Scheme of Instructions & Syllabi

of

Bachelor of Science (Honors)
in Computer Science
Third Year
(Effective from session 2020-21)

Department of Computer Applications

INVERTIS UNIVERSITY
Bareilly-243123 U.P.

STUDY AND EVALUATION SCHEME
B. Sc. (Honors) in Computer Science
(Effective from session 2020-2021)

SEMESTER V, YEAR III

Course Code	Course Title	Course Category	L+T+P	CA	EE	Total	Credit
CSH502	Internet Technologies	CC14	3+1+0	30	70	100	4
CSH505	GUI .NET Framework	CC15	3+1+0	30	70	100	4
CSH506	Data Mining	SEC	2+0+0	15	35	50	2
CSH*	DSE1	DSE	4+2+0	50	100	150	6
BCA568	Summer Internship ***	AECC(P)	0+0+2	15	35	50	2
LAB							
CSH552	Internet Technologies Lab	CC14(P)	0+0+4	15	35	50	2
CSH553	GUI .NET Framework Lab	CC15(P)	0+0+4	15	35	50	2
	Total			**170**	**380**	**550**	**22**

L – Lecture
T – Tutorial
P – Practical
ESM – End Semester Marks
MSM – Max. Sessional Marks

SEMESTER VI, YEAR III

Course Code	Course Title	Course Category	L+T+P	CA	EE	Total	Credit
CSH605	PHP	CC16	3+1+0	30	70	100	4
CSH606	Digital Marketing	SEC	2+0+0	15	35	50	2
CSH*	DSE2	DSE	3+1+0	30	70	100	4
CSH604	DSE3	DSE	4+2+0	50	100	150	6
LAB							
CSH653	PHP Lab	CC16(P)	0+0+4	15	35	50	2
CSH*	DSE3 Lab	DSE	0+0+4	15	35	50	2
	Total			**155**	**345**	**500**	**20**

L – Lecture
T – Tutorial
P – Practical
ESM – End Semester Marks
MSM – Max. Sessional Marks

		Program Outcomes (POs)	
PO1	**Engineering knowledge**	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design / development of solutions**	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**	Apply reasoning informed by the contextual knowledge to assesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environmentand sustainability**	Understand the impact of the professional engineering solutionsin societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**	Apply ethical principles, responsibility and norms of the engineering practice
PO9	**Individual and team work**	Function effectively as an individual, and as a member or leader indiverse teams, and in multidisciplinary settings.
PO10	**Communication**	Communicate effectively on complex engineering activities with the engineeringcommunity and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO11	**Project management and finance**	Demonstrate knowledge and understanding of theengineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.manage projects in multi-disciplinary environments
PO12	**Life-long learning**	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadestcontext of technological change. .

CSH 502: Internet Technologies

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week	Class Test -12Marks
Tutorials: 1 hr/Week	Teachers Assessment - 6Marks
	Attendance – 12 Marks
Credits: 4	End Semester Exam – 70 marks

Prerequisite: -
1. Familiarity with the cryptography and network security.
2. Knowledge of MIS and networking.

Course Objectives:
1. The Information Technology (IT) program will educate students to analyze, design, integrate, and manage information systems using information technology.
2. Developed a product or process by applying knowledge of programming, web, database, human computer interaction, networking and security tools.
3. Made decisions related to work that demonstrate understanding of the importance of being an ethical computing professional
4. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

Detailed Syllabus

UNIT I (10 Hours)
The Internet and WWW: Evolution of the Internet, Intranet, Extranet, Application areas: E-commerce, Education, Entertainment, ISPs, Growth of the World Wide Web , protocols governing the web, Internet accessing tools, Access methods: dialup, ISDN, ADSL/2+, cable, LAN, WIFI, Mobile & Satellite, Proxy servers. Mechanism of accessing internet on different devices, Search engines and their Searching techniques, Article on searching techniques used by various search engines: GOOGLE, YAHOO, BING.

UNIT II (10 Hours)
Process, Standards And Protocols: TCP/IP model ,TCP/IP fixed and dynamic IP addressing, IPv4 and IPv6, DNS and URLs. Servers and gateways. Remote login: telnet, HTTP and HTTPS, Internet governing bodies: Role of W3C, ISO .

UNIT III (10 Hours)
Security And Performance: Security policies/ Identification/ Authentication /Access control. Threats and attack methods such as Viruses, Spam, "phishing", Firewalls.
Performance: speed, reliability, downtime, and bandwidth.
Transmission Security: Encryption Techniques, Symmetric Encryption- Keys and Data Encryption Standards, triple encryption, Asymmetric encryption- Secret key encryption, public and private pair key encryption, Virtual Private Network.

UNIT IV (10 Hours)
Website Development: Web development strategies, Web applications. Client-Server model, applications running over the internet and their types ,HTML Formatting Tags, Images, Links, Lists, Tables, Frames, Forms, Comments in HTML, DIV and SPAN, CSS. Introduction to web development IDE: Dreamweaver -its working.

UNIT V (6 Hours)
Client-side scripting: DHTML, JavaScript Introduction, Statements, Loops, Arrays, Functions, Objects in JavaScript, Events and Event Handling, Validation, DOM model, Introduction to AJAX.
Server Side Programming: Introduction to server side scripting, Introduction to Active Server Pages (ASP) and Java Server Pages (JSP)

UNIT VI (10 Hours)
PHP (Hypertext Preprocessor): Introduction, syntax, variables, strings, operators, if-else, loop, switch, array, function, form ,GET and POST Methods, Cookies, Sessions**.**
Database action: Connectivity using Register , Signup, Login facilities.

Text and Reference Books
1. Pankaj Sharma, Introduction to Web Technology,S.K. Kataria and Sons,3rd Edition
2. Web Technology and Design, Xavier, C, New Age International, 1st Edition 2010
3. HTML, DHTML, Java Script, Perl & CGI, Ivan Bayross, BPB Publication, 2008
4. Internet and Web Design, Ramesh Bangia, New Age International, 2nd Edition, 2007
5. Data Communication and Networking, Behrouz A Frouzan, TMH, 4th Edition 2004.
6. Ullman, "PHP for the Web: Visual QuickStart Guide", Pearson Education

Course Outcomes:

After completing the course, students will be able to:

1. Be able to apply knowledge of computing and mathematics appropriate to the discipline.
2Be able to analyze a problem, and identify and define the computing requirements appropriate to its solution
3. Be able to function effectively on teams to accomplish a common goal
4. Understand professional, ethical, legal, security and social issues and responsibilities
5. Be able to analyze the local and global impact of computing on individuals, organizations, and society

6. Recognize the need for and an ability to engage in continuing professional development

CSH505: GUI using .Net Framework	
Teaching Scheme	**Examination Scheme**
Lectures: 3 hrs/Week	Class Test – 12 Marks
Tutorials: 1 hr/Week	Teachers Assessment – 6 Marks
	Attendance – 12 Marks
Credits: 4	End Semester Exam – 70 Marks

Prerequisite: HTML and CSS.

Course Objectives:

1. Learn about MS.NET framework developed by Microsoft.
2. You will be able to using XML in C#.NET specifically ADO.NET and SQL server
3. Be able to understand use of C# basics, Objects and Types, Inheritance
4. To develop, implement and creating Applications with C#.
5. To develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web
6. To understand and be able to explain Security in the .NET framework and Deployment in the .NET.
7. To develop Assemblies and Deployment in .NET, Mobile Application Development.

