

Fifth Semester

Theory					
Sl. No.	Category	Course Code	Course Title	L-T-P	Credit
1	IT	19MC501	Internet Technology and Enterprise Java	3-0-0	3
2	IT	19MC502	Computer Graphics and Multimedia	3-0-0	3
3	IT	19MC503	Elective-II	3-0-0	3
4	IT	19MC504	Elective-III	3-0-0	3
Total Credit (Theory)					12
Practical					
1	LAB	19MC505	Internet Technology and Enterprise Java Lab	0-0-4	2
2	LAB	19MC506	Computer Graphics and Multimedia Lab	0-0-4	2
3	PROJ	19MC507	Minor Project	0-0-6	3
4	SEM	19MC508	Summer Training /Industry Internship Evaluation	0-0-2	1
Total Credit (Practical)					8
Total Semester Credit					20

**Fifth Semester
Theory**

Course Code: 19MC501	Course Name: Internet Technology and Enterprise Java	L-T-P 3-0- 0	Credit 3
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Course Objective:

1. Develop dynamic web pages using HTML,CSS and Java Script.
2. Develop applications using JDBC.
3. Develop a small web site using Servlets and ,JSP and database.
4. Understanding the requirement of various frameworks Spring and Hibernate.

Module 1

(8 Hours)

Introduction to Web Application:- Introduction and overview of networking concept and Client Server Architectural Model, 3 Tier Architecture, Internet and World Wide Web , Web Browsers, Web Servers, URLs, HTTP, Web applications.

Web Programming:- Basics of HTML Programming: HTML Tags, images, hyperlinks Tables, List, Forms, Frames, CSS, Basic JavaScript Programming: DOM, Loops, function, arrays, form validation ,Event handling, XML: Document structure, DTD, XML Schema and Parsing XML documents.

Module II

(8 Hours)

Basics of JDBC: Architecture of JDBC, Various types of JDBC drivers ,Programming with JDBC, Creating a database using MySQL, Loading the Driver, Establishing the Connection, Creating Statements (Statement/Prepared Statement/Callable Statement), Executing a SQL Query, Manipulating various SQL Queries, Result, Set, Creating Database Connectivity Applications

Module III

(10 Hours)

Enterprise Java Programming: Java Servlet Technology: Introduction to Servlet, Web Servers and its Containers, Lifecycle of a Servlet, Servlet API, Servlet Packages, Types of servlets, ServletConfig, Servlet Context, sendRedirect(), Request Dispatcher forward(), Session tracking in Servlet, Cookies ,Servlet Filters, Servlet code for mailing using Mail API.

Database Programming: Servlet to DBMS communication using type-4 connection, Servlet communication with other servlets (Servlet Chaining), Servlet communication with JSP or HTML page, Database Access using Servlet.

Module IV

(8 Hours)

JSP Technology: - Architecture & Anatomy of JSP Page, JSP life cycle, JSP with MVC Architecture, Dynamic webpage Creation, Significance of JSP Engine, Built in objects

of JSP, Scripting Elements, Directive tags ,Action tags ,Session Tracking, Database access using JSP page, JSTL, Concept of Ajax. Introduction to Java Server Faces (JSF) Technology.

Module V

(6 Hours)

Enterprise JavaBeans Technology: EJB Component Architecture, Role of EJB & its life cycle, Types of Beans, Stateless and stateful beans, Overview on Spring: Spring Container ,Bean Factory, Application Context , Aspects, Spring MVC, Hibernate.

Course Outcome:

1. Design and implementation of Web pages using HTML , Java Script and CSS.
2. Develop JDBC applications.
3. Implement server side script using Servlet's.
4. Develop dynamic web pages using JSP, Develop a web site using JSP, Servlet and Database. Analyze the benefits of various frameworks like Spring, Hibernate.

Suggested Books and Reading Materials:

1. Java Server Programming Java EE6 (J2EE 1.6) Black Book, Kogent Solution Inc.
2. Head First Servlets and JSP 3rd Edition by Bert Bates (Author), Kathy Sierra (Author), Bryan Basham
3. Web Enabled Commercial Application Using HTML, DHTML, JAVA SCRIPT, PERL, CGI ,Ivan Bayross BPB Publication.
4. <https://www.udemy.com/jdbcservletsandjsp/> JDBC Servlets and JSP - Java Web Development Fundamentals Create Java Web Applications from scratch in easy steps
5. Created by Bharath Thippireddy

Course Code: 19MC502	Course Name: Computer Graphics	L-T-P 3-0- 0	Credit 3
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Course Objective:

1. To study the primary objective of this course is to learn the basic principles for representation of the geometric objects in the 2D and 3D coordinates. Utilize the computer system and methods
2. To learn the implement the algorithms and techniques necessary to produce geometric objects in 2D and 3D space illustrations.
3. To study the geometric optics necessary to determine how light bounces off surfaces. Shading algorithms to determine how a surface should be shaded to produce realistic illustrations. Curves and surfaces methods for rendering and shading curved objects.
4. The students will design and implement a substantial computer graphics system/project to represent some complex illustrations with the help of graphics system.

