Nirma University

Institute of Technology

School of Technology

Department of Computer Science and Engineering

Master of Computer Application

L	T	P	C
1	1	2	3

Course Code	3HS101
Course Title	Communication skills

Course Learning Outcomes (CLO):
At the end of the course, students will be able to –

1. know dynamics of communication skills
2. acquire and practice professional writing and speaking skills.
3. develop correct pronunciation and speaking fluency in English

Syllabus:

Teaching Hours:

Unit I: **5**
Communication Skills: Communication cycle, Types and flows of Communication, Barriers to communication, non-verbal Communication and Cross-cultural communication.

Unit II: **3**
Listening Skills: Types of listening, Barriers to effective listening, tips to improve listening skills.

Unit III: **3**
Professional writing: paragraph, letters, emails, reports

Unit IV: **2**
Reading Skills: Intensive and Extensive reading.

Unit V: **2**
Speaking Skills: Group Discussion, Personal Interview, Seminar Presentation.

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Tutorial Work:

The tutorial work will be based on the topics covered in the syllabus. One Act plays w*ill be used to teach speaking (paralinguistic) and reading. Writing practices will also be done.*

Laboratory Work:

Practices related to tenses, prepositions, word formation/transformation concord, affixes, one-word substitutes, idioms etc. vocabulary building, Presentations and Group Discussions will be done using language lab.

Suggested Readings^:

1. Leech Geoffery and Svartik Jan, A Communicative Grammar of English, Pearson
2. Murphy Raymond, Grammar in Use Intermediate with Answers, Cambridge University
3. Andrea J Rutherford, Basic Communication Skills for Technology, Pearson Business Communication,
4. Lesiker and Petit, Basic Business Communication, McGraw Hill
5. Meenakshi Raman, Sangeeta Sharma, Technical Communication: Principles and Practice, Oxford Higher Education.
6. Gupta Manish, English Bites: My Fullproof English Learning Formula, Penguin.
7. Michael Swan, Practical English Usage, OUP.
8. F.T. Wood, Remedial English Grammar,Macmillan Education.
9. On Writing Well, William Zinsser, Harper Resource Book.
10. Liz Hamp-Lyons and Ben Heasly, Study Writing, Cambridge University Press.
11. Sanjay Kumar and PushpLata, Communication Skills, Oxford University Press.
12. Raymond Murphy, Essential English Grammar: A Self-Study Reference and Practice Book for Elementary Students of English with Answers, Cambridge University Press.
13. Pete Sharma and Barney Barrett, Collins Academic Skills Vocabulary Organizer.
14. Els Van Geyte, Writing Skills B2+. Collins.

Sheila Thorn, Real Life Real Listening-Collins.

L	T	P	C
3	0	2	4

Course Code	**3CA102**
Course Title	**Computer Organization**

Course Learning Outcomes (CLO):
At the end of the course, students will be able to -

1. describe basic building blocks of digital circuits for combinational and sequential logic design
2. illustrate the basics of various units of computer system
3. apply the knowledge of digital circuits to comprehend computer organization

Syllabus: **Teaching Hours:**

Unit I **6**
Data Representation: Number systems (decimal, binary, octal, hexadecimal), conversion from one number system to other, complements (radix's and (radix-1) complements), arithmetic addition, arithmetic subtraction, overflow, gray code, BCD code, excess-3 code.

Unit II **10**
Digital Logic Circuits: Logic gates, boolean algebra, map simplification, half adder, full adder, flip flops: SR flip flop, JK flip flop, D flip flop, T flip flop, edge triggered flip flop, sequential circuits, introduction to combinational circuits

Unit III **6**
Digital Components: Decoders, encoder, multiplexer, registers, shift registers, binary counter, types of ROM.

Unit IV **6**
Register Transfer and Micro Operations: Register transfer language, bus and memory transfer, binary adder and subtractor, binary incrementer, shift micro-operations.

Unit V **3**
Basic Computer Organization and Design: Introduction to computer registers, basic instruction codes, instruction cycle.

Unit VI **6**
Central Processing Unit: Introduction, general register organization, instruction format, two address instructions, three address instructions, addressing modes, RISC, CISC.

Unit VII **4**
Input Output Organization: Peripheral devices, asynchronous data transfer, priority interrupt, direct memory access

Unit VIII **4**
Memory Organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory.

Self-Study:
The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:
Laboratory work will be based on above syllabus with minimum 5 experiments to be incorporated that will be considered for evaluation.

Suggested Readings^:

1. Morris Mano, Digital Logic and Computer Design, PHI
2. Morris Mano, Computer System Architecture, Pearson
3. Thomas Bartee, Digital Computer Fundamentals, McGraw-Hill
4. Malvino Brown, Digital Computer Electronics, McGraw-Hill
5. Douglas Hall, Microprocessor and Interfacing, Tata McGraw Hill
6. B Govindrajalu, IBM PC and Clones, Tata McGraw Hill

L=Lecture,T=Tutorial,P=Practical,C=Credit

^this is not an exhaustive list

L	T	P	C
3	0	2	4

Course Code	**3CA101**
Course Title	**Computer Programming**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

1. identify appropriate language constructs, its uses and approaches to computational problems
2. use basic components and capabilities of the computing system
3. analyze basic problems and develop flowcharts, pseudo code and program to solve them
4. design and validate the programs as per the requirements

Syllabus: **Teaching hours:**

Unit I 6

Introduction to Computers: Introduction to Computer programming environments, Introduction to problem solving concepts, algorithms and flow chart, Programming Languages, Introduction to the C Programming Language, Programme development steps, Test-Driving and debugging.

Unit II 8

Introduction to Programming and debugging:

Various data representation techniques, data types, constants, variables, arrays, various operators in C language. Conditional and unconditional execution, simple versus nested controls, various aspects of repetitive executions, iterative programming styles, assertions and loop invariants, I/O handling, library functions, types of errors, program debugging.

Unit III 9

Functions: Math Library Functions, User defined functions, Function Call Stack and Stack frames, Passing Arguments by Value and By Reference, Scope Rules, Recursion, Recursion vs. Iteration.

Defining Arrays, various functions in Arrays, Multidimensional Arrays, Variable-Length Arrays, Passing Arrays to Functions.

Unit IV 12

Pointers: Pointer Variable Definitions and Initialization, Pointer Operators, Passing Arguments to Functions by Reference, Pointer Expressions and Pointer Arithmetic, Relationship between Pointers and Arrays, Arrays of Pointers, Pointers to Functions. Introduction to dynamic memory allocation.

Characters and Strings: Fundamentals of Strings and Characters, Various String-Manipulation Functions, String Library Functions.

Unit V 10

Structures: Defining Structures and its variables, Operations on Structures, Accessing Structure Members, Using Structures with Functions.

File Processing: Files and Streams, Creating a File, Reading and writing Data from a File.

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Above concepts are to be implemented in C-language with emphases on logic development and debugging, minimum 10 experiments to be incorporated that will be considered for evaluation.

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Suggested Readings^:

1. E Balagurusamy, Pointers in C, McGraw-Hill
2. Deitel and Deitel, C How to program, Pearson
3. E Balagurusamy, Programming in ANSI C, McGraw Hill
4. Yashwant Kanitkar, Let Us C, BPB Publications
5. V Rajaraman, Fundamentals of Computers, Prentice Hall of India
6. Joyce Farrell, Programming Logic and Design Comprehensive, Cenage Learning
7. David Gries, The Science of Programming, Springer, New York, Hedelberg, Berlin
8. Dromey R.G., How to solve it by computers, Prentice Hall of India
9. Jean-Paul Tremblay, Richard B. Bunt, Introduction to Computer Science, McGraw-Hill
10. Kernighan., Ritchie, ANSI C Language, Prentice Hall of India
11. Sedgewick R., Algorithms in C, Addison Wesley

Schaum Ourline Series, Programming in C, McGraw-Hill

3CA1154 Internet and Web Technology [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- describe requirements of the client side web application
- apply client side web application concepts to design and develop the web site
- use web development tools
- identify and manage the client side configuration of web site

Syllabus:

Fundamentals: Internet, Internet Services WWW, Web Browsers, Web Servers, URL, HTTP.

XHTML: Introduction of HTML and XHTML, Editing XHTML, W3C XHTML Validation service, Heading, linking, Images, Special character and Horizontal Rules, Lists, Tables, Forms, Internal Linking, meta Elements.

Cascading Style Sheets (CSS): Introduction, Inline styles, embedded styles, Conflicting styles, Linking External Style Sheets, Box Model and Text Flow.

JavaScript: Introduction, pseudo code, displaying a Line of Text in Web Page, User inputs with prompt Dialogs, Control Statements, Functions, Arrays.

JavaScript Objects: Math, String, Boolean and Number, document, window, using Cookies, Using JSON to represent Objects.

Document Object Model (DOM): Introduction, Modeling a Document, Traversing and Modifying a DOM Tree, DOM Collections.

DHTML Filters: flipv and fliph, invert, gray and xray, Adding shadows to Text, Creating Gradients with alpha.

JavaScript – Events: Introduction, Registering Event Handlers, Event on load, Event onmousemove, the event Object and this, Rollovers with onmouseover and onmouseout, Form Processing with onfocus and onblur, More Form processing with onsubmit and onreset, Event Bubbling.

XML(Extensible Markup Language): Introduction, XML Basics, Structuring Data, XML Namespaces, Document Type Definitions(DTDs), W3C XML Schema Documents, parsing of XML documents and displaying XML documents.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Above concepts are to be implemented during laboratory and at least 10 experiments based on XHTML, CSS, JavaScript and XML should be carried out.

References:

1. Deitel and Deitel, Internet and World Wide Web: How to Program, Pearson Education
2. Minoli, Internet and Intranet Engineering, Tata McGraw Hill
3. Charlton Ting and R Allen Wyke, Pure JavaScript by Jason D. Gilliam, Techmedia
4. Guy Hart-Davis, HTML, XHTML & CSS QuickSteps, Tata McGraw Hill
5. Udit Agarwal, Web Technologies, Dhanpat Rai & Co

3CA1155 Mathematical Foundation [3 1 0 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand discrete mathematical preliminaries
- apply discrete mathematics in formal representation of various computing constructs
- recognize the importance of analytical problem solving approach in computing problems

Syllabus:

Boolean Algebra: Introduction, Laws on Boolean Algebra, Truth Tables on Boolean operations, Unique features of Boolean Algebra, Minterm and Maxterm, Boolean expression in Sum of Products(SOP) and Product of Sums(POS) form or Normal form, Boolean function, Karnaugh Map, Rules used by K-Map for simplification, Labelling of K-Map squares

Combinatorics: Introduction, Basic principles of counting, Multiplication principle, Addition rule, Factorial Notation, Binomial Theorem, Pascal's Triangle, Multinomial Theorem, permutations and combination

Linear Algebra: *Brief review of the theory of matrices, Elementary row and column operations, Rank of matrix, Inverse of a matrix, Solution of system of linear equations, Cramer's rule, Cayley-Hamilton theorem. Linear-transformation, Orthogonal transformation, Reduction to diagonal form, Quadratic forms. Vector space: Definitions and examples of vector space, linear combinations, linear dependence and linear independence, subspaces, basis and dimension*

Set, Relation and Function: Introduction, Sets, Representation of a sets, Cartesian product of sets, Union of sets, Intersections of set, Complements, Symmetric difference, Fuzzy set, Operations on fuzzy set, Binary relation, Reflexive relation, Symmetric relation, Antisymmetric relation, Transitive relation, Equivalence relation, Associative relation, Partial ordering relation, Addition and Multiplication of functions, Types of functions.

Lattices: Lattices as posets, Properties of lattices, Lattices as algebraic systems, Sub-lattices, Complemented lattices, Distributive lattices, Complete lattices.

Tutorial Work:

Tutorials will be based on above syllabus with minimum 10 tutorials to be incorporated.

