SCHEME AND SYLLABUS
M. TECH PROGRAMME
COMPUTER SCIENCE AND
ENGINEERING

HIMACHAL PRADESH TECHNICAL UNIVERSITY, HAMIRPUR
2012-13
## Scheme of Examination

### First Semester

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### Second Semester

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List of Electives
CSE1-E01 Advanced Software Engineering Concepts
CSE1-E02 Artificial Intelligence & Expert System
CSE1-E03 Automata Theory and Compiler Design
CSE1-E04 Cyber Law
CSE1-E05 Cloud Computing
CSE1-E06 Distributed Systems
CSE1-E07 Graph Theory
CSE1-E08 Research Methodology
CSE1-E09 Service Oriented Architecture
Course Code: CSE1-511
Lectures to be Delivered: 52 (1 Hr each, for each semester)

Name of The Course: Computer Architecture & Parallel Processing

Semester End Examination:
Max. Time: 3 Hrs  
Max. Marks: 100  
Min. Pass Marks: 50

Continuous Assessment (Based on sessional Tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)
Max. Marks: 50

Note: In each theory paper, nine questions are to be set. Two questions are to be set from each Unit and candidate is required to attempt one question from each unit. Question number nine will be compulsory, which will be of short answer type with 5-10 parts, out of the entire syllabus. In all, five questions are to be attempted.

UNIT – I
RTL, Bus and memory transfer, Arithmetic microoperations, Logic microoperations, Shift microoperations, Arithmetic Logic Shift unit Instruction codes, Computer registers and instructions, Timing and control, Instruction cycle, MRLs, I/O and Interrupts, Complete computer description, Design of basic computer, Design of Accumulator logic

UNIT – II
Control memory, Address sequencing, Computer configuration, Microinstruction format, Symbolic microinstructions, Design of control unit Introduction to CPU, General Register and stack organization, Instruction formats, Addressing modes, Data transfer and manipulation, RISC, CISC Parallel Computer Models: The state of computing, Multiprocessors and multicomputers, Multivector and SIMD Computers, PRAM and VLSI models

UNIT – III
Program and Network Properties: Conditions of Parallelism, Program partitioning and scheduling, Program flow mechanisms, System interconnect architectures Principles of Scalable Performance: Performance metrics and measures, Parallel processing applications, Speedup Performance laws, scalability analysis and approaches. Processor and Memory Hierarchy: Advanced processor technology, Superscalar and vector processors

UNIT – IV
Memory hierarchy technology, Virtual memory technology, Bus, Cache and Shared Memory: Backplane bus systems, cache memory organizations, Shared memory Organizations, Sequential and weak consistency models Pipelining and Superscalar Techniques: Linear pipeline processors, nonlinear pipeline processors, Instruction Pipeline design, Superscalar and superpipeline design Multiprocessors and Multicomputers: Multiprocessor system interconnects, Cache coherence and synchronization mechanisms, Three generations of multicomputers, Message passing mechanisms

Text Books:

Reference Book:
Course Code | CSE1-512 | Software Engineering | L-4 T-0, P-0
---|---|---|---
Name of The Course | Software Engineering |
Lectures to be Delivered | 52 (1 Hr each, for each semester) |
Semester End Examination | Max. Time: 3 Hrs | Max. Marks: 100 | Min. Pass Marks: 50 |
Continuous Assessment (Based on sessional Tests 50%, Tutorials/ Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | Max. Marks: 50 |

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**UNIT – I**

**UNIT – II**

**UNIT – III**

**UNIT – IV**

**Text Books:**
Reference Books:
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<th>L-4 T-0, P-0</th>
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<td>Name of The Course</td>
<td>Computer Oriented Optimization Methods</td>
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**UNIT – I**

**UNIT – II**

**UNIT – III**

**UNIT – IV**
Game theory: Significance, essential features and limitations; Maximax and minimax principle, Game with pure & mined strategies, sul-game method (caseof 2xn or mx2 methods), Probability method, graphic method, algebraic method Inventory Control: Introduction, Inventory Control, Selective Control Techniques, ABC Analysis Procedure, Economics Lot Size Problems, Problem of EQQ With shortage, Inventory Control Techniques Uncertain Demand, Stochastic Problems.

