**Proposed course structure and evaluation scheme for M.Tech Part-Time**

**SEMESTER – I**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject Category</th>
<th>Subject Code</th>
<th>Name of Subject</th>
<th>Periods</th>
<th>Evaluation Scheme</th>
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**SEMESTER – II**

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<td>Advance Modeling and Simulation</td>
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<td>Department Elective 1</td>
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Selected Topics of Computer Science

Course Code : PCSC101  
Course Category : Department Core (DC)  
L T/ P : 3 1/2  
Credit : 04  
Course Outcome : It is expected to understand the basics of computer Science.

UNIT 1:
Data Structure, Graphs and Algorithms: Searching, sorting, merging, insertion and deletion in array, stack, queue, tree, Hash table, Graph, shortest path in graph, all pair shortest path, Prim’s algorithm, Dijkeshra’s algorithms, Krushcal’s algorithm, Time and space complexity of the algorithms.

UNIT 2:
Concepts of Operating system: Concepts of single user and multiuser operating system, job scheduling algorithms, synchronization techniques, fragmentation, paging and segmentation, memory hierarchy, virtual memory concepts, Concepts of communication based operating systems, scheduling for communication channels e.g. Android

UNIT 3:
Automata Theory and compiler design: Finite automata, deterministic and non-deterministic finite automata, regular expression and regular grammar, CFG, left recursive and right recursive grammar, PDA, Turing machine, P and NP class. Phases,

UNIT 4:
Lexical analysis, Syntax and semantic analysis, Top down and bottom up Parsing, Loop optimizing and code optimizing technique.

UNIT 5:
Computer organization and architecture: Concepts of combinational and sequential circuits, arithmetic circuit design, logical circuit design, control logic design, comparator circuit design, I/O module, concepts of registers and counters, RAM and ROM design concepts, system interconnection architecture, SIMD, MIMD, Parallel processing, principle of scalable performance, vector processing, risk processor, pipelining.

Text Books:
Advance Data Network

Course Code : PCSC102
Course Category : Department Core (DC)
L  T/ P : 3  1/2
Credit : 04
Course Outcome : It is expected to understand the Advances of Data Network.

UNIT 1:
Introduction to Network Design: Overview of computer networks, seven layer architecture, TCP/IP suits of protocols, LANs, MANs and wireless LAN. Benefits of a hierarchal network design, design methodology, design considerations for the core, distribution and access layers, design considerations for the network enterprise edge, design considerations to support remote workers, design considerations for supporting enterprise wireless and/or data centre/server farms. Overview of Integrated services, differential services and MPLS, Mobility in networks, mobile IP, MANETs, routing in MANETs.

UNIT 2:
Network Building concepts and Direct link Networks: Requirements, Networking architecture, Implementing Network software, Performance evaluation, Data Communication and Transmission Technologies, Building blocks, Encoding (NRZ, NRZI, Manchester, 4B/5B), Framing (BISYNS, PPP, DDCMP, HDLC, SONET), Error detection techniques, Reliable transmission techniques, Ethernet 802.3, Token rings (802.5, FDDI), Wireless (802.11), Network adaptors.

UNIT 3:

UNIT 4:
End-to-End Protocol, Congestion control and Resource allocation: Demultiplexer (UDP), Reliable byte stream, RPC, Taxonomy of resource allocation, queuing disciplines, TCP congestion control, congestion avoidance mechanism (DECBit, RED etc). Quality of services.

UNIT 5:
Network Security and Firewalls: Cryptographic algorithms, Security mechanisms, authentication protocol, message integrity protocol, public key distribution, pretty good privacy, secure cells, TLS, SSH, HTTPS, IP security. Filter based firewalls, Proxy based firewalls, Limitations of firewalls.

Text Books:
Advance Databases

Course Code : PCSC103
Course Category : Department Core (DC)
L T/P : 3 1/2
Credit : 04
Course Outcome : It is expected to understand the Advances of Database.

UNIT 1:
Database System Concepts and Architecture; Advance SQL: Transactional Control: Commit, Save point, Rollback, DCL Commands: Grant and Revoke Types of locks: Row level locks, Table level locks, Shared lock, Exclusive lock, Deadlock Synonym: Create synonym, Sequences: Create and alter sequences, Index: Unique and composite, Views: Create/Replace, Update and alter views

UNIT 2:

UNIT 3:
Functional Dependency and Decomposition: Basics of Functional Dependency, Functional dependency diagram and examples, Full function dependency (FFD), Armstrong’s Axioms for functional dependencies, Redundant functional dependencies, Closures of a set of functional dependencies, Lossy Decomposition, Lossless join decomposition, Dependency-Preserving Decomposition, Basics of Normalization: Normal Forms, First Normal Form (1NF), Second Normal Form (2NF), Third Normal Form (3NF)