References:

1. Swapan Kumar Chakraborty, B. K. Sarkar, Discrete Mathematics, Oxford University Press
2. Tremblay J. P., Manohar R., Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw-Hill
3. Krishnamurthy V., Introduction to Linear Algebra, EWS
4. Joshi K. D., Foundations of Discrete Mathematics, New Age International Ltd.
5. Rosen, Kenneth L, Discrete Mathematics and its applications, McGraw Hill
6. C L Liu, D P Mohapatra, Elements of Discrete Mathematics, Tata McGraw-Hill

L	T	P	C
3	1	0	4

Course Code	3CA105
Course Title	Mathematical Foundation of Computer Science

Course Linear Outcomes (CLO):

At the end of the course, students will be able to –

1. comprehend discrete mathematical preliminaries
2. apply discrete mathematics in formal representation of various computing constructs
3. recognize the importance of analytical problem solving approach in computing problems

Syllabus: Teaching hours:

Unit I **6**

Sets, Relation and Functions: Introduction, Sets, Representation of a sets, Operations on sets, Principle of inclusion and exclusion, Pigeon-hole principle, Binary relations, Equivalence relations and Partial Order relations, Function and types of function

Unit II **6**

Proof Techniques: Proof Methods and strategies, Forward proof, Proof by contradiction, Principle of mathematical induction, Strong induction, The Well Ordering Principle, Recursive Definition, Proof by Contraposition, Proof of Necessity and Sufficiency

Unit III **10**

Boolean Algebra and Proportional Logic: Boolean Algebra, Laws of Boolean Algebra, Boolean Expression, Conjunctive and Disjunctive normal forms, Min-term and Max-term, Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The laws of logic, Logical Implication, Rules of Inference, use of Quantifiers

Unit IV **10**

Matrix and Linear Algebra: Matrix, Elementary row and column operations, Rank of matrix, Inverse of a matrix, Solution of system of linear equations, Cayley-Hamilton theorem, Vector space: Definitions and examples of vector space, linear combinations, linear dependence and linear independence, subspaces, basis and dimension

Unit V **9**

Graph Theory: Graphs and their properties, Isomorphism, Eulerian and Hamiltonian Paths, Graph Colouring, Perfect Graph Rooted Trees, Trees and Sorting, Weighted Trees and Prefix Codes,, Shortest Path, Spanning

Unit VI **4**

Recurrence Relations an Recursive Algorithms: Recurrence Relations, Linear Recurrence Relations with Constant Coefficients, use of Recurrence Relation for Analysis of Algorithms

Tutorial Work:

This shall consists of at least 8 tutorials based on the syllabus.

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

L	T	P	C
2	0	4	4

Course Code	3CA103
Course Title	Web Technology

Course Learning Outcomes (CLO):

At the end of the course, student will be able to -

1. apply the knowledge of HTML and JavaScript Programming to design interactive web pages and applications
2. use CSS to visually format web pages and applications
3. create mobile and browser responsive web applications

Syllabus: **Teaching Hours:**

Unit I **2**

Fundamentals: Internet, Internet Services WWW, Web Browsers, Web Servers, URL, HTTP, Basics of XML.

Unit II **7**

HTML5: Introduction, editors, basic, elements, attributes, headings, paragraphs, formatting, links, head, images, tables, lists, blocks, layout, colors, entities, URL encode, quick list, new elements, canvas, SVG, drag/drop, geolocation, video, audio, iframes, form , semantic, web storage, app cache, web workers, SSE(server sent event).

Unit III **7**

CSS3: Introduction, inline styles, embedded styles, conflicting styles, linking external style sheets, box model and text flow, grouping/nesting, pseudo-class, pseudo-element, navigation bar, image manipulation , media types, attribute selectors, borders, gradients, text effects, transformation, transitions, animations, multiple columns .

Unit IV **9**

JavaScript: Introduction, pseudo code, displaying a line of text in web page, user inputs with prompt dialogs, comments, variable, data types, operators, control statements, functions, arrays, JavaScript objects, cookies, using JSON to represent objects, JavaScript events, registering event handlers, form processing with different events, the event object and this, event bubbling, introduction of document object model (DOM), modeling a document, traversing and modifying a DOM tree, DOM collections.

Unit V **3**

JQuery: Introduction of jquery, install, syntax, selectors, events, jquery effects, jquery html, jquery traversing.

Unit VI **2**

Bootstrap Framework: Introduction of bootstrap framework, bootstrap grids, bootstrap theme, bootstrap CSS ref, bootstrap JS ref.

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:
Laboratory work will be based on HTML, HTML5, CSS, CSS3, JavaScript, jQuery and Bootstrap framework with minimum 10 experiments to be incorporated that will be considered for evaluation.

Suggested Readings^:

1. Deitel and Deitel, Internet and World Wide Web: How to Program Pearson Education.
2. Charlton Ting and R Allen Wyke, Pure JavaScript by Jason D. Gilliam, Techmedia
3. Guy Hart-Davis, HTML, XHTML & CSS QuickSteps, Tata McGraw Hill Edition
4. Matthew MacDonald, Creating a Website: The Missing Manual, 3rd Edition, O'Reilly
5. Glenn Johnson, Programming in HTML5 with JavaScript and CSS3, Microsoft Press
6. Ben Frain, Responsive Web Design with HTML5 and CSS3, Packt Publishing Ltd.
7. Chris Aquino and Todd Gandee, Front-End Web Development: The Big Nerd Ranch Guide (Big Nerd Ranch Guides),Pearson Technology Group
8. Spurlock Jake, Bootstrap: Responsive Web development. O'Reilly Media, Inc.

L=Lecture,T=Tutorial,P=Practical,C=Credit

^this is not an exhaustive list

L	T	P	C
3	0	2	4

Course Code	3CA104
Course Title	Database Management Systems

Course Learning Outcomes (CLO):

At the end of the course, students will be able to

1. describe fundamental elements and various models of database system
2. devise E-R models to represents simple database application scenario
3. apply relational database concepts to design and create databases
4. implement queries and procedures to use database system effectively along with transaction management

Syllabus: **Teaching Hours:**

Unit I **6**

Database Concepts: Database-system applications, purpose of database systems, view of data, database languages, types of database models, relational databases, database design, database architecture, database users and administrators.

Unit II **6**

Relational Model: Structure of relational databases, database schema, keys, schema diagrams, relational query languages, relational operations.

Unit III **8**

Structured Query Language: Overview of the SQL query language, SQL data definition, basic structure of SQL queries, basic operations, set operations, null values, aggregate functions, nested subqueries, modification of the database, join expressions, views, transactions, integrity constraints, SQL data types and schemas.

Unit IV **8**

Database Design and E-R Model: Overview of the design process, the entity-relationship model, constraints, entity-relationship diagrams and its design issues, extended E-R features, normalization of database tables, normalization and database design, higher level normal forms, de-normalization.

Unit V **6**

Transactions and Concurrency Control: Transaction concept, simple transaction model, transaction atomicity and durability, serializability, lock based protocols, deadlock, time stamp based protocols.

Unit VI **8**

PL/SQL: Basic concepts, types, control structures, expressions and operators, SQL within PL/SQL, built-in SQL functions, cursors, error handling, procedures, functions, and triggers.

Unit VII **3**

Indexing and Hashing: Introduction to indexing and hashing.

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:
Laboratory work will be based on SQL and PL/SQL with minimum 5 experiments to be incorporated that will be considered for evaluation.

Suggested Readings^:

1. Silberschatz, Korth and Sudarshan,, Database System Concepts, McGraw Hill.
2. Rob & Coronel, Database Systems Design, Implementation & management, Thomson.
3. Scott Urman, Oracle 9i: PL/SQL Programming, Oracle press.
4. George Koch & Kevin Loney, Oracle 9i Complete reference, McGraw Hill.
5. Martin Gruber, Mastering SQL, B.P.B.
6. C.J date, An introduction to database systems, Addison Welsley.

L=Lecture,T=Tutorial,P=Practical,C=Credit

^this is not an exhaustive list

3CA1255 Application Lab [0 0 2 1]

Course Learning Outcome:

After successful completion of this course, student will be able to

- develop computer applications
- use programming languages, tools and technologies to develop applications
- formulate strategy to solve problems in group

Laboratory Work:

Student will develop an application based on Programming languages, tools and technologies covered.

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand and analyze real world problems
- apply latest client server technologies to develop client server applications
- configure and manage web servers

Syllabus:

Client Server Architecture : Introduction to Client-Server Architecture, Distributed Processing, File Server versus Client/Server Database, Two tier versus Three tier C/S model, Introduction to the Component object model, service model, C/S deployment using components.

Introduction: Introduction to the .NET Framework, CLR, CLS, JIT etc.

Working with Forms and Controls: Creating an ASP.NET Web Application Project, Creating Web Forms, Using Server Controls, Using Code-Behind Pages, Web Server Controls, Using Validation controls usage of skins and themes.

ADO.Net: Introduction to ADO.NET, .NET Framework data providers, Data Binding, Connecting to the Database, Accessing Data with DataSets, Displaying a DataSet in a List-Bound Control, Using Multiple Tables, Accessing Data with DataReaders, Disconnected operations with Data tables and Data sets, Connection pooling, Working with LINQ.

State Management: Application and Session Variables, Cookies, Storing Session Variables in a Database, Cleaning the session state, Types of Assemblies, Private vs. Shared assemblies, Creating and placing strongly named assemblies.

Configuration: windows configuration, .net configuration, cashing.

Logging in: web based security, asp.net authentication service, managing user, asp.net login controls, authorizing users.

ASP.Net Web Services: Introduction to web services, creating web services, invoking web services.

AJAX: introduction to AJAX, ASP.NET server side support for AJAX, AJAX client support.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Above concepts are to be implemented in developing web applications, at least 10 experiments are to be carried out.

References:

1. Shepherd Microsoft ASP.NET step by step, PHI.
2. Parihar Mridula ASP.NET Bible, Wiley
3. Bill Evjenet, Professional ASP.NET, Wrox.
4. Microsoft ADO.NET step by step, Microsoft Press.
5. Platt David S., Introduction Microsoft .NET, Microsoft Press
6. Esposito Dino Programming Microsoft ASP.NET, Microsoft Press
7. Bill Evjen, Professional ASP.NET: In C# and VB, Wiley.
8. Matthew MacDonald, Bill Hamilton, ADO.NET in a NutShell, O'Relly.

3CA1257 Comprehensive Assessment – I [0 0 0 1]

Course Learning Outcome:

After successful completion of this course, student will be able to

- realize the collective understanding of various courses studied in the semester

Syllabus:

Student will be assessed on the basis of all the courses learned till the end of respective semester.

L	T	P	C
2	0	4	4

Course Code	**3CA201**
Course Title	**Object Oriented Programming**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

1. interpret the basic principles of object oriented programming
2. develop computer programs to solve real world problems using object-oriented principles
3. implement multi-threaded applications with basic input output operations and exception handling

Syllabus: **Teaching Hours:**

Unit I **6**

Introduction to Object Oriented Programming (OOP) and Java: Introduction to OOP, basic concepts of OOP, introduction to java programming, grammar of java, byte code and JVM, Java features, java tokens, data types, variables, operators, type conversion, type casting, control structure, types of java statements, arrays, strings and vectors

Unit II **11**

Classes & Objects, Inheritance, Interfaces and Packages: Classes, method overloading, constructors and garbage collector, static class members, recursion, nested and inner classes, method overloading, types of inheritance, method overriding, abstract classes and methods, extending interfaces, packages: java's built-in packages, creating user-defined packages, importing packages, classpath variable.

Unit III **7**

Exception Handling and Multi-Threading: Introduction, basics of exception handling, exception handling mechanism, runtime exception, checked versus unchecked exception, multiple catch handlers, nested try and catch blocks, custom exception, thread basics, life cycle of a thread, thread priorities, thread exceptions, synchronization

Unit IV **3**

I/O and File Management: Various types of java streams, reading console inputs, reading data from command line.

Unit V **3**

Database connectivity: Concept of JDBC, JDBC drivers, JDBC packages, overview of JDBC process, database connection, statement objects, resultset, transaction processing and metadata.

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 5 experiments to be incorporated that will be considered for evaluation.