Syllabus

Module-1: (8 Hrs.)

Overview of Graphics System: Video Display Units, Raster-Scan and Random Scan Systems, Graphics Input and Output Devices. Output Primitives: Line drawing Algorithms: DDA and Bresenham's Line Algorithm, Circle drawing Algorithms: Midpoint Circle Algorithm and Bresenham's Circle drawing Algorithm.

Module-2: (6 Hrs.)

Two Dimensional Geometric Transformation: Basic Transformation (Translation, Rotation, Scaling) Matrix Representation, Composite transformations, Reflection, Shear, Transformation between coordinate systems. Two Dimensional Viewing: Window-to-View Port Coordinate Transformation.

Module-3: (10 Hrs.)

Clipping: Line Clipping (Cohen-Sutherland Algorithm) and Polygon Clipping (Sutherland-Hodgeman Algorithm), Aliasing and Antialiasing, Half Toning, Thresholding, Dithering. Polygon Filling: Seed Fill Algorithm, Scan line Algorithm. Two Dimensional Object Representations: Spline Representation, Bezier Curves, B-Spline Curves. Fractal Geometry: Fractal Classification and Fractal Dimension.

Module-4: (8 Hrs.)

3D Geometric and Modelling Transformations: Translation, Rotation, Scaling, Reflections, shear, Composite Transformation. Projections: Parallel Projection, Perspective Projection.

Visible Surface Detection Methods: Back-Face Detection, Depth Buffer, A- Buffer, Scan-Line Algorithm, Painters Algorithm.

Module-5: (8 Hrs.)

Illumination Models: Basic Models, Displaying Light Intensities. Color models: properties of light, XYZ, RGB, YIQ and CMY color models, Surface Rendering Methods: Polygon Rendering Methods: Gouraud Shading, Phong Shading.

Computer Animation: Types of Animation, Key frame Vs. Procedural Animation, Methods of Controlling Animation, Morphing. Introduction to Virtual Reality and Augmented Reality.

Course Outcome:

1. Student will understand the basic principles for representation of the geometric objects in the 2D and 3D coordinates.
2. Student will learn the implement the algorithms and techniques necessary to produce geometric objects in 2D and 3D space illustrations.

3. Student will understand Shading algorithms to determine how a surface should be shaded to produce realistic illustrations. Curves and surfaces methods for rendering and shading curved objects.
4. The students will be able to design and implement a substantial computer graphics system/project to represent some complex illustrations with the help of graphics system.

Suggested Books:

1. Computer Graphics, C version; D. Hearn and M. P. Baker; Pearson Education, 2nd Edition, 2002
2. Computer Graphics Principle and Practice, J.D. Foley, A. Dam, S.K. Feiner, Addison Wesley, 4th Edition, 2014.
3. Procedural Elements of Computer Graphics, David Rogers, TMH. 1998

MOOC courses:

<https://www.coursera.org/learn/interactive-computer-graphics> by Takeo Igarashi (Professor) Department of Computer Science, Graduate School of Information Science and Technology, University of Tokyo.

Elective - II

Course Code: 19MC503	Course Name: Mobile Computing	L-T-P: 3-0-0	Credit: 3
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Syllabus

Module - I (06 Hours)

Introduction to Personal Communications Services (PCS): PCS Architecture, mobility management, Networks signalling, Global System for Mobile Communication (GSM) System overview: GSM Architecture, Mobility management, Network signalling.

Module - II (12 Hours)

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes, Mobile Data Communication; WLANs (Wireless LANs) IEEE 802.II standard, Mobile IP. Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark-up Languages (WML), Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies.

Module - III (06 Hours)

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000.

Module - IV**(10 Hours)**

Global Mobile Satellite Systems; case studies of the IRIDIUM, ICO and GLOBALSTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Server-side programming in Java, Pervasive web application architecture, Device independent example application.