**Text Book:**

**Reference Books:**
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<td>Data Structures and Algorithm Analysis in C</td>
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**UNIT – I**

**UNIT – II**

**UNIT – III**

**UNIT – IV**

**Text Books:**
1. Mullis Cooper: Spirit of C: Jacob Publications
2. Yashwant Kanetkar: Let us C: BPB
5. Robert L. Kruse: Data Structures & Program Design: PHI.
Course Code: CSE1-515
Name of The Course: Operating System & Case Study
Lectures to be Delivered: 52 (1 Hr each, for each semester)

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**UNIT – I**

**UNIT – II**

**UNIT – III**

**UNIT – IV**
(Protocols, Distributed-processing mechanism, Domains), Programmer interface (Access to kernel objects, Process management, Inter-process communication, Memory management).
Case Study: MS-DOS: User’s view of MS-DOS, System’s view of MS-DOS, Programmer’s view of MS-DOS system calls.

Text Book:

Reference Books:
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<th>CSE1-521</th>
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<td>Object Oriented Programming with JAVA</td>
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**UNIT – I**
Introduction To Object Oriented Programming: Data Abstraction, Encapsulation, Inheritance (Public, Protected And Private), Polymorphism, Information Hiding. Java Elements: Data Types, Literal and Variables, Operators–Arithmetic, Bitwise, Relational, Boolean Logical, Assignment, The ‘?’ Operator, Operator Precedence, Control Statements–Selection (if, switch), Iteration Statements (while, do-while, for) Jump Statements (break, continue, return), Arrays (One-dimensional, Multi-Dimensional).

**UNIT – II**
Introducing Classes: Class Fundamentals, Declaring Objects, Methods, Constructors, ‘This’ Keyword, Over loading Methods. Inheritance: Inheritance Basics, Protected Members, Method Overriding, Multiple Inheritance, Template Classes and Functions. Exception Handling: Fundamental, Exception Types, Uncaught Exceptions, Try And Catch, Dealing With Exceptions (try, throw, throws, finally).

**UNIT – III**

**UNIT – IV**

**Text Book:**

**Reference Books:**
Course Code: CSE1-522
Name of the Course: Computer Networks
Lectures to be Delivered: 52 (1 Hr each, for each semester)
Semester End Examination:
- Max. Time: 3 Hrs
- Max. Marks: 100
- Min. Pass Marks: 50
Continuous Assessment (Based on sessional Tests 50%, Tutorials/Assignments 30%, Quiz/Seminar 10%, Attendance 10%)
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UNIT – I

UNIT – II

UNIT – III

UNIT – IV
Application layer services protocols & Network Security: DNS, SMTP, FTP, TELNET, HTTP,WWW, Attacks on Computers & Computer security—Need for security, approaches, principles, types of attacks, Cryptography concept and techniques, Symmetric Key algorithms-- (DES), Asymmetric key algorithms--RSA, Digital signature , Firewalls. Internet radio, VoIP, E-mail security, Web security, social issues in network security.
Reference Books:
5. Fred Halsall, “Data Communications, Computer Networks”, Pearson Education.
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**UNIT – I**

**UNIT – II**

**UNIT – III**
Query Processing: Problem, objectives, Complexity of Relational Algebra operations, Characterization of query processing (Language, Types of Optimization, Optimization timing, Statistics, Decision sites, Exploitation of network topology & Replicated fragments, Use of semijoins), Layers of Query processing (Query decomposition, Data localization, Global & Local query optimizations). Distributed Concurrency Control: Serializability theory, Taxonomy of concurrency control mechanism, Locking based concurrency control algorithm (centralized 2pl, primary copy 2pl, distributed 2pl), Timestamp based concurrency control algorithm (conservative & multiversion TO algorithm), Optimistic concurrency control algorithm, Deadlock management, prevention, avoidance, detection & resolution.

**UNIT – IV**
Distributed DBMS Reliability: Reliability concepts & measures (system, state & failures, reliability & availability, mean time between failures/repair), Failures & fault tolerance in distributed system (reason for failures, fault tolerance approaches & techniques), Failures in Distributed DBMS (transaction, system, media & communication failure), Local reliability protocols (architectural considerations, recovery,
information execution of LRM commands, checkpointing, handling media failure), Distributed Reliability Protocols (Components, Two-Phase commit protocol, Variation of 2PC).