Suggested Readings^:

1. Hari Mohan Pandey, Java Programming, Pearson Education.
2. Herbert Schildt, Java the Complete Reference, Tata McGraw Hill
3. Cay S. Horstmann, Java For Everyone, Wiley Publication
4. Farrell Joyce, Java for Beginners, Cengage Learning
5. C Xavier, Java Programming A Practical Approach, Tata McGraw Hill
6. Rajumar Buyya, S Thamarai Selvi, Xingchen Chu, Object Oriented Programming with Java, Tata McGrawHill

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L	T	P	C
2	1	2	4

Course Code	3CA205
Course Title	Probability and Statistics

Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. comprehend prerequisite knowledge to apply concepts of probability in simulation and modeling of various computer science problems
2. apply statistical methods in various computer science related projects, seminars and research
3. simulate concepts of statistics for real world problems

Syllabus: Teaching hours:

Unit I **6**

Basic Concepts of Probability: Reorientation, Permutations & Combinations, Definition of probability, Application of permutations and combination to Probability problems, Conditional probability, Bayes' Theorem, Markov chain

Unit II **8**

Statistical Computation: Measure of central tendency, Measures of Dispersion, Correlation and Regression, Linear regression, Regression coefficients, Algorithms for linear regression, Polynomial regression, Multiple regression, Curve fitting & Principle of Least squares, Sampling, z-test

Unit III **8**

Distributions of a Statistical data set: Types of data. Bernoulli distribution, Uniform distribution, Binomial distribution, Normal distribution (bell-shaped), Poisson distribution, Exponential distribution

Unit IV **8**

Analysis of Variance: General linear hypothesis and analysis of variance, One way analysis of variance of fixed effect model, Multiple comparison tests, One way analysis of variance of random effect model, Two way analysis of variance without interaction, Two way analysis of variance with interaction

Tutorial Work:

This shall consists of at least 8 tutorials based on the syllabus.

Laboratory Work:

Laboratory work will be based on above syllabus using suitable programming language and statistical tools with minimum 10 experiments to be incorporated that will be considered for evaluation. Applications in the field of Computer Science is to be covered in each topic.

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Suggested Readings^:

1. Yogesh Jaluria, Computer Methods for Engineering, Allyn and Bacon. Inc.
2. Jay I. Devore, Probability and Statistics for Engineers and Scientists; Pearson
3. S.P. Gupta, Statistical Methods, S. Chand & Sons
4. A. Papoulis and S. Unnikrishna Pillai, Probability, Random variables and Random Processes, Tata McGraw Hill.

L= Lecture, T=Tutorial, P= Practical, C= Credit

^ this is not an exhaustive list

3CA1258 Probability, Statistics and Numerical Analysis [3 1 2 5]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand the various statistical and numerical techniques
- apply the probability theory and statistical techniques in various computer applications
- solve complex mathematical models using numerical techniques

Syllabus:

Sr. No.	Topic	Teaching Hours.
1	**Basic Concepts of Probability**: Definition of probability, Application of permutations and combination to probability problems, Conditional probability, Baye's theorem, Binomial, Poisson and normal probability distributions.	9
2	**Statistical Computation:** Measures of central tendency, Measures of Dispersion, Correlation and Regression, Linear regression, Regression coefficients, Algorithms for linear regression, Polynomial regression, Multiple regression.	7
3	**Curve fitting & Principle of Least squares:** Fitting data to line, parabola, exponential curve and geometric curve using least squares method.	2
4	**Sampling and large sample tests**: Testing of hypothesis using t-test and Z-test.	3
5	**Iterative Method:** Motivation, Errors: truncation error, rounded off error, absolute error, relative error and percentage error, Solution of algebraic and transcendental equation by Bisection, False position, Secant, Newton-Raphson iteration and extended iteration methods, Rate of convergence of the iteration methods, Comparisons of iterative methods.	6
6	**System of Linear Algebraic Equations:** Solution of simultaneous linear equations by using Gauss elimination, Gauss-Jordan, Gauss-Seidal & Gauss-Jacobi iteration method.	4
7	**Finite Differences and Interpolation:** Finite difference operators, Lagrange interpolation formula, Newton interpolation formula, Stirling's interpolation formula, Inverse interpolation formula.	5
8	**Numerical Differentiation and Integration**: Numerical differentiation, Numerical integration by Newton-Cote's formula.	5
9	**Numerical Solution of ordinary differential equations:** Taylor series method, Euler's method, Runge-Kutta method of 2nd & 4th order, Milne's Predictor – Corrector method.	4
	Total	45

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Concepts covered in the topics in the syllabus is to be implemented using programming language. Minimum 10 programming exercises.

Tutorial Work:

The tutorial work will be based on the topics covered in the syllabus. Minimum 10 tutorials should be carried out.

Suggested Readings:

1. Jaluria Yogesh, Computer methods for Engineering, Allyn and Bacon. Inc.
2. Chapra S C and Canale R P, Numerical methods for Engineers with programming and software applications, McGraw hill – Newyork.
3. Conte S D and Boor Carl de, Elementary Numerical analysis – an algorithmic approach, McGraw Hill.
4. Froberg C E, Introduction to Numerical analysis, Addison Wesley.
5. Roussas G G, First Curse in Mathematical Statistics, Addison Wesley
6. Anderson, Sweeney, and Williams, Statistics for business and economics, Thomson.

3CA1256 Professional Communication [2 1 0 3]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand the dynamics of written and professional communication skills
- write for information as well as for persuasion
- appreciate the beauty of good writing and its effectiveness

Syllabus:

An introduction to professional writing: Professional writing vs. General writing, purpose, importance and characteristics of professional writing.
Objectives of technical writing: Clarity, conciseness, accuracy, organization, ethics.
Audience recognition and involvement: High tech audience, low-tech audience, gender neutral language.
Memorandum: Objectives, difference between memos, letters and emails. Criteria and format for writing memos.
Meetings, agenda and minutes.
Technical description: Criteria and process, technical instructions for user's manual
Report Writing: Characteristics, types and writing of various reports such as feasibility reports, inventory report, mishap report, progress report, laboratory report.
Letter- writing: Business letters, Job-applications, Resume.
Business Proposals: Types & formats.

Tutorial Work:

The session will try to hone the spoken skills and logical thinking. It will consist of assignments, presentations and group discussions. Web tools will also used to reinforce the learning and teaching.

Reference:

1. Sharon J. Gerson - Steven M. Gerson, Technical writing – process and product, Person Education Asia.
2. Andrea J. Ratherford, Basic Communication Skills for Technology, Person Education Asia.

L	T	P	C
3	0	2	4

Course Code	3CA203
Course Title	Data Structures

Course Learning Outcome:

At the end of the course, students will be able to -

1. analyse various data structures and their applicability
2. comprehend and implement various techniques for searching and sorting
3. identify the appropriate data structure to design efficient algorithm for the given application

Syllabus:

	Teaching Hours:
Unit I **Introduction to Data Structures:** Basic Terminology, Elementary Data Structure Organization, Classification of Data Structures: Primitive and Non-primitive, Linear and Non-linear, Operations on Data structures, Asymptotic notations, Notion of recursive algorithms.	**06**
Unit II **Linear Data Structures:** Introduction, variations, operations and applications of array, queue, stack and linked list	**12**
Unit III **Non Linear Data Structures:** Concepts and types of trees, tree traversal algorithms, search trees, Priority queue implementation and applications, Representations of Graphs, Graph algorithms i.e. traversals, minimum spanning tree, shortest path, Traveling Salesman Problems	**12**
Unit IV **Indexing structure:** Concepts and implementations of B-Tree, B+-tree, Hashing, Dictionary	**07**
Unit V **Searching and sorting algorithms:** Linear Search, Binary search, Internal and external sorting algorithms, sorting without comparison.	**08**

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 5 experiments to be incorporated that will be considered for evaluation.

.

Suggested Readings^:

1. Jean-Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Tata McGraw Hill
2. Tanenbaum, Data Structures using C & C++, PHI
3. Robert L. Kruse, Data Structures and Program Design in C, PHI
4. Mary E.S. Loomis, Data Management and file processing, PHI

L = Lecture, T = Tutorial, P = Practical, C = Credit

^ this is not an exhaustive list

L	T	P	C
3	0	2	4

Course Code	3CA204
Course Title	Operating Systems

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

1. illustrate basic components of operating systems
2. comprehend the mechanism of operating Systems to handle processes, memory and file management
3. demonstrate competence in recognizing and using operating system features

.

Syllabus: **Teaching Hours:**

Unit I **3**

Overview of Computer System and Operating System: Elements of computer system, operating system objectives and functions, evolution of operating systems

Unit II **18**

Process Description and Control: Process states, process description, process control, process management, Uniprocessor scheduling, multiprocessor and real-time scheduling, case study

Unit III **3**

Threads: Processes And Threads, Symmetric Multiprocessing, Micro kernels

Unit IV **8**

Concurrency: Mutual exclusion and synchronization, deadlock and starvation, case study

Unit V **10**

Memory Management and Virtual Memory: Memory management requirements, partitioning, paging, segmentation, virtual memory, case study

Unit VI **3**

I/O Management and Files: I/O devices, organization of I/O functions, OS design issues, I/O buffering, disk scheduling, disk cache , file management, security aspects in OS, case study

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on Linux Shell Scripts, system calls, toy Operating System and other practicals based on above syllabus with minimum 5 experiments to be incorporated that will be considered for evaluation.

Suggested Readings^:

1. William Stallings, Operating Systems, PHI.
2. Silberschiltz, Galvin and Greg Gange, Operating System, Willey India.
3. Unix Concepts and Applications, Sumitabha Das, TMH Publications.
4. Yashvant Kanetkar, Shell Programming, BPB.
5. A.S.Tannenbaum, Modern Operating Systems, TMH Publications.

6. Kernighan, the UNIX Programming Environment, Pearson.

L=Lecture,T=Tutorial,P=Practical,C=Credit

^this is not an exhaustive list

L	T	P	C
3	0	2	4

Course Code	**3CA202**
Course Title	**Computer Networks**

Course Learning Outcomes (CLO):

At the end of the course, students will be able to -

1. describe concepts of computer networks with related applications
2. comprehend layered architecture of computer network and functions of different layers
3. use network simulating tools for simulating network protocols

Syllabus:	**Teaching Hours:**
Unit I **Introduction to Computer Networks:** Use of networks, network hardware and software, OSI model, example networks, network standardization, TCP/IP Model.	**3**
Unit II **Physical Layer:** Data communication basics, guided transmission media, wireless transmission, communication satellites, public switched telephone network.	**4**
Unit III **Data Link Layer:** Data link layer design issues, error detection and correction, elementary data link protocols, sliding window protocols.	**6**
Unit IV **Medium Access Sublayer:** Channel allocation problem, multiple access protocols, Ethernet, wireless LAN.	**6**
Unit V **Network Layer:** Network layer design issues, Network Layer protocols, routing algorithms, congestion control algorithms, quality of service, and internetworking.	**10**
Unit VI **Transport Layer:** Transport service, elements of transport protocols, simple transport protocol, UDP, TCP, performance issues.	**8**
Unit VII **Application Layer protocols:** DHCP, Domain name system, FTP, Telnet, electronic mail, World Wide Web, Network security, Virtual Private Network, Network Address Translation and Mobile IP.	**8**

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 5 experiments to be incorporated that will be considered for evaluation.

Suggested Readings^:

1. S. Tanenbaum , Computer Networks, Pearson / PHI
2. B.A. Forouzan, TCP/IP Protocol suite, TMH
3. Douglas Comer, Internetworking with TCP/IP, Pearson / PHI
4. B.A. Forouzan, Data Communications and Networking, TMH
5. Schweber W.L, Data Communication, TMH

L=Lecture,T=Tutorial,P=Practical,C=Credit

L	T	P	C
0	0	2	1

Course Code	3CA206
Course Title	Seminar

Course Learning Outcomes (CLO):

At the end of the course, student will be able to -

1. identify needed literature to retrieve useful and relevant information
2. summarize information from the identified literature
3. present and report technical summary in an effective manner

Guidelines:

Each student is expected to choose a topic of current relevance of Computer Science/Application field. They have to refer papers/reading material from various resources including latest tools. Student should compile the material in the form of seminar report and appropriately present the topic.