Module - V**(06 Hours)**

Mobile Device Operating System, Commercial mobile operating systems, Software development kit, iOS, Android, Windows phones, M-Commerce, Mobile transaction system, related security issues, 4G technology, fundamental concepts of mobile cloud computing and different application instances.

Suggested Books and Online Resources:

1. J. Schiller: Mobile Communication, Pearson Education
2. Rajkamal: Mobile Computing, Oxford University Press.
3. Burkhardt: Pervasive Computing, Pearson Education.
4. Hansmann, Merk: Principles of Mobile Computing, 2nd Edition, Springer.
5. P. Stavronlakis: Third Generation Mobile Telecommunication Systems, Springer.
6. SandeepSinghal: The Wireless Application Protocol, Pearson Education.
7. <http://ftp.mi.fu-berlin.de/pub/schiller/>, Jochen Schiller, FreieUniversitätBerlinGermany

Course Code: 19MC503	Course Name: Artificial Intelligence & Expert System	L-T-P 3-0-0	Credit: 3
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Syllabus**Module-1:****(8 Hrs.)**

Intelligence and AI, Agents, Model of different types of agent: reactive, goal-driven, utility-driven, and learning agents, Environment, Properties of Environment, Problem, Problem space and State Space, Knowledge, Rationality, Turing Test.

Module-2:**(8 Hrs.)**

Search Techniques - definition and importance, Issues in design of heuristics, Best First search, Adversarial Search, A* and AO* search, Hill climbing, Simulated Annealing, Constraint Satisfaction Problem, 8-puzzle problem, Crypto arithmetic problem.

Module-3:**(8 Hrs.)**

Knowledge Representation in AI, Logic - propositional, predicate, First Order Logic. Normal forms. Modus Ponens & Modus Tollens, Theorem Proving, Principle of

Resolutions, Non Monotonic Reasoning. Semantic Net, Semantic Net to PROLOG statement. Frame.

Module-4: (8 Hrs.)

Game Playing, min-max search, alpha-beta pruning, iterative deepening, Planning and its importance. Classical & partial order planning, Conditional Planning. Probabilistic Reasoning, Learning from Example, closed world problems.

Module-5: (8 Hrs.)

Expert Systems - Design Techniques and components, MYCIN - an early expert system. Problem and knowledge domain. Advantages of Expert system. Rule based expert systems. Two early expert systems - MYCIN and DENDRAL.

Suggested Books:

1. Artificial Intelligence - Knight & Rich, McGrawHill, 3rd Edition, 2012,.
2. Principles of Artificial Intelligence - N.J. Nilsson, 2nd Edition, Narosa Publishing, 2012.
3. Artificial Intelligence A Modern Approach - Russel & Norvig, 2nd Edition, Pearson, 2014.
4. Introduction to Artificial Intelligence and Expert Sys - D.W. Patterson, Prentice Hall, 2015.
5. NPTEL course - <https://nptel.ac.in/courses/106106126/> by Prof. Pabitra Mitra & Prof. Sudeshna Sarkar, IITKGP)

Course Code: 19MC503	Course Name: COMPILER DESIGN	L-T-P 3-0-0	Credit 3
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Syllabus

Module-1: (07 Hrs.)

Introduction: Language Processors, Overview and Phases of compilation, Programming language basics.

Lexical Analysis: Non-Deterministic and Deterministic Finite Automata (NFA & DFA), Regular grammar, Regular expressions and Regular languages, Design of a Lexical Analyzer as a NFA & DFA, Lexical Analyzer generator using LEX.

Module-2: (13 Hrs.)

Syntax Analysis: Role of a Parser, Context free grammars and Context free languages, Parse trees and derivations, Ambiguous grammar.

Top Down Parsing: Recursive descent parsing, LL (1) grammars, Non-recursive Predictive

Parsing, Error reporting and Recovery.

Bottom Up Parsing: Handle pruning and shift reduces Parsing, SLR parsers and construction or

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, Operator Precedence Parsing, Error reporting and Recovery, Parser generator using YACC.

Module-3:

(07 Hrs.)

Syntax directed definitions: inherited and synthesized attributes, dependency graph, evaluation order, bottom up and top down evaluation of attributes, L- and S-attributed definitions, Construction of Syntax Tree.

Type checking: type system, type expressions, structural and name equivalence of types, type conversion.

Module-4:

(06 Hrs.)