Detailed Syllabus:

Unit-1
The .Net framework: An Overview of .NET Framework, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In –Time Compilation.

Unit-2
C # Language Syntax: Why Datatype, Reference Type and Value Type, Datatypes & Variables Declaration, Boxing and Unboxing, Operators, Control Statements**,** creating Object and Classes, The Main method specification, IF statements, CASE (switch) statements, Looping in C#, Arrays

Unit-3
OOPs Concept: Class, Object, Encapsulation, Inheritance, Polymorphism etc.
Controlling program execution: Method Overloading and method overriding, Operator Overloading, Abstract Class, Inner Class, Interface. Delegates, Partial Classes. Exception Handling.

Unit-4
GUI –Controls and Event Handling: Text Box, Label, Link Label, Radio Button, Check Box, List Box, Combo Box, Date Time Picker Control, Calendar Control.

Unit-5
Containers and its Event Handling: Group Box, Panel, Tab Control. Dialog Boxes and its Event Handling: Message Dialog Boxes, Folder Browser Dialog, Open File Dialog, Save File Dialog.

Unit-6
Data Controls: Data Source, Data Set, and Data Grid View displaying Record in the Grid View Controls.
ADO.Net: Connected and Disconnected Architecture, Displaying Record from the Database, Inserting Record into Database, Creating Login using Database, Deleting Record from the Database, Fetching Record from the Database, Update Record in the Database.

Suggested Readings:

1. Programming with C#, E. Balagurusamy, TMH, 1st Edition.
2. Beginning Visual C# 2008, John Wiley, Wrox, May 2008.

3. Microsoft .Net for Programmers, Fergal Grimes, SPI, 2002.

Course Outcomes:

After completing the course, students will be able to:

1. Learn to develop applications using C# and VB.NET.
2. Learn to apply these languages to develop server-side applications which make use of ADO.NET, ASP.NET, Web Services etc.
3. Understand use of C# basics, Objects and Types, Inheritance
4. Develop, implement and creating Applications with C#.
5. Develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web.
6. Understand and be able to explain Security in the .NET framework and Deployment in the .NET.

CSH506: Data Mining

Teaching Scheme	Examination Scheme
Lectures: 1 hrs/Week	Class Test -6 Marks
Tutorials: 1 hr/Week	Teachers Assessment – 3 Marks
	Attendance – 6 Marks
Credits: 2	End Semester Exam – 35 marks

Prerequisite: - CSH301 RDBMS
Course Objectives:

1. To understand Data Mining, its origin and applications.
2. To understand types of data and to improve the quality of data and efficiency and the ease of the mining process.
3. Differentiate OnLine Transaction Processing and OnLine Analytical processing
4. Learn Multidimensional schemas suitable for data warehousing along with OLAP operations.
5. To understand how to identify associations among objects and to learn various algorithms to find them.
6. To understand applications and algorithms for Clustering along with methodologies of data mining.

Detailed Syllabus

UNIT 1- Data Mining:
Definition, Data Mining as the Evolution of Information Technology, Knowledge Discovery Process (KDP), Classification of Mining systems, Techniques involved.

UNIT 2- Data Preprocessing:
Needs, Pre-processing data, Data Cleaning, Data integration and transformation, data reduction, discretization, Concept of hierarchy generation.

UNIT 3- Data Warehouse:
Definition, Differences between Operational Database Systems and Data Warehouses, OLTP vs. OLAP, 3 Tier Architecture of Data Warehouse, Concept of ETL.

UNIT 4- Data Warehouse Modeling:
Data Cube- A Multidimensional Data Model, Stars, Snowflakes, and Fact Constellations: Schemas for Multidimensional Data Models, OLAP operation

UNIT 5- Data Mining Techniques:
Introduction to Association Rule and Association Rule Mining, Classification: Decision Tree Induction, K-nearest neighbor, Clustering: Cluster Analysis.

UNIT 6- Data Mining Trends:
Mining Complex Data Types, Methodologies of Data Mining, Data Mining Applications, Web Mining.

Text and Reference Books
1. Data Mining -Concepts and Techniques, Han, Kamber, Harcourt India, 2006.
2. Data Mining Introductory and advanced topics, Margaret H Dunham, Pearson, 2002.
3. Data Mining Techniques, Arjun K. Pujari, University Press, 2001.

Course Outcomes:

After completing the course, students will be able to

1. Understand the concept of data mining and its applications.
2. Understand pre-processing steps to improve the quality of data to ease data mining process.
3. Understand OLTP and OLAP as well as 3 tier architecture of data warehouse.
4. Understand various Multidimensional schemas and to apply OLAP operations.
5. Establish associations among objects by applying various algorithms.
6. Perform cluster analysis and understand the methodologies of data mining.

CSH 511: Artificial Intelligence

Teaching Scheme	Examination Scheme
Lectures: 4 hrs/Week Tutorials: 2 hr/Week Credits: 6	Class Test -20 Marks Teachers Assessment – 10 Marks Attendance – 20 Marks End Semester Exam – 100 marks

Prerequisite: - CSH101 C Programming, CSH201 Discrete Mathematics.

Course Objectives:

1. To understand how these algorithms works so the main objective of this course is and how to analyze the data to make a proper decision.
2. To know the application areas and building blocks of AI as presented in terms of intelligent agents.
3. To initiate the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems in different fields.
4. To evaluate the different stages of development of the AI field from human like behavior to Intelligent Agents.
5. To build intelligent machine which can perform and act like humans.

Detailed Syllabus

Unit-1
Introduction: Overview of Artificial Intelligence- Problems of AI, AI and related fields. **Problem Solving:** Problems, Problem Space & Search: Defining the Problem as State Space Search, Production System, Problem Characteristics, issues in the design of Search Programs.

Unit-2
Search Techniques: Uniform Search Strategies: Breadth First Search, Depth First Search, Depth Limited Search, Comparing Uniform Search Strategies, Greedy Best-First Search, A* Search, Memory Bounded Heuristic Search: Local Search Algorithms & Optimization Problems: Hill Climbing Search.

Unit-3
Knowledge representation: Knowledge Representation Issues, Representation and Mapping, Approaches to Knowledge Representation, Issues in Knowledge Representation, Knowledge manipulation, Knowledge acquisition.

Unit-4
Using Predicate Logic: Representing Simple Fact in Logic, Representing Instant & ISA Relationship, Computable Functions & Predicates, Resolution, natural deduction.
Representing Knowledge Using Rules: Procedural Verses Declarative Knowledge, Logic Programming, Forward Verses Backward Reasoning, Matching, Control Knowledge.

Unit-5
Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse & Pragmatic Processing.

Unit-6
Expert System: Rule based system architecture, Non production system architecture, knowledge organization and validation, Existing Systems (DENDRAL, MYCIN).

Text and Reference Books
1. "Artificial Intelligence", Ritch & Knight, TMH, 2006.
2. "Introduction to Artificial Intelligence & Expert Systems", Patterson, PHI, 2007.
3. "Artificial Intelligence: A Modern Approach", Russell, S., Norvig, P, Pearson Education, 2006.
4. "Introduction to A.I.", Charnick, Addision Wesley, 1999.