L=Lecture,T=Tutorial,P=Practical,C=Credit

3CA1354 Java Programming [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- build windows and console based robust applications
- apply object-oriented concepts to design and develop the system
- create documentation for java applications
- apply debugging techniques to solve errors

Syllabus:

Introduction to OOPs and Introduction to Java : Introduction To OOPs, Introduction to Java Programming with Grammar of Java , Byte code and JVM, Java Features, Java Tokens, Data Types, Variables, Operators, Type Conversion, Type Casting, Control Structure, types of Java Statements, Arrays, Strings and Vectors.
Classes and Objects in Java: Classes, Method Overloading, Constructors and Garbage Collector, Static Class Members, Recursion, Nested and Inner Classes, Method Overloading.
Inheritance, Packages and Interfaces: Types of Inheritance, Method Overriding, Abstract Classes and Methods Extending Interfaces, Packages: Java's Built-In Packages, Creating User-Defined Packages, Importing Packages, CLASSPATH.
Exception Handling in Java: Introduction, Basics of Exception Handling, Exception Handling mechanism, Runtime Exception, Checked versus Unchecked Exception, Multiple Catch Handlers, Nested Try and Catch Blocks.
Multithreading in Java: Thread Basics, Life Cycle of a Thread, Thread Priorities, Thread Exceptions, Synchronizations, Inter Thread Communication.
Files and Streams: Various types of Java Streams, Reading Console Inputs, Reading data from Command Line.
Applets and Graphics programming: Introduction, Applet versus Application Programs, Applet Class, Life Cycle of an Applet, Working with Graphic Class.
Event Handling: Introduction, The event delegation model, event classes, event listeners, event sources, listener interfaces.
Working with Layout: Layout and different Layout managers.
Introduction to Swing: What is Swing, Comparison of AWT component and Swing class, Study of various Swing classes.
JDBC Object: Concept of JDBC, JDBC driver types, JDBC packages, Brief overview of JDBC process, Database connection, Statement objects, ResultSet, transaction processing and metadata.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

At least 10 experiments are to be carried out from the above mentioned topics of the syllabus.

References:

1. Hari Mohan Pandey, Java Programming, Pearson Education.
2. Herbert Schildt, Java the Complete Reference, Tata McGraw Hill
3. Cay S. Horstmann, Java For Everyone, Wiley Publication
4. Farrell Joyce, Java for Beginners, Cengage Learning
5. C Xavier, Java Programming A Practical Approach, Tata McGraw Hill

Rajumar Buyya, S Thamarai Selvi, Xingchen Chu, Object Oriented Programming with Java, Tata McGraw Hill

3CA1355 Managerial Economics & Financial Management [3 1 0 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- describe the role of accounting in business and society
- demonstrate the principles and procedures of computerized accounting cycle in different types of business ownerships
- prepare & interpret financial statements
- forecast supply and demand using various methods
- examine costing determinants and ratio of BOP analysis

Syllabus:

Introduction of Accounting: As an Information System, Branches of Accounting (Financial, Cost & Management), Book-Keeping and Accounting (Recording, Classifying, Summarizing & Interpreting), Objective and uses of Accounting, Vocabulary.
Financial Accounting: Accounting System, Accounting Principles (Rules of Debit & Credit), Traditional Approach, Balance-Sheet Approach, Accounting Concepts and Standards, Preparation of Journal, Ledgers and Trial Balance, Preparation of Financial Statements (Company Account).
Interpreting Financial Statement and Inventory Valuation: Ratio analysis, Introduction to inventory valuation, FIFO (First in first out) and LIFO (Last in first out) methods.
Cost Accounting: Financial accounting and cost accounting, Elements of Cost, Cost Classification and Cost Sheet.
Managerial Economics: Introduction, Demand and Sales Forecast, types of demand, Determinants of demand, Demand function, Demand elasticity and there measurement, significance, Sales forecast and forecasting method.
Production function: Isoquants, Profit maximization, Least-cost combination of inputs. Determinants of cost and cost concepts, Determinants of price, Different market structure and pricing, conditions of equilibrium of a firm under different market structures.
Banks and its instrument: Barter function of money, Significance of money, Money supply and price level, Commercial banks and their functions, Functions of a central bank, Instruments of monetary policy. Inflation-its causes and consequences, measures to control it, National Income concepts-Measurement of national income, National income statistics.
International Trade: Its basis, Balance of Payments.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Tutorial work:

Tutorials will be based on the topics covered in the syllabus. Minimum 10 Tutorials should be carried out.

References:

1. D.R. Patel, Accounting & Financial Management, Atul Prakashan.
2. Ashok Sehgal, Deepak Sehgal, Financial Accounting, Taxman's Allied Service (p) Ltd.
3. S.N. Maheshwary, Financial Accounting SultanChand & Co.
4. Ravi M Kishore , Cost & Management Accounting, Taxman's Allied Service (p) Ltd.
5. S.N. Maheshwary, Cost & Management Accounting, SultanChand & Co.
6. Mote and Gupta, Managerial Economics, TMH
7. Dominick Salvatore, Managerial Economics, TMH
8. Prasanna Chandra, Financial Management, TMH

3CA1353 System Analysis and Design Methodologies [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- analyse feasibility of various problems pertaining to information systems development
- identify and analyse the system requirements using various system analysis techniques
- design information system using structured and object oriented techniques
- model different views of information systems using object oriented design patterns
- recognize current and future trends of system analysis and design

Syllabus:

System Analysis Fundamentals: Assuming the Role of the System Analyst, Determining Feasibility, Activity planning and control, Managing Analysis and Design activities.
Information Requirements Analysis: Information Gathering-Interactive Methods. Information Gathering-Unobtrusive Methods. Agile Modeling and Prototyping: Prototyping, Rapid Application Development, Agile Modeling
The Analysis Process: Using Data Flow Diagrams. Analyzing Systems Using Data Dictionaries. Describing Process Specifications and Structured Decisions, Presenting the System Proposal. .
The Essentials of Design: Designing Effective Output, Designing Effective Input, Introduction to Designing Effective Databases and Data-warehouses., Human Computer Interaction, Designing accurate Data-Entry Procedures.
Introduction to Object Oriented Analysis and Design: Object Oriented Modeling**,** UML, Conceptual Model of UML, Architecture, Software development life cycle.
Structural Modeling: Terms & Concepts and common modeling technique for Modeling classes, relationships, common mechanisms, Diagrams, class Diagrams, An Introduction to Interfaces, Packages diagram development.
Behavioral Modeling: Terms & Concepts and common modeling technique for Modeling Interactions, Use Cases, Use Case Diagram, Interaction Diagram, Activity Diagram, An Introduction to: Events, Signal, State Machines and State chart Diagram.
Architectural Modeling: Terms & Concepts and Common Modeling technique for Modeling Component and Deployment diagrams.
Design Patterns: Introduction of GRASP and GoF.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

At least 10 experiments/Project based case study are to be carried out covering the syllabus using OOAD tools.

References:

1. Kenneth E. Kendall & Julie E. Kendall, System Analysis and Design, PHI
2. Russ Miles, Kim Hamilton, Learning UML 2.0, O'reilly publication
3. Craig Larman, Applying Uml and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified process , Prentice Hall/Pearson Education
4. James Senn, Analysis and Design of Information system, Mc Graw Hill
5. Whitten and Bentley, System Analysis and Design Methods, Tata McGraw Hill
6. Roger Pressman, Software Engineering , McGraw Hill
7. Grady Booch, James Rumbaugh, The Unified Modeling Language User Guide, PHI
8. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design Patterns – Element of Reusable object- Oriented Software, Pearson Education

3CA1437 Elective-II Advanced Java Technologies [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand the need and use of different software architecture
- design and develop the middle tier and presentation tier of web applications
- use modern tools for designing and developing web applications and web services
- configure and manage application servers

Syllabus:

Network Programming: Socket Fundamentals, TCP/IP and UDP Sockets in Java.
Java Servlets: Introduction to Java servlets, Life Cycle of Java Servlet, Basics of the Servlet API, Reading data from a client, Reading http request headers, Sending data to client and writing the http response header, Working with cookies and tracking sessions.
Java Remote Method Invocation (RMI): About Serialization, RMI concept, Server side and client side.
Java Server Pages (JSP): Introduction to JSP tags and directive, Request String, User Sessions, Cookies, Session objects, Custom Tag Libraries: The taglib Directive, The tag-library Descriptor and Java Classes, The Expression Language (EL), The JSTL Core Tag Library, Packaging Tag Libraries in Web Applications.
Enterprise Java Bean (EJB): Introduction to Java Beans and Enterprise Java Beans, Role of EJB Components in Java EE Applications: EJB Life Cycle, Deployment descriptors, Session Java Beans, Entity Java Bean, Message-driven Bean and the JAR file.
The Java Persistence API (JPA): Objective, Additional Resources, The Java Persistence API, Object Relational Mapping Software, Entity class Requirements, Life Cycle and Operational Characteristics of Entity: Components.
Service Oriented Computing: Challenges and Benefits, Service Oriented Architecture, Web Services and J2EE, SOAP, WSDL, Web Service Registries.
Internationalization (I18N): Introduction, Setting the Locale, Isolating Locale-Specific Data, Formatting Working with Text, Internationalization of Network Resources, Service Providers for Internationalization.
J2EE Frameworks and Design Patterns.

Self Study:
The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

References:

1. Jim Keogh, Complete Reference J2EE, Tata McGraw Hill.
2. Sun Micro Systems, Developing Applications for the Java™ EE Platform FJ-310 Student Guide,

Sun Micro Systems.
3. B V Kumar and S Sangeetha, J2EE Architecture –An Illustrative Gateway to Enterprise Solutions concepts to Application Design & Development, Tata McGraw Hill.A. Binildas, Malhar Barai and Vincenzo Caselli, Service Oriented Architecture with Java: Using SOA and Web Services to Build Powerful Java Applications, SPD.
4. Kogent, Java Server Programming EE6 Black Book, Dreamtech.
5. G. Radhamani and G. S.V. Radha Krishna Rao, Web Services Security and E-Business, Idea Group publishing.k8
6. Herbert Schildt, Java 2 Complete Reference, Tata McGraw Hill.
7. Ivan Bayross, Sharanam Shah, Cynthia Bayross and Vaishali Shah, Java Server Programming for professionals, The Team X (SPD).

3CA1416 Elective-I Artificial Intelligence [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand the major areas and challenges of artificial intelligence
- formalize a given problem
- apply basic AI algorithms to solve problems
- create expert system for various domains

Syllabus:

Introduction to Artificial Intelligence Overview: What is AI, Importance, and early work in AI, AI related fields.

Knowledge: General concepts, definition and importance of knowledge, knowledge based system, representation, organization, manipulation and acquisition of knowledge.

Problems, Problem Spaces and State Space Search: The AI Problems, The Underlying Assumption, What Is An AI Techniques, The Level Of The Model, Criteria For Success, Some General References, One Final Word. Defining the Problems as a State Space Search, Production Systems, Production Characteristics, Production System Characteristics, and Issues in the Design of Search Programs.

Search and Control Strategies: Uninformed (Blind) and informed search, DFS, BFS, Heuristic Search Techniques: Generate-And-Test, Hill Climbing, Best-First Search, A*, AO*, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

Knowledge Representation: Knowledge Representation Issues, Representations And Mappings, Approaches to knowledge Representation, Using Predicate Logic Representation Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions And Predicates, Resolution, Representing Knowledge using Rules, Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning.

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing.

Neural Network: Hopfield Network, Learning In Neural Network, Application of Neural Networks, Recurrent Networks, Connectionist AI and Symbolic AI.

Reasoning: Symbolic Reasoning under Uncertainty, Introduction to Non-monotonic Reasoning, Logics for Non-monotonic Reasoning. Statistical Reasoning , Probability and Bay's Theorem, Certainty Factors and Rule-Base Systems, Bayesian Networks, Dempster-Shafer Theory.

Game Playing: Overview and Example Domain, Min-max Search, Adding Alpha-Beta Cutoffs.

Expert System: Introduction, Architecture, and Types of Expert Systems, Expert System shell.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

The Practical will be based on the topics covered in the syllabus. Minimum 10 experiments should be carried out.

References:

1. Elaine Rich And Kevin Knight, Artificial Intelligence, Tata McGraw-Hill.
2. Russell and Norving, Artificial Intelligence A Modern Approach, Pearson.
3. D.W. Patterson, Artificial Intelligence And Expert Systems, Prentice Hall of India.
4. D.W. Rolston, Artificial Intelligence And Expert System, Development, McGraw-Hill
5. International Edition.
6. Carl Townsend, Introduction to Prolog Programming, BPB publications.
7. Ivan Bratko, PROLOG Programming For Artificial Intelligence, Addison-Wesley.

3CA1417 Elective-II Data warehousing and Mining [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand multidimensional behavior of data and data warehouse architectures
- apply data pre-processing concepts to clean, integrate and transform different datasets
- apply data mining methods to information systems and generate results for decision making systems
- demonstrate data mining techniques to solve problems in other disciplines using mathematical approach

Syllabus:

Introduction: Data Mining, Mining different kind of Data, Mining different kinds of Patterns, Data Mining Technologies, applications and issues.
Objects and attributes: Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and dissimilarity.
Data Preprocessing: Introduction, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Discretization.
Data Warehousing and On-Line Analytical Processing: Data Warehouse: Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation.
Data Cube Technology: Data cube computation: Preliminary concepts, Data cube computation methods, Exploration and Discovery in Multidimensional Databases
Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods, Pattern Evaluation Methods, Applications.
Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Overview of other Classification Methods: K-nearest neighbor classifiers, neural network classifiers, genetic algorithms.
Cluster Analysis: Basic Concepts, Clustering structures, Major Clustering Approaches, Partitioning Methods, Hierarchical clustering, Density-Based, Grid-Based Clustering.
Overview of other data mining techniques: web-mining, sequence mining, text mining multimedia mining etc.

