientation.
4. Write a tcl script for creating nodes, links, orientation and labelling.
5. Write a tcl script for creating nodes, links, bandwidth and delay description.
6. Write a tcl script for creating eight nodes, bandwidth, delay and queue of the link
7. Write a tcl script to set identification colors to the links.
8. Write a tcl script for UDP communication between two nodes.
9. Write a tcl script for UDP communication in a network topology having ten number of nodes.
10. Write a tcl script for TCP communication between two nodes.
11. Write a tcl script for TCP communication between two sources and two destinations.
12. Write a tcl script for TCP communication for more number of nodes.
13. Write a tcl script to drop down packets in a link.
14. Write a tcl script to drop down packets in a router and end server at a particular time.
15. Write a tcl script to drop down packets in a link at particular time interval

Master of Science (Computer Science)
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CSC-3.4 Compiler Design

Unit -1

Introduction: Overview and phases of compilation.

Non-deterministic and deterministic finite automata (NFA & DFA), Conversion of NFA to DFA Classification of grammars, regular grammar, regular expressions and regular languages, Context free grammars, ambiguous grammar

Unit -2

Scanners: Top down parsing, LL grammars, Bottom up parsing, Polish expressions. Operator precedence grammar, LR grammars, Comparison methods Error handling

Unit-3

SLR parsers and construction of SLR parsing tables, LR(1) parsers and construction of LR(1) parsing tables, LALR parsers and construction of efficient LALR parsing tables, parsing using ambiguous grammars

Symbol table handling techniques, Organisation for non-block and block structured languages

Unit – 4

Syntax Directed Translation: Syntax directed definitions (SDD), inherited and synthesized attributes, dependency graphs, semantic rules, application of syntax directed translation.

DAG for expressions, three address codes - quadruples and triples, types and declarations, translation of expressions, array references, type checking and conversions, translation of Boolean expressions and control flow statements, back patching, intermediate code generation for procedures.

Run time storage administration, Static and Dynamic allocation

Unit-5

Intermediate forms of source program, Semantic analysis and code generation.

Code optimization folding, peephole optimization, Redundant sub-expression evaluation, redundant and un-reachable codes, Optimization with interactive loops. Basics of flow of control optimization

Reference Books:

1. A.V. Aho, R. Sethi & J.D. Ullman "Compilers Principles Techniques and Tools" Pearson Education

2. Kenneth C. Louden "Compiler Construction Principles & Practice "Cengage Learning Indian Edition.

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III Semester (II Year)
CSC-3.5 Artificial Intelligence

Unit – I

Introduction to AI, Application areas of AI, State-Space-Search: Production system design, Production system characteristic.

Search Techniques

Blind search: Depth first search, Breadth first search.

Heuristic search Techniques: Hill Climbing, Best first search, Branch and bound, A*, AO*.

Unit- II

Game playing: Min-Max Search, Alpha-Beta Cutoff.

Knowledge Logic: Skolemizing queries, Unification algorithm, Modes Ponens, Resolution.

Unit- III

Structured knowledge representation,: Semantic nets, Frames, Conceptual dependencies, Scripts.

Unit – IV

Expert System: Expert System need & Justification, Rule based architecture, Non production system architecture, Case studies of expert system: MYCIN, R1. Learning: Concept of learning, Types of learning, Genetic algorithm, Neural network.

Unit – V

Natural language processing: Introduction syntactic processing, semantic analysis, discourse and pragmatic processing.

Handling uncertainty: Probabilistic reasoning, Use of certainty factor

Knowledge organization & management: Introduction, HAM.

Reference Books:
1. Rich & Knight (Chapters 1.1,2,3,5,9,10.1,10.2,12.1, 12.2, 12.3, 15.1-15.4, 17.1-17.6)
2. Dan W. Patterson (Chapters 4.1-4.4, 5.3, 11.1,11.4, 15.1-15.4)
3. N.J. Nilson "Artificial Intelligence a new Synthesis"
4. Russel & Norvig "Artificial Intelligence a Modern Approach"

Master of Science (Computer Science)
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IV Semester (II Year)
CSP - 4.1Project work

Each student must have an internal supervisor who is a faculty of the department/ Institution. Each student must submit the abstract of the project which will be approved by the department on the recommendation of the internal supervisor. .

Guidelines: SUMMARY/ABSTRACT

All students must submit a summary/abstract of the project to be undertaken to the internal supervisor for approval, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up should include the followings-
1. Name / Title of the Project
2. Statement about the Problem
3. Why is the particular topic chosen?
4. Objective and scope of the Project
5. Methodology (including a summary of the project)
6. Hardware & Software to be used
7. Testing Technologies used
8. What contribution would the project make?

After the approval, the student is allowed to carry out the project in any organization/ Institution. He/She must immediately inform the internal supervisor about the name and contact details of the external supervisor in the organization/Institution. Moreover he must report to the internal supervisor about the progress of his/her work periodically. After the end of 16 weeks, the student is required to submit the project report in the department after getting approved by the internal and external supervisors.

Guidelines for preparation of the final project report

Good quality white executive bond paper of A4 size should be used for typing and duplication with the following specification
Left margin : 3.0cm
Right margin : 2.0cm
Top margin : 2.5cm
Bottom margin : 2.5cm
Page numbers: All text pages as well s the Program source code should be numbered in the bottom center of the pages.
Font size of the normal Text :12pt Times New Roman
Font size of Paragraph Heading :14pt Times New Roman
Font Size of chapter Heading :18pt Times New Roman
Font size of Code :10pt Courier New

Format of the Project report

Cover page
Certificate of the internal supervisor
Certificate of the external supervisor
Self certificate
Acknowledgement
List of abbreviations, figures, Tables
Synopsis of the project (3-4 pages)

Main Report
Objective and scope of the project
Theoretical background
Definition of the problem

System Analysis and design
System planning
Methodology adopted
System implementation
System maintenance and Evaluation
Cost benefit Analysis
Detail life cycle of the project
Test reports (print out of the reports)
Print out of the code
References
Every student has to submit the followings
(a) One hard copy of the Project report
(b) Soft copy of the project on CD (to be submitted to the Universiy) on a cover mentioning the name of the project, name of the student, Regd No. , name of the department, Year
(c) Five copies of the synopsis of the project report

Evaluation of the Project

Evaluation of the project will be done by a jury of experts including one external expert, Head of the Department, internal supervisor, two teachers of the department. The evaluation will be done on the basis of the followings:
Presentation : 50 marks
Viva-Voce : 50 marks

Project report : 150 mark