Text Books:

Reference Books:
Course Code: CSE1-524
Name of The Course: Data Warehousing and Data Mining
Lectures to be Delivered: 52 (1 Hr each, for each semester)

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**UNIT – I**
Introduction: DSS, Data warehouse Architecture, Data Staging & ETL, Multidimensional Model, Metadata, Accessing data warehouse, ROLAP, MOLAP, HOLAP System Lifecycle: Risk factors, Top-down, Bottom-up, Data mart design phases, Methodological framework, Testing data marts
Data Sources: Inspecting and normalizing schemata, Integration problems, Integration phases, Mapping User Requirements & Conceptual Modeling: Glossary based requirements analysis, Goal-oriented requirements analysis, Dimensional Fact Model, Advanced modeling, Events and Aggregation, Time, Formalizing the dimensional fact model
Conceptual Design: ER schema based design, Relational schema based design, XML schema based design, Mixed approach design

**UNIT – II**
Logical Modeling & Design: MOLAP, HOLAP & ROLAP systems, Views, Temporal scenarios, Fact schemata to star schemata, View materialization, View Fragmentation, Populating - reconciled databases, dimension tables, fact tables & materialized views, Cleansing data
Data Warehouse Components: Overall architecture, database, Sourcing, acquisition, cleanup and transformation tools, Metadata, Access tools, Administration and management, Info delivery System
Building a Data Warehouse: Considerations - business, design, technical & implementation, Integrated solutions, Benefits

**UNIT – III**
Mapping Data Warehouse to a Multiprocessor Architecture: Relational database technology, Database architectures for parallel processing, Parallel RDBMS features and vendors DBMS Schemas & Decision Support: Data layout for best access, Multidimensional data models, Star schema
Data Tools and Metadata: Tool requirements, Vendor approaches, Access to legacy data, Transformation engines, Metadata - definition, interchange initiative, repository, trends, Reporting & Query Tools – categories OLAP: Need, Multidimensional data model, guidelines, Multidimensional Vs multirelational OLAP, Categorization of OLAP tools

**UNIT – IV**
Introduction: Data mining, Measuring effectiveness, Discovery Vs prediction, Overfitting, Comparing the technologies, Decision trees, Where to use them, General idea, How do they work, Strengths and weaknesses
Techniques and Algorithms: Neural networks - uses, making predictions, different kinds, Kohonen feature map, their working, Nearest Neighbour & Clustering – uses, predictions and differences, their working, Genetic Algorithms – uses, cost minimization, cooperative strategies, their working, Rule
Induction – uses, evaluation of rules, rules Vs decision trees, their working, Using the right technique, Data mining & business process

**Text Books:**

**Reference Books:**
Course Code | CSE1-525 | Software Quality & Testing | L-4 T-0, P-0
---|---|---|---
Name of The Course | Software Quality & Testing
Lectures to be Delivered | 52 (1 Hr each, for each semester)
Semester End Examination | Max. Time: 3 Hrs | Max. Marks: 100 | Min. Pass Marks: 50
Continuous Assessment (Based on sessional Tests 50%, Tutorials/ Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | Max. Marks: 50

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**UNIT – I**
Assuring Software Quality Assurance (SQA): Objectives, goals, responsibilities, life cycle, SQA planning, SQA monitoring and controlling, testing, setting standards and procedures, Developing and controlling relevant metrics, SQA activities- revision, process evaluation, software standards.

**UNIT – II**
Software Quality Metrics: Objectives, Software metrics, Software Quality metrics framework, Software Quality metrics features, Development of software quality metrics- SATC’s approach, Kitchenham’s approach, Abreu’s approach, Victor’s approach, Selection of Software Quality metrics- Size related metrics, complexity metrics, Halstead metrics, quality metrics.

**UNIT – III**
Decision Table Based Testing- Introduction & Definition, technique, test cases.

**UNIT – IV**
Structural Testing: Path testing - Introduction & definition, DD-path, Test coverage metrics, McCabe’s basis path method, its observations and complexity.
Data Flow Testing: Definition, data flow graphs, data flow model, Data flow testing strategies.
Levels of Testing: Traditional view of testing levels, Integration Testing (Decomposition based integration), Unit Testing, System Testing.