Self Study:
The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

References:

1. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concept and Techniques, Elsevier.
2. Sam Anaory & Dennis Murray Data Warehousing in the Real World: A practical Guide for Building Decision Support System, Publication: Addision-Wesley
3. Margaret H. Dunham, Data Mining: Introductory and Advanced Topics, S. Sridhar Publication: Pearson Education.
4. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Introduction to Data Mining Pearson Education.
5. K.P.Soman, S.Diwakar, V.Ajay, Insight into Data Mining ,PHI.
6. Paulraj Ponnaiah, Data Warehousing Fundamentals, Wiley student Edition.
7. Ralph Kimball,The Data Warehouse Life cycle Tool kit, Wiley student edition.
8. William H Inmon, John,Building the Data Warehouse, Wiley & Sons Inc.
9. Arun K Pujari , Data Mining Techniques, Universities Press.

V. Pudi and P. Radha Krishna Data Mining, Oxford University Press.

3CA1452 Database Administration [2 0 2 3]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand database administration and management
- understand database architecture and background processes in detail
- install and configure the database servers and client systems
- understand the functional roles and duties involved in database administration and are able to perform database tuning

Syllabus:

Views: Introduction to Views, Data definition, Data manipulation-retrieval operations, Data manipulation-update operation, updating union, intersection and difference views, updating other views, snapshots, SQL support.
Database Architecture: Oracle Architecture, Database Instance(s).
Connection: Oracle listener, Listener configuration, Oracle Net client
Server Processes: Dedicated server, Shared Server Files: Parameter files, Control files, Data files, Segments, Extents, Data blocks, redo log Files, Temporary files, Oracle managed Files
Table Spaces: System Table space, logical Managed table space
Memory Areas: Shared Global Area, Program Global Area.
Background Processes: Process Monitor (PMON), System Monitor(SMON),Database Writer(DBWn), Log Writer(LGWR), Archiver(ARCn), Check Point(CKPT), Job process(Jnnn), Recoverer (RECO)
Security: Database Security, User and schemas, System Privileges, Object privileges, Database Roles, PL/SQL Roles.
Managing Transactions: Rollback Segments, space usage within rollback Segments, Monitoring Rollback Segment Usage.
Database Tuning and Performance: Tuning Application, Tuning SQL, Tuning Memory Usage, Tuning Data Storage, Tuning Data Manipulation, Tuning Physical Storage, Tuning Logical Storage.
Introduction to Distributed Database System: Some preliminaries, the twelve objectives, problems of distributed systems, gateways, client/server systems, SQL support.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

The Practical will be based on the topics covered in the syllabus. Project based laboratory should be carried out.

References:

1. Kevin Loney and Bob Bryla , Oracle Database 11g DBA Handbook, Tata Macgraw Hill.
2. Iggy Fernandez, Beginning Oracle Database 11g administartion, Apress
3. Sam R. Alapati Expert Oracle Database 10g Administration, Apress.
4. Kevin Loney , Oracle 9i DBA Handbook, Tata Macgraw Hill
5. C J Date, An introduction to Database Systems, Addition-Wesley.
6. Thomas Kyte, Beginning Oracle programming by Sean Dillon, Christopher Beck, Shroff Publisher

3CA1466 Elective-I Design and Analysis of Algorithms [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- analyze algorithms and estimate their worst-case and average-case behavior
- model and implement efficient software solutions for various application areas using appropriately selected algorithms and data structures
- analyze data structures and algorithms, to compare and evaluate them with respect to time and space requirements, in order to make the most appropriate design choices, when solving real-world problems

Syllabus:

Introduction: Notations for programs

Elementary Algorithmic: Efficiency of Algorithms, Average & worst-case analysis, Elementary operation.

Asymptotic Notation: A notation for "the order of", Other asymptotic notation, Conditional asymptotic notation.

Analysis of Algorithms: Analyzing control structures: sequencing, "For" loops, Recursive calls, "While" and "repeat" loops, Using a barometer, Amortized analysis.

Solving Recurrences: Intelligent guesswork, Homogeneous recurrences, Inhomogeneous Recurrences, Change of variable, Range transformations.

Some Data Structures: Arrays, stacks and queues, Records and pointers, lists, graphs, trees, Associative tables, Heaps, Binomial heaps, Disjoint set structures.

Greedy Algorithms: Graphs: Minimum spanning trees-Kruskal's algorithm, Prim's algorithm, Graphs: Shortest paths.

Knapsack problem, Scheduling: Minimizing time in the system, Scheduling with deadlines.

Divide-and-Conquer: Multiplying large integers, Binary search, Sorting: sorting by merging, Quick sort, Finding the median, Matrix multiplication, Exponentiation.

Dynamic Programming: Making Change, The principle of optimality, The Knapsack

Problem, Shortest path, Chained matrix multiplication, Approaches using recursion, Memory functions.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

References:

1. Gilles Brassard & Paul Bratley, Fundamentals of Algorithmics, PHI.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekharan, Fundamentals of Computer Algorithms, Galgotia.

3CA1454 Management Information System [3 1 0 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand role of various information systems in business processes
- identify, describe and analyze role of IT in business problems from organizational and management aspects
- evaluate and suggest need of IT infrastructure and ensure security
- build and manage information system for local and global business scenarios ethically

Syllabus:

Organizations, Management and the Networked Enterprise: Information Systems in Global Business Today, E-Business: How Businesses Use Information Systems, Information Systems, Organizations, and Strategy; Ethical & Social issues in Information Systems.
Information Technology Infrastructure: IT Infrastructure and Emerging Technologies, ITIL concepts, Foundations of Business Intelligence: Databases and Information Management, Telecommunications, the Internet, and Wireless Technology; Securing Information Systems.
Key System Applications for the Digital Age: Achieving Operational Excellence and Customer Intimacy: Enterprise Applications, E-Commerce: Digital Markets, Digital Goods; Managing Knowledge and Collaboration, Enhancing Decision Making.
Building and Managing Systems: Building Information Systems, Managing Projects, Managing Global Systems, ISO2000.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Tutorial work

Tutorials will be based on the topics covered in the syllabus. Minimum 10 Tutorials should be carried out.

References:

1. Kenneth C. Laudon and Jane P. Laudon., Rajnish Dass, Management Information Systems, Pearson Education.
2. R. M. Stair and G. W. Reynolds, Principles of Information System, Thomson Learning.
3. Andrew C. Boynton and Robert W. Zmud, Management Information Systems: Readings and Cases, Foresman and Company, London.
4. Girdhar Joshi, Management Information Systems, Oxford University Press.

3CA1455 Mini Project [0 0 2 1]

Course Learning Outcome:

After successful completion of this course, student will be able to

- acquire practical knowledge within the chosen area of technology for project development
- identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach
- contribute as an individual or in a team in development of technical projects
- develop effective communication skills for presentation of project related activities

Guidelines:

Student will be assigned one or more system development projects. The project development involves part or all the phases of system development life cycle thus providing student with experience of analyzing, designing, implementing and evaluating information systems. The subject area of the project should be related to the current or future status of Computer Applications.

Major component of the project should include identification of the system, deciding the aims and objectives to be achieved, modules to be studied. It also includes analysis, innovations / research, laboratory / applications studies.

3CA1453 Mobile Application Development Technologies [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- apply the knowledge of technologies for designing and developing secure and robust mobile apps for mobile platforms
- use modern designing and rapid application development tools for developing mobile apps
- identify the need and use of mobile design patterns during mobile apps development
- understand global, economical and societal impact to publish mobile apps

Syllabus:

Introduction: Introduction to Mobile Computing, Introduction to Mobile application development technologies, development Environment, Issues of Mobile application development, Installing Phone Gap, its tools, setting up multiple development environments for different platforms.

Building and Debugging on Multiple Platforms, Mobile Web to Mobile Applications.

Factors in Developing Mobile Applications: Mobile Software Engineering, Frameworks and Tools, Generic UI Development. Mobile Design Patterns.

User Interfaces: Designing the Right UI for Mobile Devices, Text-to-Speech Techniques, Multichannel and Multimodal UIs, UI Design Patterns, Working with XUI, Working with User Interface with JQuery mobile.

Mobile application Development Components: Application, Activity, Intents and Services

Managing a Cross-Platform Codebase, HTML5 APIs and Mobile JavaScript CSS3: Transitions, Transforms and Animation.

Storing and Retrieving Data: Synchronization and Replication of Mobile Data, Storing and retrieving data from Sql Lite, Working with a Content Provider, Reading and Writing to Contacts, using the Contacts APIs from PhoneGap to work with the user's native contacts list of their mobile device.

Communications Via Network and the Web: Communications Model, Android Networking and Web Telephony, Wireless Connectivity and Mobile Apps, Android Telephony.

Notifications and Alarms: Performance and Memory Management, Android Notifications and Alarms.

Graphics: Performance and Multithreading , Graphics and UI Performance , Android Graphics, Android Multimedia, Accessing Device Sensors, Accessing Camera, Data and Files, working with Videos, Images and Audio with PhoneGap.

PhoneGap Plugins for different Mobile OS platform.

Mobility and Location Based Services: Working Offline Sync and Caching in Phone Gap Packaging and Deploying Apps, Performance Best Practices, Android Field Service App.

Security and Hacking: Active Transactions, More on Security, Preventing Hacking of latest mobile Devices.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Minimum two projects should be carried out which should cover all the aspects of the Syllabus.

References:

1. Reto Meier, Professional Android 4 Application Development, Wrox Publication.
2. B.M. Harwani, Android Programming Unleashed, Sams Publishing.
3. Greg Nudelman, Android Design Patterns: Interaction Design Solutions for Developers, John Wiley & Sons.
4. Wei-Meng Lee, Beginning Android 4 Application Development, Wrox Press.
5. Sheran Gunasekera, Android Apps Security, Apress.
6. Thomas Myer , Beginning PhoneGap, Wrox Publication.
7. Rohit Ghatol, Yogesh Patel , Beginning PhoneGap, Apress publication.
8. John M. Wargo, PhoneGap Essentials, Amazon.com.
9. Matt Gifford, PhoneGap Mobile Application Development Cookbook, Amazon. Com.

3CA1456 Elective-I Multimedia Systems [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand the methodology of transmitting multimedia components on a network
- apply the knowledge of compression and decompression in multimedia communication
- select and use protocols ensuring Quality-of-Service(QoS) in developing multimedia application
- design and develop multimedia application

Syllabus:

Multimedia Systems Design: An Introduction, Multimedia Elements, Multimedia Systems Architecture, Multimedia Databases
Compression and Decompression: Types of Compression, Video Image Compression, Audio Compression
Data and File Format Standards and Multimedia Input/output Technologies: Different File Formats, Various Input Output Technologies
Storage and Retrieval Technologies: Magnetic Media Technology, Optical Media, Hierarchical Storage Management, Cache Management for Storage Systems
Multimedia Application Design: Architectural and Telecommunication Considerations, Virtual Reality Design, Components, Organization and other design issues.
Multimedia Authoring and User Interfaces: Multimedia Authoring Systems, User Interface Design, Information Access, Object Display/Playback Issues
Hypermedia Messaging: Mobile Messaging, Hypermedia Message Components, Linking and Embedding, Integrated Multimedia Message Standards, Distributed Multimedia Systems.
System Design: Methodology and Considerations: Fundamental Design Issues, Determining Enterprise Requirements, Examining current Architecture and Feasibility, Designing for Performance, Multimedia Systems Design, System Extensibility, and Multimedia System Design Example.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

References:

1. Prabhat K. Andleigh, Kiran Thakrar, Multimedia Systems Design, Prentice-Hall India.
2. Ralf Steinmetz and Klara Nahrshedt, Multimedia: Computing, Communications and Applications,

Pearson Education.
3. Nigel Chapman & Jeny Chapman, Digital Multimedia, Wiley Publication.
4. John F. Koegel Buford , Multimedia Systems, Pearson Education.
5. S. Gokul, Multimedia Magic, BPB publication.