Course Outcomes:
After completing the course, students will be able to:

1. How to solve a particular problem by using different algorithms which is impossible for humans.
2. How to make proper decisions by gathering information and analyzing them.
3. How expert system works and perform tasks.
4. How to convert a particular sentence into logical statement.
5. Analyze the problem as a state space, graph, design heuristics and select amongst different search-based techniques to solve them.
6. Apply concept Natural Language processing to problems leading to understanding of cognitive computing.

CSH 512: Artificial Neural Networks

Teaching Scheme	Examination Scheme
Lectures: 4 hrs/Week	Class Test -20 Marks
Tutorials: 2 hr/Week	Teachers Assessment – 10 Marks
	Attendance – 20 Marks
Credits: 6	End Semester Exam – 100 marks

Prerequisite: - Machine Learning

Course Objectives:
1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective
3. To give design methodologies for artificial neural networks
4. To provide knowledge for network tunning and overfitting avoidance
5. To offer neural network implementations.
6. To demonstrate neural network applications on real-world tasks

Detailed Syllabus

Unit-1

Fundamental of Neural Networks: Introduction, Model of Artificial Neuron, Architectures, Learning Methods, Taxonomy of NN Systems, Single Layer NN System, Applications.

Unit-2

Multilayer NN System and Backpropagation Networks: Background, Backpropagation Learning, Backpropagation Algorithm, Learning in Multilayer NN Systems. Applications of Backpropagation Algorithm.

Unit-3

Associative Memory: Introduction, Auto-associative Memory, Bi-directional Hetro-associative memory. Applications of Associative Memory.

Unit-4

Self-Organizing Maps (SOMs): Introduction to supervised and unsupervised learning. Competitive Learning, SOMs and their working principles, applications.

Unit-5

Adaptive Resonance Theory: Stability-Plasticity Dilemma, ART Networks, Iterative Clustering, Unsupervised Learning, ART Networks and their working principles, applications.

Unit-6

Introduction to Soft Computing: Basics of Soft Computing, Components of Soft Computing. Introduction to Fuzzy Logic, Genetic Algorithms.

Text and Reference Books
1. Neural Networks, Fuzzy Logic and Genetics Algorithms- Synthesis and Applications by
2. Rajasekaran and G.A. Vijaylakshmi Pai, Prentice Hall.
3. Neural Networks: A Comprehensive Foundation by Simon S. Hakin, Prentice Hall.
4. Fundamental of Neural networks: Architecture, Algorithms and Applications by Laurene V. Fausett, Prentice Hall.

Course Outcomes:

After completing the course, students will be able to:

1. Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
2. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
3. To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
4. Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
5. Reveal different applications of these models to solve engineering and other problems.

CSH513: Theory of Computations

Teaching Scheme	Examination Scheme
Lectures: 4 hrs/Week	Class Test -20 Marks
Tutorials: 2 hr/Week	Teachers Assessment – 10 Marks
	Attendance – 20 Marks
Credits: 6	End Semester Exam – 100 marks

Prerequisite: Sets, Relations, Trees, Graphs, Boolean Algebra etc.

Course Objectives:
1. Introduce concepts in automata theory and theory of computation.
2. Identify different formal language classes and their relationships.
3. Design grammars and recognizers for different formal languages.
4. Prove or disprove theorems in automata theory using its properties.
5. Determine the decidability and intractability of computational problems.

Detailed Syllabus:

UNIT I
Introduction: Basic Concepts: Formal proofs, Additional form of Proofs, Inductive proof, Sets, Relation, Kleen Closures, Graphs, Trees, Symbol, Alphabets, strings and languages, automata and grammar, Applications of automata theory.

UNIT – II
Finite Automata: Basic Machine and Finite State Machine. Finite Automata: Definition and Types of Automata- DFA, NFA, Construction of DFA and NFA, NFA with epsilon-Moves, Minimization Of FA, Equivalence of NFA and DFA, Conversion of NFA with epsilon moves to NFA, Conversion of NFA with epsilon moves to DFA, Moore and Mealy Machines, Inter-conversion between Moore and Mealy Machines.

UNIT – III
Regular Expressions, Regular Grammar and Languages: Definition and Identities of Regular Expressions, regular and non-regular language, operations on RE and their precedence, Algebraic laws for RE, Regular Expression and Finite Automata, Conversion from RE to FA and DFA to RE, Arden's theorem, Pumping Lemma for RL.

UNIT – IV
Context Free Grammar and Languages: Definition and Construction of CFG, Definition and Generation of CFL from CFG, Derivation, derivation trees, Ambiguous Grammar and Removal of Ambiguity. Simplification of CFGs. Normal Forms of Grammar: CNF and GNF.

UNIT - V
Pushdown Automata: Definition of push down automata, The language of PDA, Definition and Construction of DPDA and NPDA. Equivalence of PDAs and CFGs, Closure Properties Of CFLs.

UNIT – VI
Turing Machines: Definition and Construction of Turing Machines. Languages of TM. Types of TM. Comparison And Applications of DFA, PDA and TM.

Text and Reference Books
1. John C. martin, "Introduction to Language and Theory of Computation", TMH, Third Edition.
2. Michel Sipser "Introduction to Theory of Computation" Thomson Course Technology, Second Edition .
3. Kavi Mahesh, "Theory of Computation" Wiley-India.

Course Outcomes:
After completing the course, students will be able to:

1. Acquire a fundamental understanding of the core concepts in automata theory and formal languages.

2. An ability to design grammars and automata (recognizers) for different language classes.
3. An ability to identify formal language classes and prove language membership properties.

4. An ability to prove and disprove theorems establishing key properties of formal languages and automata.
5. Acquire a fundamental understanding of core concepts relating to the theory of computation and computational models including (but not limited to) decidability and intractability.

CSH514: MATLAB

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week	Class Test -12Marks
Tutorials: 1 hr/Week	Teachers Assessment - 6Marks
	Attendance – 12 Marks
Credits: 4	End Semester Exam – 70 marks

Prerequisite: - Basic Mathematics, Elementary knowledge of computer programming and basic understanding of matrices, linear algebra, calculus, trigonometric functions and geometry.

Course Objectives:

Familiarization of the syntax, semantics, data-types and library functions of numerical computing languages such as MATLAB and/or SCILAB, and application of such languages for implementation/simulation and visualization of basic mathematical functions relevant to electronics applications.

Detailed Syllabus

UNIT I (6 Hours)
Basics of MATLAB: Starting MATLAB, matrices, variables, and the colon operator, linspace, plotting vectors.

UNIT II (10 Hours)
Matrices: Typing matrices, concatenating matrices, useful matrix generators, subscripting, end as a subscript, deleting rows or columns, matrix arithmetic, transpose.

UNIT III (10 Hours)
MATLAB Programming: Logical expressions, for loops, while loops, conditional programming, scripts, function m scripts, return statements, recursive programming.

UNIT IV (10 Hours)
Basic Graphics: Plotting many lines, adding plots, plotting matrices, clearing the figure window, subplots.
Graphics of Functions of Two Variables: Basic plots, color maps, color bar.

UNIT V (10 Hours)
Text Strings and cell arrays: String matrices, comparing strings, string manipulations, converting numbers to strings, using strings as commands, introduction and use of cell arrays.

UNIT VI (10 Hours)
Multidimensional Arrays: Generating Multidimensional Grids, Operations with Multidimensional Arrays. Digital Image Processing using MATLAB: Reading and writing gray scale image, Conversion of gray scale image to binary image, finding the number of density, perimeter, branch, area points of the image.