UNIT 4:
Transaction Processing: Introduction to transaction concepts, Concurrency, Methods for Concurrency control, Locking Methods, Timestamp methods, Optimistic methods. Deadlock and Concurrency Control; Object Oriented and Object Relational Databases:

UNIT 5:
Backup and Recovery Concepts, Emerging Database Technologies, Parallel and Distributed Databases

Text Books:
3. Alexis Leon, Mathews Leon, "Database Management Systems
Advance Algorithm

Course Code : PCSC201
Course Category : Department Core (DC)
L T/P : 3 1/2
Credit : 04
Course Outcome : It is expected to understand the Advances of Algorithm.

UNIT 1:
Algorithm Fundamentals: Basic Concept, Analysis of Algorithm, Growth of Functions, Master’s Theorem.

UNIT 2:

UNIT 3:

UNIT 4:

UNIT 5:
Graph Algorithm: DFS and BFS algorithm, Minimum spanning trees, Single source shortest paths, NP Hard and NP Complete Classess, Cook’s Theorem, NP Hard and NP Complete Problem.

Text Books:
1. Coreman, Rivest, Lisserson, “Algorithm”, PHI.
Advance Modeling and Simulation

Course Code : PCSC202
Course Category : Department Core (DC)
L  T/ P : 3 1/2
Credit : 04
Course Outcome : It is expected to understand the advances of modeling and simulation.

UNIT 1:
Modeling and simulation. Application areas, definition and types of system, model and simulation, introduction to discrete-event and continuous simulation.

UNIT 2:
Simulation Methods: Discrete-event Simulation, Time advance Mechanisms, Components and organization of Discrete event simulation, Flowchart of next-event time advance approach, Continuous Simulation, Random Number generation methods.

UNIT 3:
Queuing Models: Single server queuing system, introduction to arrival and departure time, flowcharts for arrival and departure routine. Event graphs of queuing model. Determining the events and variables

UNIT 4:
Distribution Functions: Stochastic activities, Discrete probability functions, Cumulative distribution function, Continuous probability functions. Generation of random numbers following binomial distribution, poisson distribution, continuous distribution, normal distribution, exponential distribution, uniform distribution.

UNIT 5:
Programming in GPSS and C/C++: Basic Introduction to Special Simulation Languages:-GPSS and Implementation of Queuing Models using C/C++.

Text Books:
Advance Artificial Intelligence

Course Code : PCSE101
Course Category : Department Elective (DE)
L T/ P : 3 1/2
Credit : 04
Course Outcome : It is expected to understand the Advances of Artificial Intelligence.

UNIT 1:
Introduction to AI. Agents and environments. Problem solving by search; uninformed search, informed ("heuristic") search, constrained satisfaction problems,

UNIT 2:
Adversarial search, Knowledge representation and reasoning; rule based representations

UNIT 3:
Logical formalisms, frames or object oriented systems,

UNIT 4:
network based approaches and mixed representations. Theorem-proving. Knowledge bases and expert systems.

UNIT 5:

Text Books:
1. Charniak and Mcdermott. Introduction to Artificial Intelligence, Addison-Wesley.
2. Ginsburg. Essentials of Artificial Intelligence, Morgan Kaufmann.
Advance Software Engineering

Course Code : PCSE102  
Course Category : Department Elective (DE)  
L T/P : 3 1/2  
Credit : 04  
Course Outcome : It is expected to understand the Advances of Software Engineering.

UNIT 1:  
Basic Concepts  

UNIT 2:  
Agile Software Development  
Agility, Agility and the cost of change, Agile process, Agility principles, Human factors, Extreme programming(XP), XP values, XP process, Industrial XP, Testing in XP, pair programming, scaling agile methods.

UNIT 3:  
Software Metrics  

UNIT 4:  
Distributed and Aspect-oriented Software Engineering  
Distributed system issues, client-server computing, Architectural pattern for distributed system, software as a service, the specification of concern, aspects, join points and point cuts, software engineering with aspects.

UNIT 5:  
Quality management  
software reliability, statistical testing, ISO 9000 Model, SEI-CMM, SPICE Six Sigma, Software maintenance, software reengineering, reverse engineering, the economics of reengineering risk management, software reuse the future of software engineering.

Text Books:  
2. Shari Lawrence Pfleeger, Software engineering theory and practice, Pearson education asia  
3. Ian Sommerville, Software Engineering, Addison Wesley  
4. pankaj jalote, An Integraleed Approach to software engineering; naros a publishing house
Object Oriented Software Engineering

Course Code : PCSE103
Course Category : Department Elective (DE)
L T/ P : 3 1/2
Credit : 04
Course Outcome : It is expected to understand the Advances of Object Oriented Software Engineering.