3CA1447 Elective-II Open Source Technologies [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand the need and use of different software architecture for designing applications
- design web applications using open source technologies
- use modern open source tools for web applications and web services development
- explore technicalities associated with application servers

Syllabus:

Introduction to Server side scripting
About PHP: What is PHP, OOP in PHP, LAMP/WAMP Installation, Starting with PHP Programming: Overview, Basic syntax and commands, PHP Operators, Conditional Statements, Loops, Arrays, Forms, Functions, Global variables, displaying information about PHP
Database Management using Web Technology(s)
MySQL Commands: Introduction of MySQL and its features, Logging on to MySQL, Understanding MySQL Commands
PHP and MySQL Programming: Accessing MySQL from PHP, Database Management using PHP
AJAX: Overview, Limitations of Traditional Web Applications, AJAX Basics, Items for Implementing AJAX
Web Forms—Get Wet in AJAX : JavaScript Basics, DOM, Steps to place Asynchronous request to the Server, Accessing form elements, XML Http Post Requests, Separating JavaScript Code in another files, Accessing JavaScript function using Hyperlink, Specifying functions in .js file, AJAX, PHP and My SQL all combined for accessing database
Validation: Validation regarding web forms and storing records in table
Receiving XML and JSON: Types of Response data, Receiving Extensible Markup Language (XML) Response, Display contents of all types Nodes, Overview of Java Script Object Notation (JSON), Installing JSON, Receiving Data in JSON Format, Accessing the JSON response through iteration. Using the Library for Encoding, Convert user data into JSON format, Accessing data and displaying in JSON Format
Introduction to Web Services: Overview of Web Service, Methods of producing and consuming of web services, Overview of Representational State Transfer (REST) , Tools for adding SOAP functionality to PHP, NuSOAP: Installation of NuSOAP, First Web Service, Web Service Description Language(WSDL), (Universal Description, Discovery, and Integration(UDDI), Web Services accessing the Database, Dealing with Complex Type

Note: The server side scripting language will be decided by the course co-ordinator according to the current trends at the time of opting the subject. The final syllabus will be submitted by the course co coordinator before the semester commencement.

Self Study:

To be decided by course coordinator at the beginning of semester, which will be a blend of one or more of the e-Learning Resources, Video Lectures, Online courses, tools, research material, web links etc. along with the related assessment component(s).

Laboratory work

The Practical work and tutorials will be based on the topics covered in the syllabus. Minimum 10 practical experiments are to be carried out.

References

1. B M Harwani ,Developing Web Applications in PHP and AJAX,, Mc Graw Hill
2. Kogent, Java Server Programming EE6 Black Book, Dreamtech
3. Ed Lecky-Thompson, Heow Eide-Goodman, Steven D. Nowicki and Alec Cove Professional PHP5 (Programmer to Programmer) , Wrox publisher
4. Hayder, Hasin ,Object-Oriented Programming with Php5, Packt Publishing, Limited
5. David Sklar, Learning PHP 5, Oreilly & Associates Inc
6. Mark Dexter, Louis Landry, Joomla! TM Programming , Joomla!TM Press
7. Davey Shafik with Ben Ramsey , ZEND PHP5 Certification : Study Guide , nbTM php architecht nanobooks

3CA1451 System Software [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand fundamentals of language processing and grammar
- apply knowledge of compilation and code optimization steps to mimic a simple compiler
- demonstrate the working of various system software like assembler, loader, linker, editor and device driver

Syllabus:

Language Processor: Fundamentals of Language Processing and language Specification, Grammar and Types of Grammar, Toy Compiler, Introduction to Data structures: Heap and heap allocation, sorting methods.

Scanning and Parsing: Scanning, Finite Automata: DFA and NFA, Conversion of NFA into DFA, Top Down Parsing, Bottom up Parsing, Introduction to LEX and YACC tools.

Assemblers: Elements of Assembly Language Programming, a Simple Assembly Language Scheme, Pass Structure of Assembler, Design of Two Pass Assembler

Macro Processors: Macro Definition and Call, Macro Expansion, Nested Macro Calls, Advanced Macro Preprocessor, Design of Macro Preprocessor: Single Pass Algorithm, Two Pass Algorithm and Macro Calls within Macro Calls.

Loader and Linkers: Relocation And Linking Concept, Design of a Linker, Various schemes of Loader.

Introduction to Compilers: Aspects of Compilation, Memory Allocation, Compilation of Expression, Compilation of Control Structure, Code Optimization, Interpreters.

Editors and Debuggers: Various types of Editors and Debuggers and its design.

Device Drivers: Introduction to the Device Driver, Requirements of Device Driver, Types of Device Driver.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

The Practical work will be based on the topics covered in the syllabus. Minimum 10 experiments are to be carried out.

References:

1. Dhamdhere, Introduction to System Software, McGraw Hill.
2. Aho. A.V. Sethi R. and Ulman J.D, Compilers, Principles, Techniques and Tools, Pearson.
3. Srimanta Pal, Systems Programming, Oxford University Press.
4. John Donowan, System Programming, TMH.
5. Leland L. Beck and D. Manjula, System Software-An Introduction to Systems Programming, Pearson.
6. Das, Compiler Design Using Flex and Yacc, PHI.

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3	0	2	4

Course Code	3CA1577
Course Title	Big Data Analytics

Course Learning Outcome(CLO):

At the end of the course, student will be able to -

1. define the significance of Big Data,
2. discover the challenges of Big Data Analytics and how to deal with the same,
3. comprehend distributed file system with MapReduce programming,
4. discriminate Big Data Analytics problem with NoSQL databases.

Syllabus	Teaching Hours:
UNIT I **Introduction to Big Data Analytics:** Nature of Data, Types of Digital Data, Classification of Digital Data, Structured Data, Semi-Structured Data, Unstructured Data, Characteristics of Data, Introduction to Data Mining, Data Mining for Large Scale Dataset, Statistical Limits on Data Mining. Introduction to Big Data and its Importance, Big Data Dimensions, Drivers for Big Data, Big Data Analytics issues and challenges, Big Data analytics applications.	8
UNIT II **Hadoop:** Introducing Hadoop, comparisons of RDBMS and Hadoop, Distributed Computing Challenges, A Brief History of Hadoop, Hadoop Overview, Business Value of Hadoop, Hadoop Distributors, Hadoop Distributed File System, Processing Data with Hadoop , Hadoop YARN , Hadoop Ecosystem, HDFS,	14
UNIT III **MapReduce and the New Software Stack:** Distributed File Systems, MapReduce, Algorithms Using MapReduce, Extensions to MapReduce, the Communication Cost Model, Complexity Theory for MapReduce	8
UNIT IV **Mining Data Streams:** The Stream Data Model, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream with case studies.	6
UNIT V **Open Source Solutions for Big Data Analytics:** Introduction to NoSQL Databases, Types of NoSQL databases, SQL Vs NoSQL, why NoSQL, Introduction to MongoDB, Data Types in MongoDB, CRUD, relevant case studies	8
UNIT VI **Introduction to other frameworks:** Data Processing Operators in Pig, Hive Services, HiveQL, Querying Data in Hive, Applications on Big Data using Pig and Hive, Fundamentals of HBase and ZooKeeper, Streams, Visualizations, Visual Data Analysis Techniques, Interaction Techniques, Systems and Applications, Jasper Report using Jasper Soft, Spark Framework and Architecture, Spark essentials and Components	4

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

The Practical will be based on the topics covered in the syllabus. Project based laboratory should be carried out.

Suggested Readings:

1. Seema Acharya and Subhashini C, Big Data and Analytics, Wiley India
2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press
3. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer
4. Tom White, Hadoop: The Definitive Guide, Third Edition, O'reilly Media
5. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill Publishing
6. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & sons
7. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons
8. Da Ruan, Guoquing Chen, Etienne E.Kerre, GeertWets, Intelligent Data Mining, Springer

Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch, James Giles, David Corrigan, Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill P

3CA1526 Elective-III Business Intelligence & Analytics [3 1 0 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand how business analytics is used to formulate and solve business problems
- apply the processes needed to develop, report, and analyze business data
- identify and use various business analytics, integration, and reporting software

Syllabus:

Introduction to Business Intelligence: Introduction to OLTP and OLAP, BI definitions & concepts, Business applications of BI, BI framework, Role of Data Warehousing in BI, BI infrastructure components – BI process, BI technology, BI roles & responsibilities.
Basics of Data Integration (Extraction Transformation Loading): Concepts of data integration, need and advantages of using data integration, introduction to common data integration approaches, introduction to (Extraction Transformation Loading) ETL using Integrated services tools, Introduction to data quality, data profiling concepts and applications.
Introduction to Multi-Dimensional Data Modeling: Introduction to data and dimension modeling, Multi-dimensional data model, ER Modeling vs. multi-dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using Analysis Services tool.
Basics of Enterprise Reporting: Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, introduction to Reporting services tool, enterprise reporting using Reporting services tool.

Self-Study:
The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Tutorial Work:
Tutorials will be based on the topics covered in the syllabus. Minimum 10 tutorials should be covered.

References:

1. David Loshin, Business Intelligence, Elsevier Science.
2. Mike Biere, Business intelligence for the enterprise, Prentice Hall PTR.
3. Larissa Terpeluk Moss, Shaku Atre, Business intelligence roadmap, Addison-Wesley.
4. Cindi Howson, Successful Business Intelligence: Secrets to making Killer BI Applications, Tata McGraw-Hill.
5. Brain, Larson, Delivering business intelligence with Microsoft SQL server, McGraw Hill Professional.

Stephen Few, Information dashboard design, O'Reilly Media.

3CA1517 Elective-IV Cloud and Service Oriented Computing [3 0 2 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand technical foundations and challenges of virtualization, cloud computing and service oriented computing
- identify various service delivery models of cloud computing architecture
- understand security aspects in cloud
- design and develop simple cloud based web services

Syllabus:

Introduction: Cloud computing introduction, Roots of cloud computing, Layers of clouds, desired features of cloud, Cloud infrastructure management, Cloud Services, Challenges and risks.

Virtualization: Characteristics of virtual environments, taxonomy, virtualization and cloud computing technology examples.

Cloud Computing Architecture: Cloud reference model, types of clouds.

Software as a Service: Evolution of SaaS, Challenges of SaaS paradigm, SaaS integration services, SaaS integration of products and platforms.

Infrastructure as a Service: Virtual machines provisioning and manageability- introduction, Virtual machine migration services.

Platform as a Service: Integration of private and public cloud, Technologies and tools for cloud computing, Aneka cloud platform, Resource provisioning Services.

Migrating into a Cloud: Cloud services for individuals, Cloud services aimed at the mid-market, Enterprise class cloud offering.

Data Security in the cloud: cloud computing and identity, the cloud, digital identity and data security.

Service Oriented Architecture: Introduction, Computing with services, open environments, evolving web, basic standards for web services, Extensible Markup Language, Simple Object Access Protocol, Web Services Description Language, Universal Description, Discovery and Integration.

Programming Web Services: Developing web service programming, Web Services Description Language, Java for web services, .NET, web services interoperability, introduction to Simple Object Access Protocol and Representational State Transfer.

Enterprise Architecture & Principles of Service Oriented Computing, Introduction Engagement and Transaction.

Self Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 8 experiments to be incorporated.

References:

1. Rajkumar Buyya, James Broberg, Andrzej M Goscinski, Cloud Computing: Principles and Paradigms, Wiley Publication.
2. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, Mastering Cloud Computing: Foundations and applications programming, Elsevier Morgan Kaufmann.
3. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Cloud Computing – A Practical Approach, Tata McGraw Hill Education.
4. Munindar P. Singh, Michael N. Huhns, Service-Oriented Computing – Semantics, Processes, Agents, Wiley India Pvt. Ltd.

5. Mark D. Hansen, SOA using Java Web Services, Prentice Hall.

3CA1559 Comprehensive Assessment – II [0 0 0 1]

Course Learning Outcome:

After successful completion of this course, student will be able to

- conceptualize the collective understanding of various courses studied during the programme

Syllabus:
Student will be assessed on the basis of all the courses learned till the end of this semester.