Text and Reference Books
1. Basics of MATLAB and beyond, Andrew knight, CRC Press LLC, 2000.
2. A Guide to MATLAB for Beginners and Experienced Users, Brian R. Hunt, Ronald L. Lipsman, Cambridge University, 2005.
3. Digital Image Processing using METLAB, Rafel, Richard & Steven, Pearson, 2007.

Course Outcomes:

On successful completion of the course, the students should be able to

1. Understand the need for simulation/implementation for the verification of mathematical functions.
2. Understand the main features of the MATLAB program development environment to enable their usage in the higher learning.
3. Implement simple mathematical functions/equations in numerical computing environment such as MATLAB.
4. Interpret and visualize simple mathematical functions and operations thereon using plots/display.
5. Analyze the program for correctness and determine/estimate/predict the output and verify it under simulation environment using MATLAB tools.

CSH515: Software Testing & Quality Assurance

Teaching Scheme	Examination Scheme
Lectures: 4 hrs/Week	Class Test -20 Marks
Tutorials: 2 hr/Week	Teachers Assessment – 10 Marks
	Attendance – 20 Marks
Credits: 6	End Semester Exam – 100 marks

Prerequisite: - programming languages, software engineering.

Course Objectives:

The objectives of this course are

1. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. To highlight the strategies for software testing and understand the various types of black box and white box testing methods.
3. To discuss various software testing issues and solutions in unit testing, integration, regression, and system testing
4. To identify the issues in testing management and understand test planning.

5. To gain the techniques and skills on how to use modern software testing tools to support Software testing projects.

Detailed Syllabus:

UNIT I (6 Hours)

Software Quality Assurance: Software crisis, Birth of software engineering, Why Software engineering, Criteria for the success of a software project, phases in SDLC, Software Quality Assurance, Quality Management Systems.

UNIT II (10 Hours)

Software Testing Process: Verification and Validation, Cost of Quality, Why Testing is difficult, Levels of testing-Unit Testing, Module Testing, Integration and System Testing, Acceptance Testing, Testing Approaches: Top-down versus Bottom-up, Functional versus Structural testing, Mutation testing, Regression Testing, Types of Testing, Manual Testing and its Limitations.

UNIT III (10 Hours)

Software Testing Tools: Need for Automated Testing Tools, Taxonomy of testing tools, Functional/Regression Testing Tools, Performance Testing tools, Testing Management Tools, Source Code Testing Tools, How to select a Testing Tool?

UNIT IV (12 Hours)

WinRunner: Overview, Testing an application using WinRunner, TestScript Language(TSL), GUI MAP file, Synchronization of Test cases, Data driven testing, Checking GUI objects.

UNIT V (12 Hours)

SQA Robot: overview, testing an application, Synchronization of Test procedures, creating checkpoints.TestDirector: overview, testing management process, managing the testing process using TestDirector.

UNIT VI (6 Hours)

Source Code Testing Utilities in Unix and Linux Environnement: GNU tools, Timings of programs, Profiler, Code optimization, Productivity tools, Portability Testing Tool, Configuration Management Tools, Coding Guidelines and Standards.

Text and Reference Books

1. "Effective Software Testing", Elfriede Dustin, Pearson Education, IV edition.
2. "Software Testing Concepts and Tools", N. R. Pusuluri, Dreamtech press, 2008.
3. "Automated Software Testing", Jeff Rashka, John Paul and E. Dustin, Pearson
4. Education, 2008.
5. "Effective Methods For Software Testing", W. E. Perry, Wiley-India, III edition.

Course Outcomes:

After completing the course, students will be able to:

1. Have an ability to apply software testing knowledge and engineering methods. Have an ability to design and conduct a software test process for a software testing project.
2. Have an ability to understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods
3. Have an ability to design and conduct various types and levels of software testing for a software project.
4. Have basic understanding, knowledge of contemporary issues in software testing and test planning. Have an ability to use various communication methods and ethical skills to communicate with their teammates to conduct their practice-oriented software testing projects.
5. Have an ability to identify the needs of software test automation, and define and develop a test tool to support test automation.

CSH516: Multimedia and its Applications

Teaching Scheme	Examination Scheme
Lectures: 4 hrs/Week	Class Test -20 Marks
Tutorials: 2 hr/Week	Teachers Assessment – 10 Marks
	Attendance – 20 Marks
Credits: 6	End Semester Exam – 100 marks

Prerequisite: - Data Structure, Design and Analysis of Algorithms, Discrete Mathematics.

Course Objectives:
1. Introduce to the students the characteristics and design methodologies of Multimedia
2. Expose students to theoretical and fundamental concepts of multimedia, its applications and the techniques involved
3. Help students learn the issues involved in capturing, processing, manipulating, storing, and retrieving various kinds of continuous media.
4. To understand the image creation.
5. To work on animation and video.

Detailed Syllabus

Unit-1
Introduction to Multimedia: Definition of Multimedia, CD-ROMs and Multimedia applications. Multimedia requirements-Hardware, Software, Creativity and organization, Multimedia skills and training.

Unit-2
Multimedia Hardware: Hardware requirement for multimedia, Macintosh verses PC. The Macintosh platform, PC platform, Connections, Memory and storage devices, input devices, output hardware, Communication devices.

Unit-3
Multimedia Software: Basic tools, painting and drawing tools, OCR software, Sound editing programs, Animation devices and digital movies and other accessories, Linking multimedia objects, office suites, word processor, spreadsheets presentation tools, Types of authoring tools card and page-based, Icon based and time based authoring tools, Object oriented tools.

Unit-4
Multimedia Software : Basic tools, painting and drawing tools, OCR software, Sound editing programs, Animation devices and digital movies and other accessories, Linking multimedia objects, office suites, word processor, spreadsheets presentation tools, Types of authoring tools card and page-based, Icon based and time based authoring tools, Object oriented tools.

Unit-5
Production Tips: Image-creation, making still images, images colors, Image, File format, image editing.

Unit-6
Animation and video: Animation-principals of animation, making workable animations, Video, using video, Broadcast video, standard, integrating computer and TVs, shooting and editing video, using recording formats, Video tips.

Text and Reference Book
1. Multimedia Making It Work, Tay Vaughan, TMH, 5th Edition.
2. Multimedia Power Tools, Peter Jerram, M. Gosney, Random House Electronics Publishing, 2nd Edition

Course Outcomes:
        After completing the course, students will be able to:

1. Identify different media; representations of different multimedia data and data formats.
2. Analyze various compression techniques.
3. Compare various audio and video file formats.
4. Apply different coding technique for solving real world problems
5. Choose optical storage media suitable for multimedia applications.

6. Apply concept Natural Language processing to problems leading to understanding of cognitive computing.

CSH517: UNIX and Shell Programming

Teaching Scheme	Examination Scheme
Lectures: 4 hrs/Week	Class Test -20 Marks
Tutorials: 2 hr/Week	Teachers Assessment – 10 Marks
	Attendance – 20 Marks
Credits: 6	End Semester Exam – 100 marks

Prerequisite: Operating Systems, DOS, C-Language etc.