UNIT 1:
OO manifesto for OO Analysis. Object modeling and difference with data-oriented,

UNIT 2:
Process-oriented and behaviour modelling

UNIT 3:
Object modeling: classes, complex object classes, inheritance. Sub systems and systems in OO modeling. State transition diagrams,

UNIT 4:
Dynamic Modeling: Modeling an event. Event typology, event as trigger , Functional Modeling:

UNIT 5:
Review of Structured techniques, Cross model constraints and linkages. Conversion to OO implementation, UML notation

Text Books:
Distributed Computing

Course Code: PCSE201
Course Category: Department Elective (DE)
L T/ P: 3 1/2
Credit: 04
Course Outcome: It is expected to understand the Advances of Distributed Computing.

UNIT 1:
Foundation and Characterization of Distributed Systems, System Models, Shared Address Architecture and Message Passing Architecture,

UNIT 2:
Theoretical Foundation for Distributed System, Clock Synchronization, Distributed Synchronization and Distributed Mutual Exclusion,

UNIT 3:
Distributed Deadlock Detection, Agreement Protocols, Distributed Resource Management, Process and Threads, Distributed File System

UNIT 4:
Distributed Scheduling, Load Distribution, Fault Tolerance, Transactions and Concurrency Control in distributed transactions, Routing

UNIT 5:
Distributed Objects, Socket and Skeleton, Remote Procedure Call and Remote Method Invocation, CORBA RMI

Text Books:
2. Ramakrishna, Gehrke," Database Management Systems", Mc Grawhill
4. Tenanuanbaum, Steen,” Distributed Systems”, PHI
Cloud Computing

Course Code : PCSE202
Course Category : Department Elective (DE)
L T/P : 3 1/2
Credit : 04
Course Outcome : It is expected to understand the Advances of Cloud Computing.

UNIT 1:
Virtualized Data Center Architecture : Cloud infrastructures, Service provider interfaces Saas, Paas, Iaas

UNIT 2:
VDC environments; concept, planning and design, business continuity and disaster recovery principles. Managing VDC and cloud environments and infrastructures

UNIT 3:
Information Storage Security & Design ,Storage Network Design

UNIT 4:
Cloud Optimized Storage: Global storage management locations, scalability, operational efficiency

UNIT 5:
Global storage distribution; terabytes to petabytes and greater. Policy based information management; metadata attitudes; file systems or object storage.

Text Books:
Cryptography and Stegnography

Course Code: PCSE301
Course Category: Department Elective (DE)
L T/ P: 3 1/2
Credit: 04
Course Outcome: It is expected to understand the Advances of Cryptography and stegnography.

UNIT 1:
Introduction to security attacks, services and mechanism, Symmetric Encryption techniques, DES, Strength of DES, Differential and Linear Cryptanalysis of DES, Advanced Encryption Standard, Stream Cipher and RC4, Block Cipher Principles, Block Cipher Modes of operation.

UNIT 2:

UNIT 3:

UNIT 4:

UNIT 5:

Text Books:
Advance Software Testing

Course Code : PCSE302
Course Category : Department Elective (DE)
L T/ P : 3 1/2
Credit : 04
Course Outcome : It is expected to understand the Advances of Software Testing.

UNIT 1:
A perspective on testing : Humans, Errors, and Testing; Organization Structures for Testing Teams, Test cases; Identifying test cases; Types of Testing: Test planning, Management, Execution, and planning, Test Automation, Levels of Testing; Building a software testing strategy; The Saturation Effect.

UNIT 2:
Test Generation : Test generation from requirements- Boundary value analysis, Equivalence class partitioning, Cause-effect graphing, Test generation from predicates; Test generation from finite state models, Test generation from combinatorial designs, Path testing, Data flow testing, Retrospective on structural testing.

UNIT 3:
Test Selection, Minimization, and Prioritization for regression testing: Regression-test process, RTS-The problem, Selecting regression tests, Scalability of test selection algorithms, minimization, prioritization and tools for regression testing.

UNIT 4:
Test Adequacy assessment and enhancement: Test Adequacy Assessment using Control flow, Data flow and program mutation, Scalability of coverage measurement.

UNIT 5:
Object-Oriented Testing : Issues in Object Oriented Testing; Class testing, Integration testing, GUI testing, System testing, Mutation Testing.

Text Books:
## List of Electives

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<tr>
<th>Elective</th>
<th>Elective Code</th>
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<td>Elective 1</td>
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<td>Advance Software Engineering</td>
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