3CA1567 Elective-IV Computer Animation [3 0 2 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand the basic principle of computer generated animations
- conceptualize the complex, technical and aesthetic components of computer animation design
- apply computer animation techniques for various real life scenario

Syllabus:

Learning Animation: Working with files, workspace, setting the stage, using template, exploring drawing modes, working with drawing tools, adding filters.
Objects and text: Moving, copying, deleting and editing objects, transforming objects, working with text field, frames and key frames, layers and layer folders.
Advance Effects in Animation: Tween animation, motion tweens, editing the motion path of a motion tween, frame by frame animation, Bones, animating an armature and 3D animation.
Symbols, instances, library, Action Script: Types of symbols, creating and modifying symbols, instances and library panel, working with sound and video, actions panel overview, resizing the actions tool box or script pane, Publishing and exporting the files.
3DAnimation: Workflow of 3D content development, main features of 3D Animation tool, Exploring user Interface of 3D Animation tool, working with Projects and Scenes.
Objects, Polygonal Modeling in 3D Animation tool: Exploring types of Objects in 3D Animation tool, creating objects using interactive creation mode, Reflection, Transforming objects, describing the components of polygon mesh, creating and modifying polygon mesh.
NURBS Modeling: Components of NURBS, creating and editing NURBS curve and surface.
Animating Objects, Shading, Lighting and Texturing in 3D Animation tool: Types of animation, exploring animation controls, key frames, animation layers, sound in animation.
Rendering Scene in 3D Animation tool: Rendering methods, render able camera, nodes, layers.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

References:

1. Chris Grover, Flash CS5 The missing manual, Oreilly Media/ Pogue Press.
2. Lance Flavell, Beginning Blender, Apress.
3. Kelly L Murdock, 3DS Max 2010 Bible.
4. Adobe Creative team, Adobe Flash Professional CS5 Classroom in a book, Adobe Press.
5. Kogent Learning Solutions, Flash CS4 in Simple Steps, Dreamtech Press.
6. Dariush Derakhshani, Introducing Maya 2011, Sybex Wiley Higher Education.

3CA1551 Computer Security and Cyber Laws [3 0 2 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand the need for computer security
- analyze the vulnerabilities in the computer system
- design system to handle simple cyber attacks
- understand the legal aspects to handle cyber-crimes and cyber frauds

Syllabus:

Overview: Computer Security concepts, Threats, Attacks and Assets, Security Functional Requirements, Scope of Computer Security, Cryptographic tools.

User Authentication: Mechanisms of Authentication, Password - based Authentication, Token based Authentication, Biometric Authentication, Remote User Authentication.

Access Control: Access Control Principles, Subjects, Objects and Access Rights, DAC.

Database Security: DBMS, RDBMS, Database Access Control, Inference, Statistical Databases, Database Encryption.

Malware: Types, Viruses, Virus attacks, Virus Countermeasures, Worms, Bots, Rootkits, Trojans

Denial of Service Attacks: Introduction, Flooding Attacks, Distributed Denial of Service Attacks, Reflector and Amplifier Attacks, Defenses against Denial of Service Attacks and Responding.

Trusted Computing and Multilevel Security: Bell-La Padula Model for Computer Security, Biba Model, Clark Wilson Integrity Model, Discretionary Access Control, Graham Denning Model, Mandatory Access Control, Concept of Trusted Systems, Application of multilevel security, Security Modes of Operation, Take Grant Protection Model, trusted computing and trusted platform module, common criteria for IT Security Evaluation.

Buffer Overflow: Stack Overflow, Defending against buffer overflows, and other forms of overflow attacks.

Other Software Security Issues: Software Security Issues, Handling Program Input, Writing safe program code, interacting with the operating system and other programs, handling program input.

Developing Secure Web Applications: Design Issues, Deployment Considerations, input validation, authentication, authorization, Configuration management, sensitive data, session management, Parameter Manipulation, Exception Management, Auditing and Logging

Secured Communication: IPSec, Secured Socket Layer, Transport Layer Security, Secured Shell

Cyber Crimes and Cyber Laws: Introduction to IT laws & Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Pornography, Software Piracy, Intellectual property, Legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits, and Cyber Security, IT Act 2000.

Self Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

References:

1. William Stallings and Lawrie Brown, Computer Security Principles and Practices, Pearson Education
2. Pfleeger and Pfleeger, Security in Computing, Pearson Education.
3. Raghu Santanam, Sethumadhavan, Mohit Virendra, Cyber Security, Cyber Crime and Cyber Forensics: Applications and Perspectives, IGI Global.
4. Chris Davis, IT Auditing Using controls to protect Information Assets, TMH.

3CA1554 Corporate Communication [2 0 0 2]

Course Learning Outcome:

After successful completion of this course, student will be able to

- study the dynamics of communication with their key audiences, both internal and external to the corporation
- understand the nuances of corporate communication
- learn tools to reach variety of stakeholders

Syllabus:

Changing Environment of Workplaces: Recognizing the changing environment, connecting corporate communication to business strategy, Case: Google.
Communications Strategy: Setting communication objectives, Analyzing constituencies, Delivering messages appropriately, Identifying channels and structuring the message, Case: Cason Container Company.
Negotiation Skills: Contract/price/terms and conditions.
Different Kinds of communication: Verbal communication, Non-verbal communication, Visual communication.
Reputation Management: Identity, image and reputation, How people perceive you, Self- branding, Enhancing your reputation using media, Personal reputation management.
Corporate Social Responsibility: What is corporate responsibility?, Communicating about corporate responsibility, Case: Starbucks Coffee Company.
Media, and Public Relations: Building better relations with the media, Guide to media, Social Media, Integrating digital strategies into your business, Reputation management in a social media world.
Internal Communications: Organizing the internal communications effort, Implementing an effective internal communications program.
Crisis Communication: Communicating during the crisis, Case: Coca Cola India, Crisis Communications: Lessons from "9/11", Crisis Communications Simulation.

Self-Study:

Self-study content will be declared at the commencement of the course. Approximately 10% of the assessment will be upon this content.

References:

1. Paul Argenti, Corporate Communication, McGraw Hill.
2. The Essentials of Corporate Communications and Public Relations (Business Literacy for HR Professionals) by Harvard Business School Press (Compiler), Society for Human Resource Management (Compiler).
3. Mary Ellen Guffey, Dana Loewy, Essentials of Business Communication, Cengage Learning

3CA1516 Elective-III Enterprise Resource Planning [3 1 0 4]

Course Learning Outcome:

After successful completion of the course, student will be able to:

- understand and explain various fundamentals and modules of Enterprise Resource Planning (ERP)
- analyse and compare various decision making processes using ERP
- design the implementation of ERP life cycle, E-Business, E-Commerce, SCM, CRM
- understand the introductory level implementation scenarios of various ERP packages

Syllabus:

ERP: Introduction, the E-Business Backbone, evolution, definition, advantages, Business Modelling.
ERP and Related Technologies: Business Process Reengineering, Management Information System, Decision Support System, Executive information System, Data Warehousing - Data Mining, Online Analytical Processing.
ERP Manufacturing Perspective: Material Requirement Planning, Bill of Material, Manufacturing Resource Planning, Distributed Requirement Planning, Product Data Management, Make to Order and Make to Stock, Assemble to Order, Engineer to Order, Configure to Order.
ERP Modules: Finance, Sales & Distribution, Manufacturing, Human Resources, Plant Management, Quality Management, Material Management.
Benefits of ERP: Reduction of Lead-Time, On-Time shipment. Reduction in Cycle Time, Improved Resource Utilisation, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and decision-making capacity and other.
ERP Implementation Life Cycle: Pre-Evaluation Screening, Package Evaluation, Project Planning, Gap Analysis, Reengineering, Configuration, Implementation Team Training, Testing, Going Live, End-User Training, Maintenance.
E-Commerce to E-Business: Flexible Business Design, Definition of Value, E-Business Communities, Customization and integration, E-Business Architecture.
Business Engineering: Customer Relationship Management, Business Process Model, Customer Centric Business, Pre Order, Point of Order and Post Order Customer Support, Supply Chain Management, Business & Technology Forces - Driving Needs For SCM, Managing Order Acquisition Process, Elements of SCM.

ERP Packages: Introduction to SAP, Baan, Oracle, People Soft implementation scenarios.

Self Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Tutorial work:

Tutorial will be based on the topics covered in the syllabus. Minimum 10 tutorials should be covered.

Reference:

1. Alexis Leon, Enterprise Resource Planning, Tata McGraw Hill.
2. Ravi Shankar & S. Jaiswal, Enterprise Resource Planning, Galgotia.
3. Vinod Kumar Garg, Enterprise Resource Planning Concepts and Practices, PHI Learning Pvt Ltd
4. Annetta Clewwto and Dane Franklin, Network Resource planning using SAP R/3 Baan and People soft: A Practical Guide to Planning, ERP Application, McGraw-Hill.
5. Jose Antonio, The SAP R/3 Handbook, McGraw Hill.

3CA1553 ICT Tools [0 0 2 1]

Course Learning Outcome:

After successful completion of this course, student will be able to

- identify various modern ICT based tools and technologies
- understand features of the tools which are useful for academic/research/application development
- use and demonstrate the tools and their features with appropriate case studies

Syllabus:

Appropriate numbers of tools are to be identified and studied as per programme specific needs, to be decided by the respective Course Coordinator.

Categories of ICT tools: Classroom teaching learning and evaluation, Virtualization, Software project management, Performance tuning, Software testing, Application development, Research & Innovation, E-commerce, Computer Animation.

Survey of ICT Tools: Understanding the components of ICT, Document Generation Tools, Document Publishing, Moodle as Learning Management system, Latex for document writing, Simulation tools, Data Analysis, Graph generation and plotting, Video Conferencing tools(Skype), Webcasting, Website development, Picasa for image editing and presentation, effective presentation development, pdf converters, NetMeeting, Verisign, SMS Gateways, Payment Gateways, Turnitin, Dreamweaver, Vmware, JUnit, CUDA profiling, Gprof.

e-Learning Resources: Text to audio conversion tools, Web Publishing, Plagiarism, Online Certifications.

The tools specific to the categories can be identified by the course coordinator and approved by Dean FOTE, can be covered.

Self Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 5 experiments to be incorporated using various tools.

References:

1. Online courses and ICT in Education - Emerging Practices and Applications (http://www.igi-global.com/bookstore/titledetails.aspx?TitleId=46981).
2. http://www.avu.org/Courses-Tables-List/ict-integration-education.html.
3. http://wiki.ask.com/Information_and_communication_technologies_in_education.
4. International Journal of education and development using ICT (http://ijedict.dec.uwi.edu) official websites and resources of the tools mentioned in the syllabus.

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Course Code	3CA1566
Course Title	Machine Learning and Applications

Course Learning Outcome:
At the end of the course, student will be able to -

1. understand machine learning concepts and range of problems that can be handled by machine learning
2. compare and parameterize different learning algorithms
3. apply the machine learning concepts in real life problems

Syllabus:

Topic	Teaching Hours.
UNIT I	
Introduction: Well Posed Learning Problems, Motivation to Machine Learning, Applications of Machine Learning, Designing a Learning System, Perspective and Issues in Machine Learning, Concept Learning	5
UNIT II	
Regression Techniques: Simple and Multiple Linear Regression – Gradient Descent and Normal Equations Method, Non-Linear Regression, Linear Regression with Regularization, Regression Trees, Support Vector Regression, Evaluation Measures for Regression Analysis	10
UNIT III	
Supervised and Unsupervised Learning: Introduction, Naïve Bayes Classification: Fitting Multivariate Bernoulli Distribution, Gaussian Distribution and Multinomial Distribution, K-Nearest Neighbours, Decision Trees, Support Vector Machines: Hard Margin and Soft Margin, Kernels and Kernel Trick, Evaluation Measures for Classification, Ensemble Models, k-means and Hierarchical Agglomerative Clustering, Evaluation Measures for Clustering	13
UNIT IV	
Artificial Neural Networks: Biological Neurons and Biological Neural Networks, Perceptron Learning, Activation Functions, Multilayer Perceptrons, Back-propagation Neural Networks, Learning with Momentum, Winner-take-all Learning, Competitive Neural Networks, Self-organizing Maps, Introduction to Recurrent Neural Networks	10
UNIT V	
Applications of Machine Learning: Applications of Machine Learning in Natural Language Processing, Image & Video Processing and Analysis, Computer Vision, Financial Data Processing and Social Network Analysis	10

Total	**48**

Self-Study:
The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Tutorial Work:
Tutorial work will be based on above syllabus with minimum 5 tutorials to be incorporated.