**Text Books:**

**Reference Books:**
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**UNIT – I**

**UNIT – II**

**UNIT – III**
Two Dimensional Viewing: Window-To-Viewport Coordinate Transformation, Clipping Operations, Point Clipping, Line Clipping–(Cohen-Sutherland Line Clipping, Liang-Barsky Line Clipping, Nicholl-Lee-Nicholl Line Clipping), Polygon Clipping–(Sutherland-Hodgeman Polygon Clipping, Weiler-Atherton Polygon Clipping), Curve Clipping, Text Clipping.
Three Dimensional Concepts: Three Dimensional Display Methods–Parallel Projection, Perspective Projection, Surface Rendering. Three Dimensional Transformations: Translation, Rotation, Scaling, Reflection, Shear.

**UNIT – IV**

**Text Book:**

**Reference Books:**
Electives

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<th>CSE1-E01</th>
<th>L-4 T-0, P-0</th>
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<tbody>
<tr>
<td>Name of The Course</td>
<td>Advanced Software Engineering Concepts</td>
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<tr>
<td>Lectures to be Delivered</td>
<td>52(1 Hr each, for each semester)</td>
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<tr>
<td>Semester End Examination</td>
<td>Max. Time: 3 Hrs</td>
<td>Max. Marks: 100</td>
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<td>Continuous Assessment (Based on sessional Tests 50%, Tutorials/ Assignments 30%, Quiz/Seminar 10%, Attendance 10%)</td>
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</tbody>
</table>

Note: In each theory paper, nine questions are to be set. Two questions are to set from each Unit and candidate is required to attempt one question from each unit. Question number nine will be compulsory, which will be of short answer type with 5-10 parts, out of the entire syllabus. In all, five questions are to be attempted.

UNIT – I

UNIT – II
Object Methodology & Requirement Elicitation: Introduction to Object Oriented Methodology, Overview of Requirements Elicitation, Requirements Model-Action & Use cases, Requirements Elicitation Activities, Managing Requirements Elicitation

UNIT – III

UNIT – IV

Text Book:
Course Code | CSE1-E02 | L-4 T-0, P-0
---|---|---
Name of The Course | Artificial Intelligence and Expert Systems | 
Lectures to be Delivered | 52 (1 Hr each, for each semester) | 
Semester End Examination | Max. Time: 3 Hrs | Max. Marks: 100 | Min. Pass Marks: 50 | Max. Marks: 50
Continuous Assessment (Based on sessional Tests 50%, Tutorials/ Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | 

**Note:** In each theory paper, nine questions are to be set. Two questions are to set from each Unit and candidate is required to attempt one question from each unit. Question number nine will be compulsory, which will be of short answer type with 5-10 parts, out of the entire syllabus. In all, five questions are to be attempted.

**UNIT – I**
Overview Of A.I.: Definition Of AI, The Importance Of AI, Previous Works In The History Of AI, AI And Related Fields, Problems, Problem Spaces And Search. Knowledge: General Concepts – Definition and Importance of Knowledge, Knowledge-Based Systems, Representation of Knowledge, Knowledge Organization, Knowledge Manipulation, Acquisition Of Knowledge.

**UNIT – II**

**UNIT – III**

**UNIT – IV**

**Text Book:**

**Reference Books:**
Course Code | CSE1-E03 | L-4 T-0, P-0
---|---|---
Name of The Course | Automata Theory and Compiler Design |
Lectures to be Delivered | 52 (1 Hr each, for each semester) |
Semester End Examination | Max. Time: 3 Hrs | Max. Marks: 100 | Min. Pass Marks: 50
Continuous Assessment (Based on sessional Tests 50%, Tutorials/ Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | |

**Note:** In each theory paper, nine questions are to be set. Two questions are to set from each Unit and candidate is required to attempt one question from each unit. Question number nine will be compulsory, which will be of short answer type with 5-10 parts, out of the entire syllabus. In all, five questions are to be attempted.