Course Objectives:

Detailed Syllabus

Unit-1
Introduction to UNIX: features of UNIX, Shell Vs Kernel, types of shell, System Calls, System calls Vs Library functions, UNIX file System, The Parent-Child Relationship, Orphan, Zombie, UNIX Architecture, UNIX Commands

Unit-2
The first faltering step(Login), Password, Password Ageing, files related commands, Symbolic links, Listing Files & directories, Hidden files, Shell Meta characters, Masking file permission, Changing file permission(Absolute & Symbolic mode), Sticky bit, Directory related commands, Best calculator.

Unit-3
The UNIX file system, INODE Table, Disk related commands, File related commands, viewing files, Locating files, Taking printouts, File Compression (File Compression & Archiving), Filters, The Stream Editors, I/O redirection & Piping, Command substitution.

Unit-4
Process basic, process status, Mechanism of process creation, Job Control, background processes, Killing a process, Daemon, Changing process priorities, Scheduling a process, process synchronization, Semaphores, Communication In UNIX,
System Administration in UNIX- the System administrator's login, the administrator's privileges, Adding & Removing groups, user's management.

Unit-5
Editor, types of editor (vi and ed), Modes of operation in vi, Navigation in vi (use of h, j, k and l keys), word navigation (use of b, e and w keys), Scrolling, deleting text, copy & paste in vi, block commands, Searching, Find & replace, Abbreviation(abbr), set command.

Unit-6
Shell Scripts/program, need of shell scripts, Interactive shell scripts, shell variables, shell keywords, System variables, shell keywords, System variables, user defined variables, Command line arguments, exit and status of command, use of operators, Control Instructions in shell.

Text and Reference Book
1.UNIX shell programming By Yashvant Kanetkar ---BPB Publications

2.UNIX Concepts and Application By Sumitabha Das--- Tata McGraw-Hill publication

3.The C Odyssey UNIX the open boundless C By Meeta Gandhi--- BPB Publications

Course Outcomes:

After completing the course, students will be able to:

1. To define operating system, its features, shell, types , kernal, about commands in UNIX.
2. To understand basic building commands to accomplish specific task, UNIX commands, syntax

   and semantics.
3. To Implement basic building commands, working with editors.
4. To focus on contemporary approach of shell programming stressing the importance of clarity,

   legibility and efficiency in script design along with the knowledge of shell variables and

   keywords.
5. To test and organize different techniques pertaining problem solving skills and to validate the

   usefulness of elementary shell scripts in the context of real world problems and day to day

   problems/ regular jobs/ system related jobs.
6. To design a shell script of a problem; writing shell scripts, compilation and debugging various   shell scripts.

CSH605: PHP	
Teaching Scheme	**Examination Scheme**
Lectures: 3 hrs/Week	Class Test -12Marks
Tutorials: 1 hr/Week	Teachers Assessment - 6Marks
	Attendance – 12 Marks
Credits: 4	End Semester Exam – 70 marks

Course Objectives:

1. To give knowledge about server site programming.
2. To introduce latest web development language.
3. To give knowledge about MySQL database management.
4. To explore the skills of programming in the file of online web project

Detailed Syllabus

Unit-1

Introduction to PHP: - Evaluation of Php, Basic Syntax, defining variable and constant, Php Data type, Operator and Expression, Making Decisions, Doing Repetitive task with looping, Mixing Decisions and looping with Html.

Unit-2

Function: - What is a function, define a function, Call by value and Call by reference, Recursive function, PHP GET and POST, Built-in Functions, User-Defined Functions, Functions with Parameters, Values and arguments in Function.

Unit-3

String and Array:-String - Creating and accessing String, Searching & Replacing String, Formatting String, String Related Library function , Array- Anatomy of an Array, Creating index based and Associative array, Accessing array Element, Looping with Index based array, Looping with associative array using each() and foreach(), Some useful Library function

Unit-4

Introduction to OOPS- Introduction, Objects, Declaring a class, The new keyword and constructor, Destructor, Access method and properties using $this variable, Public, private, protected properties and methods, Static properties and method, Class constant, Inheritance & code reusability, Polymorphism, Parent:: & self:: keyword, Instance of operator, Abstract method and class, Interface, Final

Unit-5

Exception Handling, file and Directories:-Understanding Exception and error, Try, catch, throw, Global Exception Handler, Defining Custom Exceptions, Understanding file& directory, Opening and closing a file, Coping, renaming and deleting a file, working with directories.

Unit-6

Database Connectivity with MySql:-Introduction to RDBMS,Connection with MySql Database, Performing basic database operation (DML) (Insert, Delete, Update, Select), Executing query, Framework.

Text and Reference Books
1. Lynn Beighley & Michael Morrison- Head First Php & MySQL.
2. Robin Nixon: Learning Php, MySQL, Java script and CSS: A step-by-step guide to creating dynamic websites.
3. Luke Welling & Laura Thompson: PHP & MYSQL web development

Course Outcomes:

After completing the course, students will be able to:

1. Understand various types of website development using php and MySQL.
2. Analyze the latest language designing and optimize new technology.
3. Identify difference between traditional web development and php web development.
4. Understand level of web technology at corporate level.
5. Learning professional framework of php and mysql for project development.

CSH606: Digital Marketing

Teaching Scheme	Examination Scheme	
Lectures: 1 hrs/Week	Class Test	– 6 Marks
Tutorials: 1 hr/Week	Teachers Assessment	– 3 Marks
	Attendance	– 6 Marks
Credits: 2	End Semester Exam	– 35 Marks

Prerequisite: Knowledge of Social Media Platforms.

Course Objectives:

1. To understand the importance of Digital Marketing.
2. To study various types of Digital Marketing.
3. To know the significance of Digital and Internet Marketing.
4. To understand the recent trends in digital advertising and SEO.
5. To create a campaign on any social media platform.

Detailed Syllabus:

Unit-1

Introduction to Digital Marketing: Evolution of Digital Marketing from traditional to modern era, Role of Internet; Current trends, Info-graphics, implications for business & society; Emergence of digital marketing as a tool; Drivers of the new marketing environment; Digital marketing strategy; P.O.E.M. framework, Digital marketing plan, Digital marketing models.

Unit-2

Internet Marketing and Digital Marketing Mix: Internet Marketing, opportunities and challenges; Digital marketing framework; Digital Marketing mix. Introduction to Content Marketing, Email Marketing, Web analytics, Conversion Rate Optimization, Sales Funnels and Affiliate Marketing.

Unit-3

Social Media Marketing: Role of Influencer Marketing, Tools & Plan–Introduction to social media platforms, penetration &characteristics; Building a successful social media marketing strategy. Facebook Marketing, LinkedIn Marketing, Twitter Marketing, Instagram Marketing: Introduction and framing content strategy, Advertising.

Unit-4

Mobile Marketing: Mobile Advertising, Forms of Mobile Marketing, Features, Mobile Campaign Development, Mobile Advertising Analytics.

Unit-5

Introduction to SEO and SEM: Trends in Digital Advertising– - Introduction and need for SEO, how to use internet & search engines; search engine and its working pattern, On-page and off-page optimization, SEO Tactics, Introduction to SEM.

Unit-6

Web Analytics: Google Analytics & Google Ad Words; data collection for web analytics. Online Reputation Management.

Application: A group of two students (Maximum) has to work on creating an advertising campaign through any form of digital marketing viz: Mobile Marketing, Twitter Marketing, Facebook

Marketing, LinkedIn Marketing, Instagram or Snapchat Marketing. The student/s should work on creating the campaign, running the campaign, presenting the results of the campaign in terms of Lead Generation and / or sales and / or web analytics.