Suggested Readings:

1. Tom Mitchell, Machine Learning, TMH
2. C. Bishop, Pattern Recognition and Machine Learning, Springer
3. R. O. Duda, P. E. Hart and D. G. Stork, Pattern Classification and Scene Analysis, Wiley
4. Kishan Mehrotra, Chilukuri Mohan and Sanjay Ranka, Elements of Artificial Neural Networks, Penram International
5. Rajjan Shinghal, Pattern Recognition, Techniques and Applications, OXFORD
6. Athem Ealpaydin, Introduction to Machine Learning, PHI
7. Andries P. Engelbrecht, Computational Intelligence - An Introduction, Wiley Publication
8. Prince , Computer Vision: Models, Learning, and Inference, Cambridge University Press, Theodoridis and Koutroumbas
9. Theodoridis, Pikrakis, Koutroumbas, and Cavouras, “Pattern Recognition”, 4th ed., Academic Press.

3CA1558 Minor Project [0 0 6 3]

Course Learning Outcome:

After successful completion of this course, student will be able to

- practice acquired knowledge within the chosen area of technology for project development
- identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach
- reproduce, improve and refine technical aspects of the projects
- work as an individual or in a team in development of technical projects
- communicate and report effectively project related activities and findings

Syllabus:

Minor project may be carried out in one or more form of following:
product preparations, working/non-working models, prototype development, fabrication of set-ups, laboratory experiment development, process modification/development, simulation, software development, integration of software and hardware, statistical data analysis, survey, creating awareness in society.

The student is required to submit a report based on the work. The evaluation of the project shall be on continuous basis.

Guidelines:

The project development should involve all the phases of Software Engineering/Project Development life cycle thus providing student with experience of analyzing, designing, implementing and evaluating information systems. The subject area of the project can be related to the current or future state of Computer Science.
Major component of the project should include identification of the system, deciding the aims and objectives to be achieved, modules to be studied, and implemented. It also includes analysis, innovations / research, laboratory / applications studies.

3CA1555 Network Administration Lab [0 0 2 1]

Course Learning Outcome:

After successful completion of course, student will be able to

- understand the function of various LAN components and devices
- illustrate, configure and manage secure wired and wireless computer networks and network servers
- analyze the working and performance of computer networks using various network monitoring tools

Syllabus:

Study of LAN components and devices, configuring switch, setting of IPv4 and IPv6 network, configuring routers, connecting LANs, network server configuration, setting up domain controller, DNS, DHCP, FTP, web and application server roles, domain and user account management, study of network simulators, network monitoring tools, network performance analysis, setting up virtual private network, setting up wireless networks and defining secured access on wired and wireless network.

Self Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on the above syllabus with minimum 8 experiments to be incorporated.

References:

1. Rusen, Network your computers and devices, step by step, PHI learning.
2. Kenneth D. Stewart III, Aubrey Adams, Designing and supporting computer Networks CCNA Discovery Learning Guide, Pearson Education.
3. Barrie Sosinsky, Networking Bible, John Wiley & Sons.
4. Thomas A. Limoncelli, Christina J. Hogan, Strata R. Chalup, The Practice of System and Network Administration, Addison Wesley.

3CA1546 Elective-III Optimization Techniques [3 1 0 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand importance of optimization of industrial process management
- apply basic concepts of mathematics to formulate an optimization problem
- analyse and appreciate variety of performance measures for various optimization problems

Syllabus:

Introduction to Operation Research: Operation Research approach, scientific methods, introduction to models and modeling techniques, general methods for Operation Research models, methodology and advantages of Operation Research, history of Operation Research.

Linear Programming (LP): Introduction to LP and formulation of Linear Programming problems, Graphical solution method, alternative or multiple optimal solutions, Unbounded solutions, Infeasible solutions, Maximization – Simplex Algorithm, Minimization – Simplex Algorithm using Big-M method, Two phase method, Duality in linear programming, Integer linear programming.

Transportation & Assignment Problems: Introduction to Transportation problems, various methods of Transportation problem, Variations in Transportation problem, introduction to Assignment problems, variations in Assignment problems.

Network Analysis: Network definition and Network diagram, probability in PERT analysis, project time cost trade off, introduction to resource smoothing and allocation.

Sequencing: Introduction, processing N jobs through two machines, processing N jobs through three machines, processing N jobs through m machines.

Inventory Model: Introduction to inventory control, deterministic inventory model, EOQ model with quantity discount.

Queuing Models: Concepts relating to queuing systems, basic elements of queuing model, role of Poison & exponential distribution, concepts of birth and death process.

Replacement & Maintenance Models: Replacement of items, subject to deterioration of items subject to random failure group vs. individual replacement policies.

Simulation: Introduction & steps of simulation method, distribution functions and random number generation.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Tutorial Work:

Tutorials will be based on the topics covered in the syllabus. Minimum 8 tutorials should be covered.

References:

1. J K Sharma, Operations Research Theory and Applications, MacMillan India Ltd.
2. N D Vohra, Quantitative Techniques in management, Tata McGraw Hill.
3. Handy A Taha, Operations Research – An Introduction, Prentice Hall of India, New Delhi.
4. Wagner H M, Principles of Operations Research: With Applications to Management Decisions, Prentice-Hall of India, New Delhi.
5. Hillier F S and Lieberman G J, Operations Research, Holden Day Inc., San Francisco.
6. Payne T A, Quantitative Techniques for Management: A Practical Approach, Reston Publishing Co. Inc., Virginia.

7. Wilkes F M, Baum P and Smith G D, Management Science: An introduction, John Wiley and Sons, Santa Barbara.

3CA1552 Software Engineering [3 1 0 4]

Course Learning Outcome:

After successful completion of course, student will be able to

- analyze and model requirements for the purpose of designing and implementing software systems by using relevant standards, tools and methodologies
- apply key aspects of software engineering processes for the development of a sophisticated software system
- manage a project including planning, scheduling and risk management for developing qualitative software
- effectively work in various roles within a project team

Syllabus:

Introduction: Definitions, Characteristics of Software, Brook's-No silver bullet, Software Engineering vs other engineering disciplines, Software Myths, Software Life Cycle Models, Types of Software Process models, Agility, Agile process model, Cockburn scale

Requirements Engineering: Inception, Elicitation, Elaboration, Software Requirement Specification, Building analysis model, Requirements validation, VORD (Viewpoint Oriented Requirements Description) Model.

Project Management: Introduction to Project Management; Project Planning, Project Scheduling and Tracking, Software Metrics and measurement, software Risk, Risk Identification, Risk Projection, RMM.

Software Design: Software design, Abstraction, Modularity, Software architecture, Effective modular design, Cohesion and Coupling, Architectural design and procedural design, Data flow oriented design

User Interface Design: User Interface design, Human factors, Human computer interaction, Human, Computer interface design, Interface design, Interface standards. Programming languages and coding, Language classes, Code documentation, Code efficiency, Software configuration management.

Testing Techniques: Software validation and verification, Formal methods, Software testing, Agile and Non Agile testing, Path testing, Control structures testing, Black Box , White Box testing, Unit, Integration, System testing, Software Maintenance.

Trends In Software Engineering: Reverse Engineering and Re-engineering, wrappers, CASE tools, Overview of Object Oriented Software Engineering, and Design Patterns.

Configuration Management: Introduction to Configuration management, versioning of software, Change Control, Software release, SCM standards, SCM Audit., Change & Version Management

Software Quality Management: Introduction to Quality Models-ISO,CMM, SQA,S/W Reviews, statistical Quality Assurance, Software Maintenance and Software Reuse.

Self Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Tutorial Work:

Tutorials will be based on the topics covered in the syllabus. Minimum 6 tutorials should be carried out.

References:

1. Roger S. Pressmen, Software Engineering, McGraw Hill International.
2. Rajib Mall, Fundamentals of Software Engineering, PHI learning.
3. Ian Sommerville, Software Engineering, Addison Wesley.
4. Ivar Jacobson, Object Oriented Software Engineering A use case Approach, Pearson Education.

5. Shari Lawrence Pfleeger and Atlee, Software Engineering: Theory and Practice, Pearson
6. Pankaj Jalote, An Integrated Approach to Software Engineering, Springer**.**
7. Pankaj Jalote, Software Engineering: A Precise Approach, Wiley India Private Limited.

3CA1536 Elective-III Software Project Management [3 1 0 4]

Course Learning Outcome:

After successful completion of this course, student will be able to

- understand the basic concepts and issues of software project management
- create effective plan for real world software project and implement the project plans with available resources
- select and employ mechanisms for tracking the software projects
- identify and conduct activities necessary to successfully complete and close the software projects

Syllabus:

Introduction to Software Project Management: Introduction to Project and Project Management, Reasons for IT project failure, Triple constraint of IT project management, Management spectrum of project, Overview of project life cycle models, Project manager skills and job description conceptualization and initiation of IT project, Business case.

Project Charter : Introduction, Project management process and their correlation with project life cycle phases, Introduction to Project Integration management and seven processes, Project Charter.

Project Scope Management: Introduction, Processes of scope management.

Project Human Resource Management: Introduction, Organizational structure – Function, Project and Matrix, Keys to managing people motivation theories and improving effectiveness, Project team selection.

Project Time and Cost Management : Introduction, Development of project schedule, CPM and PERT, Activities their sequencing and dependencies, Project network diagrams, Development of Gantt Charts, Earned Value Management, Introduction to Constructive Cost Model (COCOMO).

Project Risk Management : Introduction, Risk Management Process, Risk Identification for IT projects, Qualitative and Quantitative approaches to Risk Analysis, Risk Strategies, Risk Monitoring and Control, Risk Response and Evaluation Project Quality Management.

Project Communication Management: Introduction, Project Communication Plan, Project metrics, Information distribution, Performance Reporting.

Project Change Management: Introduction, Impact of change, Change as a process, Change Management plan, Dealing with resistance and conflict, Configuration management.

Project Procurement Management: Introduction, Processes Planning Purchases and Acquisition, Contracting, Request Seller Responses, Select Sellers, Contract Administration, Contract Closure, Outsourcing of products and services.

Project Leadership and Ethics: Introduction, Project Leadership, Modern approaches, Styles of leadership, Ethical leadership, Making sound ethical decisions in the situations of conflict.

Closure of a Project: Introduction, Project implementation, Administrative closure, Project Evaluation.

Self Study:

The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

Tutorial Work:

Tutorials will be based on the topics covered in the syllabus. Minimum 8 tutorials should be covered.

Reference :

1. Jack T Marchewka, Information Technology Project Management, (International Student Version), Wiley India.
2. Kathy Schwalbe, Project Management in IT, India Edition, Cengage Learning.
3. Bob Hughes, Mike Cotterell, Rajib Mall, Software Project Management, Mc GrawHill.
4. Pankaj Jalote, Software Project Management in Practice, Pearson, Education Asia.

5. Samuel J mantel et.el, Project Management Core Textbook, Wiley India.
6. Roger S. Pressman, Software Engineering: A practical Approach, Mc Graw Hill.
7. Ian Sommerville, Software Engineering, Addison Wesley.

3CA1651 **Major Project** **[0 0 0 13]**

Course Learning Outcome:

After successful completion of this course, student will be able to

- use various tools and techniques to study existing systems
- critically analyze existing systems, thereby select and justify parameters to be improved
- start and manipulate proposed computer science solution as per industry / research / societal need
- achieve precision in uses of the tools related to their projects
- reorganize and refine various components of technology to optimize the resources at large
- appraise the potential of technology for scalability and wide spectrum of applications
- report project related activities effectively to peers, mentors and society
- follow and value ethical practices during project

Syllabus:

Major project may be carried out in one or more form of following:
product preparations, working/non-working models, prototype development, fabrication of set-ups, laboratory experiment development, process modification/development, simulation, software development, integration of software and hardware, statistical data analysis, survey, creating awareness in society.

The student is required to submit a report based on the work. The evaluation of the project shall be on continuous basis.

Guidelines:

The project development should involve all the phases of Software Engineering thus providing student with experience of analyzing, designing, implementing and evaluating information systems. The scope of the project comprises the academic/laboratory/applications/research and contents should be commensurate with a meaningful and effective engagement for a full semester project of the VI semester. The subject area of the project can be related to the current or future state of Computer Science.
Major component of the project should include identification of the system, deciding the aims and objectives to be achieved, modules to be studied. It also includes analysis, designing, innovations / research and final evaluation in terms of results achieved. The report should follow the style of PG dissertation report. The institution should device the detailed scheme of periodical evaluation of the project and its progress.