Intermediate code generation: intermediate representations, three address codes - Quadruples and Triples, DAG for expressions, translation of declarations, assignments, control flow, Boolean expressions, Back Patching and procedure calls.

Symbol Table: Structure and features of symbol tables, symbol attributes and scopes.

Run Time Environment: Storage Organizations, Static and Dynamic Storage Allocations, STACK

Allocation, Handlings of activation records for calling sequences.

Module-5:

(07 Hrs.)

Code Generation: Factors involved, Registers allocation, Basic blocks and flow graphs, Simple code generation using flow graphs.

Code Optimization: Objective, Peephole Optimization, Concepts of Elimination of local common sub-expressions, Redundant and un-reachable codes, Basics of flow of control optimization.

List of Practical:

- Token Reorganization using C Code
- Develop a lexical analyzer to recognize a few patterns using C Code
- Design of Lexical Analyzer using LEX tool
- Design of Syntax Analyzer integrating LEX With YACC tool

Suggested Books:

6. Compilers: Principles, Techniques and Tools By Aho, Lam, Sethi, and Ullman, Second Edition, Pearson, 2014
7. Principles Of Compiler Design, CENGAGE, 3rd Edition, Prasad K.S. Nandin
8. Compiler Design, O. G. Kakde, University Science Press.
9. K. C. Loudon, *Compiler Construction Principles and Practice*, Thomson Learning Inc
10. K Cooper, L Torczon, *Engineering a Compiler*, 2nd Ed., Morgan Kaufmann, 2011
11. NPTEL Course, Prof Y. N. Srikant, IISc, Bangalore
(<https://nptel.ac.in/courses/106108052/>)

Course Code: 19MC503	Course Name: Cloud Computing	L-T-P: 3-0-0	Credit: 3
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Syllabus

Module 1 **(8 Hrs.)**

Principles of Cloud Computing- Overview of Existing Hosting Platforms, Grid Computing, Utility Computing, Autonomic Computing, Dynamic Datacenter Alliance, Distributed Computing and Enabling Technologies, Cloud Fundamentals: Cloud Definition, Cloud Characteristics, Cloud Service (Delivery) Models, Deployment models, and service models. Issues with virtualization, virtualization technologies and architectures, Internals of virtual machine monitors/hypervisors, virtualization of data centers, and Issues with Multi-tenancy.

Module 2 **(10 Hrs.)**

Cloud Architecture and Resource Management: Workload Distribution, Resource Pooling, Dynamic Scalability, Elastic Resource Capacity, Service Load Balancing, Cloud Bursting, Elastic Disk Provisioning. Distributed Management of Virtual Infrastructures, Server consolidation, Dynamic provisioning and resource management, Resource Optimization, Resource dynamic reconfiguration, Scheduling Techniques for Advance Reservation, Capacity Management to meet SLA Requirements, and Load Balancing, various load balancing techniques.

Module 3 **(10 Hrs.)**

Applications and Paradigms: Amazon Web Services - IaaS, The Elastic Compute Cloud (EC2), The Simple Storage Service (S3), The Simple Queuing Services(SQS), ,Google App Engine, and Microsoft Azure- PaaS, Windows Azure, SQL Azure, Windows Azure AppFabric, Build Private/Hybrid Cloud using open source tools, Deployment of Web Services from Inside and Outside a Cloud Architecture. MapReduce and its extensions to Cloud Computing, HDFS, and GFS.

Module 4 **(6 Hrs.)**

Cloud Security - Infrastructure security - Data security - Identity and access management Privacy- Audit and Compliance., Grid of Clouds, Open Source and Commercial Clouds, Cloud Simulator.

Modulo-5: **(6 Hrs.)**

Cloud Application Development: Storage systems: Evolution, Storage models, file systems, databases, DFS, General parallel File system, GFS, Hadoop, Locks & Chubby, TPS, NOSQL, Big Table, Mega store.

Suggested Books:

12. Cloud Computing: A Hands-On Approach ,ArshdeepBahga , Vijay Madiseti : University Press
13. Cloud Computing Principles and Paradigms, RajkumarBuyya, James Broberg, Andrzej Goscinski, Wiley Publisher
14. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly
15. *Cloud Computing: Theory and Practice*, Dan C. Marinescu, Elvesier, 2013.
16. <https://nptel.ac.in/courses/106105167/> COURSE AVAILABLE FROM : 08-JUNE-2017
COURSE CO-ORDINATED BY : Prof.SoumyaKanti Ghosh , IIT Kharagpur

Elective - III