Suggested Readings:
1.Seema Gupta, Digital Marketing, Mc-Graw Hill, 1st Edition - 2017
2. Ian Dodson, The Art of Digital Marketing, Wiley Latest Edition
3.Puneet Singh Bhatia, Fundamentals of Digital Marketing, Pearson 1st Edition – 2017
4.Vandana Ahuja, Digital Marketing, Oxford University Press Latest Edition
5. Philip Kotler Marketing 4.0: – Moving from Traditional to Digital Wiley 2017

Course Outcomes:

After completing the course, students will be able to:

1. Understand the concept of Digital Marketing
2. Develop insight on Current Trends – Digital and Social Statistics (Infographics)
3. Provide an introduction to Digital Marketing Platforms like Facebook, Twitter, YouTube, etc.
4. Understand the basics of Search Engine Optimization (SEO) and Mobile Marketing.
5. Know various strategies involved in Marketing products and Services Digitally.

CSH- 611 Numerical Algorithms and Operation Research

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week	Class Test -12Marks
Tutorials: 1 hr/Week	Teachers Assessment - 6Marks
	Attendance – 12 Marks
Credits: 4	End Semester Exam – 70 marks

Course Objectives:

1. To comprehend various computational techniques to find approximate value for possible root(s) of non-algebraic equations, to find the approximate solutions of system of linear equations and ordinary differential equations.
2. To make the students familiar with the basic statistical concepts and tools which are needed to study situations involving uncertainty or randomness.
3. This course develops the ideas underlying the Simplex Method for Linear Programming Problem, as an important branch of Operations Research.
4. The course covers Linear Programming with applications to Transportation problem. Such problems arise in manufacturing resource planning and financial sectors.
5. To render the students to several examples and exercises that blend their everyday experiences with their scientific interests.

Detailed Syllabus

Unit-1
Computer Arithmetic: Floating point representation of numbers, arithmetic operations with normalization, consequences of normalized floating point representation of numbers, Errors in numbers.

Unit-2
Finding the roots of an equation: Iterative method: Introduction, Beginning an iterative method, Bisection method, Newton Raphson method, Regula Falsi method. Comparison of Iterative methods, Order of Convergence of Newton Raphson Method and Secant Method.

Unit-3
Ordinary differential equations: Euler‟s method, Taylor series method, Range Kutta II and IV order methods.
Numerical Integration: Simpson‟s 1/3 and 3/8 rule, Trapezoidal rule.

Unit-4
Solving simultaneous linear equations: Introduction, Gauss Elimination method, pivoting, ill conditioned equations, Gauss Jordon method, and Gauss-Seidel iterative method. Comparison of direct and iterative methods..

Unit-5
Some important definitions – Solutions to LPP, Feasible Solution, Basic Solutions, Basic Feasible Solution, Optimum Basic Feasible Solution, Unbounded Solution. Assumptions in LPP, Limitations of LPP, Applications of LPP and advantages of LPP
Standard Linear Programming – Formulation of a Linear Programming Solving L.P.P. by Graphical Method Problem and Simplex Method.

Unit-6
Transportation Problems – Method of finding initial basic feasible solution to Transportation problem-North West Corner, Least Cost Method and Vogel‟s Method. Method of finding initial basic feasible solution to Assignment Problem using Hungarian Method.

Reference Books:
1. Computer Oriented Numerical Methods by Rajaraman. V.
2. "Operation Research", by S.D.Sharma Kedarnath Ramnath Publishers 16th edition 2010
3. Numerical Methods by S.S. Sastry.

Course Outcomes:

1. Apply some numerical methods to find the zeroes of nonlinear functions of a single variable and solution of a system of linear equations, up to a certain given level of precision.
2. Understand the applications of numerical differentiation and integration to convert differential equations into difference equations for numerical solutions.
3. Establish a formulation helping to predict one variable in terms of the other, i.e., correlation and linear   regression.
4. Solve an algebraic or transcendental equation using an appropriate numerical method.
5. Analyze and solve linear programming models of real life situations.
6. Find the graphical solution of LPP with only two variables, and illustrate the concept of convex set and extreme points. The theory of the simplex method is developed.

CSH612: Simulation and Modeling

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: -

1. Basic knowledge of numerical mathematics,
2. probability and statistics, and Programming skills

Course Objectives:

1. The main objective of this subject is to gain the knowledge about system and its behavior so that a person can transform the physical behavior of a system into a mathematical model that can in turn transform into a efficient algorithm for simulation purpose.
2. The area of experimentation and results analysis for simulation models is briefly introduced here. By the end of this module you will learn the verification and validation techniques to compare the defined model with real system's data.

Unit –I (10 Hours)

Introduction of System Models & system simulation:Advantages and disadvantages of simulation,difficulties of simulationwhen to use simulation?modeling concepts(model classification)

Unit-II (6 Hours)

VERIFICATION AND VALIDATION OF MODEL:Introduction of validation and verification,comparing model data with real system data,validating exiting systems,validating first time model

Unit-III(10 Hours)

Discrete system simulation:time graph representation,discrete simulation,the single-server queue queue parameters,the multi-server queue,basic queuing relationships,SINGLE-SERVER QUEUES,MULTISERVER QUEUES,performance measures for queuing systems,the simulation of time sharing systems.

Unit-IV(10 Hours)

Continuous simulation:Introduction of Continuous Simulation,Examples related to continuous simulation,Why do we use Continuous Simulation?The Uses of Simulation.

Unit-V(10 Hours)

Simulation Language:Continuous Simulation Language,Classification of Continuous Simulation Languages,Discrete Simulation Language,Classification of Discrete Simulation Languages,Other Simulation Languages,Introduction of SIMULA.

Unit-VI(10 Hours)

Use of DatabaseA.I. in modeling Simulation:Database in Modeling And Simulation,Definition of Simulation Data Model,Data Representation of Simulation Model,Data Representation For Input Files For a Simulation,Data Representation for Output Files for a Simulation ,A.I. in Modeling Simulation

Text and Reference Books

1. Jerry Banks and John Carson, "Discrete Event System Simulation", PHI, 2005
2. Geoffrey Gordon, "System Simulation", Second Edition, PHI, 2006 Frank L. Severance, "System Modeling and Simulation", Wiley, 2001
3. Averill M. Law and W. David Kelton, "Simulation Modeling and Analysis McGraw Hill, 2006.
4. Jerry Banks, "Handbook of Simulation: Principles, Methodology, Advances, Applications and Practice", Wiley, 1998.
5. Sheldon M. Ross: Introduction to Probability Models 7th Edition, Academic Press, 2002
6. Donald E. Knuth: The Art of Computer Programming - Volume 2: Semi Numerical Algorithms, 2nd Edition, PEARSON

Course Outcomes:

1. Have a clear understanding of the need for the development process to initiate the real problem.
2. Have a clear understanding of principle and techniques of simulation methods informed by research direction.
3. Cognitive skills (thinking and analysis) –
4. Be able to describe the components of continuous and discrete systems and simulate them.
5. Be able to model any system from different fields
6. Be able to implement numerical algorithm to meet simple requirements, expressed in English
7. Be able to discuss the simulation methods and select the suitable technique on the problems.