**UNIT – I**
Finite Automata and Regular Expression: Finite State System, Basic Definition, Deterministic and Non-Deterministic Finite Automata (Only Definition), Finite Automata With Output, Regular Expression. Turing Machines: Definition Of Various Version Of Touring Machines, Deterministic, Non-Deterministic, Two-Way, Infinite Tape, Multi Tape, Multi Head, Statements Of Their Equivalence (Without Proof), Construction Of Turing Machines (Any Model) For Log N; N!, N2;

**UNIT – II**

**UNIT – III**

**UNIT – IV**

**Text Book:**

**Reference Books:**
<table>
<thead>
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<th>Course Code</th>
<th>CSE1-E04</th>
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<tr>
<td>Name of The Course</td>
<td>Cyber Law</td>
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<tr>
<td>Semester End Examination</td>
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<td>Max. Marks: 100 Min. Pass Marks: 50</td>
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**UNIT – I**

**UNIT – II**

**UNIT – III**

**UNIT – IV**
Regulation of Certifying Authorities (Sections 17 to 34). Digital Signature Certificates (Sections 35 to 39). Duties of Subscribers (Sections 40 to 42). Penalties, Adjudication Offences (Sections 45 to 47 & Sections 65 to 78). Cyber Regulations Appellate Tribunal (Sections 48 to 64).

**Text and Reference Books:**
<table>
<thead>
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<th>CSE1-E06</th>
<th>L-4 T-0, P-0</th>
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<tr>
<td>Name of The Course</td>
<td>Distributed Systems</td>
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<tr>
<td>Lectures to be Delivered</td>
<td>52(1 Hr each, for each semester)</td>
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</tr>
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<td>Semester End Examination</td>
<td>Max. Time: 3 Hrs</td>
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UNIT – I
Introduction and Architectures: Definition of a Distributed System, Goals and Types of distributed systems, Architecture Styles, System Architectures, Middleware, Self-management in Distributed Systems with examples of Astrolabe, Globule and Jade.
Processes: Threads, Virtualization, Clients, Servers and Code Migration

UNIT – II
Communication: Remote Procedure Call, Message-Oriented, Stream Oriented and Multicast Communication
Naming: Names, Identifiers and Addresses, Flat naming, Structured Naming and Attribute-Based Naming.

UNIT – III
Synchronization: Clock Synchronization, Logical Clocks: Lamport’s Logical Clocks and Vector Clocks, General Introduction to the Concepts of Replication and Fault Tolerance
Distributed File Systems: Client-Server Architecture in NFS, Cluster-based Architecture in Google, Symmetric Architectures, RPC in NFS.

UNIT – IV
Distributed Web-Based Systems: Architecture, Processes i.e. clients, Apache Web Server and Web Server Clusters, Communication i.e. HTTP and Simple Object Access Protocol, Web Proxy Caching. Case studies of Mach, Chorus and Amoeba distributed operating systems

**Text Book:**

**Reference Books:**
2. Introduction to Reliable Distributed Programming - Rachid Guerraoui and Louis
Name of The Course | Graph Theory
--- | ---
Lectures to be Delivered | 52(1 Hr each, for each semester)
Semester End Examination | Max. Time: 3 Hrs Max. Marks: 100 Min. Pass Marks: 50
Continuous Assessment (Based on sessional Tests 50%, Tutorials/ Assignments 30%, Quiz/Seminar 10%, Attendance 10%) | Max. Marks: 50

Note: In each theory paper, nine questions are to be set. Two questions are to set from each Unit and candidate is required to attempt one question from each unit. Question number nine will be compulsory, which will be of short answer type with 5-10 parts, out of the entire syllabus. In all, five questions are to be attempted.

UNIT – I
Introduction – Definition of a graph, application of graphs, finite and infinite graphs, incidence and degree, isolated vertex, pendant graph, null graph. Path and circuits-Isomorphism, subgraphs, walks, paths, circuits, connected graphs, disconnected graphs and its components, Euler graph, operations on graphs, Hamiltonian paths and circuits, travelling salesman problem.

UNIT – II
Trees and fundamental circuits- Trees, properties of the trees, pendant vertices in a tree, distance and centres in a tree, rooted and binary trees, on counting trees, spanning tree, fundamental circuits, finding all spanning trees of a graph, spanning tree in a weighted graph.

UNIT – III

UNIT – IV
Directed Graphs- Definition of a directed graph, types of digraphs, digraphs and binary relations, directed path and connectedness, trees with directed edges, fundamental circuits in a digraph, adjacency matrix of a graph, acyclic digraphs and decyclization. Graph algorithms- algorithm for connectedness, a spanning tree, a set of fundamental circuits, directed circuits, shortest path algorithm, depth search first on a graph, algorithm for planarity testing, algorithm for isomorphism.

Text Book:
1. Narsingh Deo, “Graph Theory”, Prentice Hall of India.