CSH 613 Internet of Things

Teaching Scheme	Examination Scheme
Lectures: 3 hrs./Week	Class Test -12Marks
Tutorials: 1 hr./Week	Teachers Assessment - 6Marks
	Attendance – 12 Marks
Credits: 4	End Semester Exam – 70 marks

Prerequisite: Basics of Networking, Internet Technology

Course Objectives:

The objectives of the course are:

1. Understand general concepts of Internet of Things (IoT)
2. Demonstrate evolution from M2M to IoT
3. Study general architecture of IoT and prototyping in IoT
4. Standardization of IoT platform
5. Evaluate security issues in IoT applications

Detailed Syllabus

UNIT I (10 hrs.)
Introduction to IoT: Internet of Things: IoT: An overview, Introduction, Characteristics, IoT technology, IoT as a Network of Networks, IoT architecture, IoT developments, Smart Technology, Brief introduction of smart technology, Smart devices, Smart environment. IoT Components, Basic Principles, Embedded technology Vs IoT, Sensors, Wireless sensor networks, Arduino, Raspberry Pi.

UNIT- II (8 hrs.)
M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics. Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT.

UNIT- III (8 hrs.)
IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Constraints affecting design in IoT world-Introduction, Technical design Constraints

UNIT- IV (10 hrs.)
Prototyping in IoT- Basics of prototypes, Prototyping in IoT, Communication in IoT, Prototyping model, Data handling in IoT, **Operating Systems for Low-End IoT Devices**, Open-Source OSs, Closed Source OSs

UNIT- V (8 hrs.)
Architectural Approach for IoT Empowerment: Introduction, defining a Common Architectural Ground, IoT Standardization, M2M Service Layer Standardization, OGC Sensor Web for IoT, IEEE, IETF and ITU-T Standardization activities, Interoperability Challenges, Physical vs. Virtual, Solve the Basic First, Data Interoperability, Semantic Interoperability, Organizational Interoperability, Eternal Interoperability, Importance of Standardization, Plan for Validation and testing.

UNIT- VI (8 hrs.)
Identity Management Models in IoT: Introduction, Vulnerabilities of IoT, Security requirements, Challenges for a secure Internet of Things, identity management, Identity portrayal, Different identity

Management model: Local identity, Network identity, Federated identity, Global web identity.

Text and Reference Books

1. Olivier Hersent, David Boswarthick, Omar Elloumi "The Internet of Things key applications and protocols", Wiley
2. Michael Miller "The Internet of Things" Pearson
3. Adrian McEwen, Hakin Cassimally "Designing the Internet of Things" Wiley India
4. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",** 1st Edition, Academic Press, 2014.
5. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on Approach)", 1st Edition, VPT, 2014.

Course Outcomes:
1. Understand the basics of IoT.
2. Visualize the evolution from M2M to IoT.
3. Illustrate the architecture of IoT using various views.
4. Understand various standardizations for IoT empowerment.
5. Enlist vulnerabilities and security issues for IoT network.

CSH 614: E-Business	
Teaching Scheme	**Examination Scheme**
Lectures: 3 hrs/Week	Class Test -12Marks
Tutorials: 1 hr/Week	Teachers Assessment - 6Marks
	Attendance – 12 Marks
Credits: 4	End Semester Exam – 70 marks

Prerequisite: -

Course Objectives:
1. Define e-commerce and e-Business.
2. Compare e-commerce with traditional commerce.
3. Understand media convergence.
4. Explain the business applications of e-commerce .
5. Discuss the need for e-commerce and e-Business.
6. Describe the basics of e-commerce: network and electronic transaction today.

Detailed Syllabus

Unit-1
Introduction to Electronic Commerce: Definition, e-commerce v/s traditional commerce, , E-Com vs. E-Business ,Framework of E-Commerce: The Information Superhighway, Multimedia Content and Network Publishing, Messaging and Information Distribution, Services Infrastructure. E-Commerce Models.

Unit-2
Securing Business on Network: Web Security issues related to e-business, e-commerce threats: Communication channel ,Secrecy threats, Web server threats, Security by Digital Signatures.

Unit-3
E-Payment Methods : Elements involved in Electronic Payment Systems, Brick and Mortar: Payment Authorization and Settlement, Smart Cards and its types, Credit Cards, Security Issues in Electronic Payment Systems.

Unit-4
Different e-Transactions: EDI- Definitions, EDI-Layered Architecture, Advantages & Limitations of EDI, Firewalls: Packet Filtering, Application Level Firewalls, Transaction Security: Active and Passive attacks, Fabrication, Interruption , Interception,Modification.

Unit-5
WAP and WWW : WAP technology and its benefits, WAP Protocol Suit: WDP,WTP,WSP,WTLS, Comparison between WWW and Wireless Application Protocol, WWW based security schemes.

Unit-6
Mobile Commerce and Security Issues : Overview, Framework of M-Commerce:, Introduction of Home Banking, Security issues related to Online Banking.

Text and Reference Books

1. Frontiers of Electronic Commerce- Ravi Kalakota & Whinston, 10th edition, Pearson.
2. Electronic Commerce-Bharat Bhaskar, IInd Edition, TMH.
3. E-business- Daniel Amor, Ist, Pearson
4. Electronic Commerce- Turban & Lee, Ist, Pearson
5. Electronic Commerce- Ravi Kalakota & Whinston, VIIth edition, Pearson.

Course Outcomes:

After completing the course, students will be able to:

1. Analyze the impact of E-commerce on business models and strategy
2. Describe Internet trading relationships including Business to Consumer, Business-to-Business, Intra-organizational.
3. Describe the infrastructure for E-commerce
4. Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other.
5. Discuss legal issues and privacy in E-Commerce
6. Assess electronic payment systems
7. Recognize and discuss global E-commerce issues

CSH615: Enterprise Resource Planning

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week	Class Test -12Marks
Tutorials: 1 hr/Week	Teachers Assessment - 6Marks
	Attendance – 12 Marks
Credits: 4	End Semester Exam – 70 marks

Prerequisite: - Basic Knowledge of Project Management Skills

Course Objectives:
1. Understand the functionality of Supply chain and management techniques.
2. Understand business process models that assist with implementation of ERP.
3. Analyze the implementation of ERP and MPGPRO.
4. Design different types of ERP Interfaces.
5. Architect the system control, presentation, database Interfaces.

Detailed Syllabus

Unit-1
Introduction: ERP Introduction, Benefits, Origin, Evolution and Structure: Conceptual Model of ERP, The Evolution of ERP, System Architecture of ERP.

Unit-2
Overview of an enterprise: Why ERP is required and how can it help in development and deployment of information system in an enterprise?
Case1: Manufacturing Industry.

Unit-3
ERP Functional Modules: Introduction, Client Server Multi tire Architecture of ERP,Standard Modules, Extended ERP, Integration of ERP with SCM and CRM Applications, Concept of e-ERP, Web Architecture of e-ERP.

Unit-4
ERP Implementation: Standard Methodology, As is Study, Requirement Engineering and Business Process Reengineering, Reverse Engineering, Batch data conversion from legacy system, Technology set up and testing, Issues/Risks, Impacts, Solution/ Mitigation.
Case2: Why does ERP implementation fail in more than 50% cases?

Unit-5
ERP software (any standard ERP package): Structure, concepts of Data Acquisition, Data Organization, Data Conversion/Reporting, ERP Basis and Maintenance, Programming Interface.
Core Modules: Financials, Materials, Manufacturing/Conversions, Sales and Distribution, Human Resources.

Unit-6
ERP Software Services and Opportunities: Step by step implementation, Document management Systems, Document Linking, Process change and document change & control, ERP Database, Online services/ Helpdesk, Control and security, Managing Communications and Training for ERP, Employment opportunities.

Text and Reference Books
1. Alexis Leon, "ERP Demystified", Tata McGraw Hill,2007,1st Edition
2. Rahul V. Altekar "Enterprise wide Resource Planning", Tata McGraw Hill, 2004,1st Edition
3. Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, 2003, 2nd Edition,

4. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology,2001,1st Edition

Course Outcomes:
        After completing the course, students will be able to:
1. Demonstrate a good understanding of basic issues in Enterprise Systems.
2. Explain the scope of common Enterprise Systems (e.g., MM, SCM, CRM, HRM, procurement).
3. Explain the challenges associated with implementing enterprise systems and their impacts on organizations.
4. Describe the selection, acquisition and implementation of enterprise systems.
5. Use one of the popular ERP packages to support business operations and decision-making.

6. Communicate and assess an organization's readiness for enterprise system implementation with a professional approach in written form.
7. Demonstrate an ability to work independently and in a group.

CSH 616: Mobile Computing

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week	Class Test -12Marks
Tutorials: 1 hr/Week	Teachers Assessment - 6Marks
	Attendance – 12 Marks
Credits: 4	End Semester Exam – 70 marks

Pre-requisites: Mobile communication and Computer Network, INTERNET, Router

Course Objectives:
1. To introduce the characteristics, basic concepts and systems issues in mobile and pervasive computing.
2. Describe and designing of GSM architecture and HLR/VRL .So that it can be able to solve the mobile connective problems
3. To design successful mobile and pervasive computing applications and services.
4. To analyze the strengths and limitations of the tools and devices for development of pervasive computing systems
5. To introduce wireless communication and networking principles, that support connectivity to cellular networks, wireless internet and sensor devices.
6. Creatively analyze mobile and wireless networks.

Detailed Syllabus

Unit-1

Introduction to mobile communication and computing, Generations of mobile computing, Issues and Applications of mobile computing, Cellular concept and cellular architecture, Frequency reuse, handoff in mobile computing.

Unit-2

GSM: GSM architecture, HLR, VLR, protocol, Call flow sequence in GSM, Security in GSM.CDMA, IS-95 the North American CDMA, Service aspects, radio aspects.

Unit-3

Wireless LAN, Architecture, IEEE-802.11, Hidden and Exposed Terminal Problems. Bluetooth, Bluetooth Architecture, Mobile IP, Terminologies.

Unit-4

Location Management- Motivation, Network Architecture, Location Management in Cellular Network, Static and Dynamic Location Management, Location Management in Wireless Data Networks.

Unit-5

Data Management- Data Management Issues, Mobile Databases, Impact of Mobile Computing in the Area of Data Management, Data Replication, Asynchronous and Synchronous Replication.

Unit-6

File System: CODA File System. Adaptive Clustering: Adaptive Clustering for Mobile Wireless Networks, Architecture, Algorithm, Cluster Maintenance.

Text and Reference Books
1. Ashok K Talukdar: Mobile Computing-Technology, Applications and Service Creation, 1st Edition,TMH Publication, 2006.
2. J Schillar: Mobile Communications, 2nd Edition, Pearson Education, 2009.
3. Vishnu Sharma- Mobile computing , 4th Edition, Pearson Eduction, 2010.

Course Outcomes:
After completing the course, students will be able to:
1. Apply the fundamental design paradigms and technologies to mobile computing applications.

2. Demonstrate the different wireless technologies such as CDMA, GSM, and GPRS etc.
3. To design and considerations for deploying the wireless network infrastructure
4. To easily understand and design network architecture
5. Evaluate network protocols, routing algorithms, connectivity methods and characteristics
6. To understand and evaluate CODA File System and Adaptive Clustering for mobile computing

CSH617 Digital Image Processing

Teaching Scheme	Examination Scheme
Lectures: 3 hrs/Week	Class Test -12Marks
Tutorials: 1 hr/Week	Teachers Assessment - 6Marks
	Attendance – 12 Marks
Credits: 4	End Semester Exam – 70 marks

Prerequisite: - Basic Logical operations, Computer Graphics.

Course Objectives:
1. To describe and explain basic principles of digital image processing.
2. To study basic image operations.
3. To understand the algorithms that perform basic image processing (e.g., noise removal and image enhancement).
4. To design and implement algorithms for advanced image analysis (e.g., image morphing, image segmentation).
5. To expose students to current applications in the field of DIP

Detailed Syllabus

UNIT I

Introduction to digital image processing, applications, steps of digital image processing, Components of Image Processing system, Image sampling and Quantization.

UNIT II

Image Enhancement in Spatial Domain: Meaning of spatial domain, image negatives, log transformation, power law transformation, Introduction to histogram Processing, histogram equalization, histogram specification, Enhancement using logical AND and logical OR operator, Image subtraction, Image Averaging.

UNIT III

Image Enhancement in Frequency Domain: meaning of frequency domain, one dimensional Fourier frequency domain and its inverse, Two dimensional Fourier frequency domain and its inverse, filtering in frequency domain, Smoothing Frequency-Domain Filters- Ideal Low pass Filters, Butterworth Low pass Filters, Gaussian Low pass Filters, Sharpening Frequency Domain Filters- Ideal High pass Filters, Butterworth High pass Filters, Gaussian High pass Filters.

UNIT IV

Image Restoration: Introduction to image restoration. Model of the Image Degradation/Restoration Process, Restoration in the Presence of Noise- arithmetic mean filter, geometric mean filter, harmonic mean filter, contra harmonic mean filter, Minimum Mean Square Error (Wiener) Filter, Geometric Mean Filter.

UNIT V

Morphological Image Processing: Basic Concepts from Set Theory, Logic Operations Involving Binary Images, Dilation and Erosion, Opening and Closing, Hit or Miss Transformation, Extensions to Gray-Scale Images- Dilation, Erosion, Opening and Closing.

UNIT VI

Image Segmentation: Detection of Discontinuities- Point Detection, Line Detection, Edge Detection, Global Processing via Graph-Theoretic Techniques, Thresholding- Foundation, Basic Global Thresholding, Basic Adaptive Threshold, Region-Based Segmentation- Basic Formulation, Region Growing, Region Splitting and Merging.

Text and Reference Books

1. Fundamentals of Digital Image Processing, Anil K. Jain, Pearson, IIIrd, 2004.
2. Digital Image Processing, Rafel C. Gonzalez & Richard E. Woods, PHI, 10th, 2005.
3. Digital Image Processing using MATLAB, Rafel, Richard & Steven, Pearson, IInd, 2007.
4. Digital Image Processing, Jayaraman S,Veerakumar T,Esakkirajan S, TMH, Ist, 2009.

Course Outcomes:

After completing the course, students will be able to:

1. Understand general terminology of digital image processing.
2. Examine various types of images, intensity transformations and spatial filtering.
3. Develop Fourier transform for image processing in frequency domain.
4. Evaluate the methodologies for image segmentation, restoration etc.
5. Implement image process and analysis algorithms.
6. Apply image processing algorithms in practical applications.