DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD
DEPARTMENT OF COMPUTER SCIENCE AND
INFORMATION TECHNOLOGY

SCHEME FOR CHOICE BASED CREDIT SYSTEM (CBCS)

W.E.F. JUNE, 2011 (ACADEMIC YEAR, 2011 to 2012 Onwards)

The CBCS System

Department of Computer Science and Information Technology adopted a credit-based system under the Academic Flexibility Program of the University from the academic year 2011-12.

It is a flexible, cafeteria-type learning system with an inbuilt horizontal mobility for students to all desire units of education in the Department/Departments with provision for even inter Departmental mobility for students. CBCS operates on modular pattern based on module/units called "credits", wherein 'credit' defines the quantum of contents/syllabus prepared for a course/paper and determines the minimum number of teaching-learning hours required.

CBCS permits students to: I) Learn at their own pace, II) Choose electives from a wide range of elective courses offered by the department, III) Undergo additional/value added courses and acquire more than the required number of credits, depending upon the learner aptitude, IV) Adopt an interdisciplinary approach in learning, V) Make best use of the expertise of faculty across the Department, beside the particular department faculty and VI) Acquire knowledge, skill and attitude of learning outcomes through participatory teaching and learning and continuous evaluation process.

This provides the flexibility to make the system more responsive to the changing needs of our students, the professionals and society. The credit-based system also facilitates the transfer of credits.

Courses offered by the Department
1. M. Sc. Computer Science
2. M. Sc. Information Technology
3. M. Phil. Computer Science

Admission/ Promotion:
1. **M. Sc. Computer Science**
   Duration: (Four Semesters means Two Academic Years)
   Intake: 32
Eligibility: i) B.Sc. Computer Science **OR** B.Sc. IT **OR** B. Sc. Computer Application **OR** B.E/B. Tech. in Computer Science and Engineering/IT.**OR ii)**. Any Science Graduate with at least one Optional Subject as Computer Science.
Objective: The overall objective of this course is to cater the need of computational field. The content of this course is according to the current trends of research in Computer Science field. Some of the objectives of this course are to develop analytical, presentation, strategy formulation and personality development skills among the students, through which the students get prepared and trend for building their carrier in computer science and its related applied technology, research and development.

M. Sc. Computer Science per Semester

Sr. No	Head	Fees
1	Tuition	3,500/-
2	Registration	50/-
3	Admission	200/-
4	Library	100/-

5	Laboratory	1,250/-
6	Medical Exam	100/-
7	MKCL	50/-
8	Avishkar, Indradhanushya and Other Students Activities	200/-
	Total	**5,450/-***

Note: In second and fourth semesters students should pay only Tuition and Laboratory Fess.

* Fees likely to be modified as per the university rule and regulation from time to time and will be applicable to the concern students

2. **M. Sc. Information Technology**
   Duration :(Four Semesters means Two Academic Years)
   Intake: 32

Eligibility: i) Any Science Graduate with at least one optional subject as Computer Science/ Information Technology/ Mathematics/ Electronics/ Physics OR ii) Any Science graduate having Mathematics as one of the subject in XII Standard OR iii) B.E./ B. Tech.

Objective: The objective of this course is to fulfill the current needs of IT Industries and academic developments in the relevant field. Most of the objectives of this course are to develop analytical, presentation, strategy formulation and personality development skills among the students, through which the students get trend for a carrier in IT industry.

M. Sc. Information Technology per Semester

Sr. No	Head	Fees
1	Tuition	20,000
2	Registration	50/-
3	Admission	200/-
4	Library	5,000/-
5	Laboratory	5,850/-
6	Medical Exam	100/-
7	MKCL	50/-
8	Avishkar, Indradhanushya and Other Students Activities	131/-
	Total	**31,231**

Note: In second and fourth semesters students should pay only Tuition and Laboratory Fess.

* Fees likely to be modified as per the university rule and regulation from time to time and will be applicable to the concern students

Admission to the M. Sc. Computer Science and M. Sc. Information Technology course in the department will be done on the performance of CET score and on their performance in the qualifying graduate level examination.

The student will apply on the application form of the University provided with the prospectus/e-prospectus. Once the student is admitted to the concern department/ course, he/she will be promoted to next semester with full carryon; subject to the registration of student in every consecutive semester. Dropout student will be allowed to register for respective semester as and when the concerned courses are offered by the department, subject to the condition that his/her tenure should not exceed more than twice the duration of course from the date of first registration at parent department. The admission of concern student will be automatically get cancelled if he/she fails to complete the course in maximum period (Four years/Eight semesters).

Credits and Degrees
i) A candidate who has successfully completed all the core courses, Elective/ Specialized courses and, seminars and project prescribed and or optional service courses approved by the University for the programwith prescribed CGPA shall be eligibleto receive the degree.

ii) One Credit shall mean one teaching period of one hour per week for one semester (of 15 weeks) for theory courses and two practical/laboratory/field/demonstration hours/ week for one semester.

iii) Every student will have to complete at least 100 credits to obtain the master's degree of M. Sc. Computer Science/ M. Sc. Information Technology (Post graduate degree) out of which 96 credits should be from this Department and four or eight credits of service courses from this or other Department. However the Department can design the curriculum of more credits and it will be compulsory for the students of this Department to complete the credits accordingly.

Courses
(i) Core Course: - A core course is a course that a student admitted to M. Sc. Computer Science/ M. Sc. Information Technology program must successfully completes to receive the degree. Normally no theory course shall have more than 4 credits.

(ii) Elective Course: Means a optional course from the basic subject or specialization.

(iii) Service course (SC): The service courses will be offered in third and fourth semesters in the department. Student should complete one service course in each semester.

(iv) Each Course shall include lectures / tutorials / laboratory or field work / Seminar / Practical training / Assignments / midterm and term end examinations/ paper / Report writing or review of literature and any other innovative practice etc., to meet effective teaching and learning needs.

(v) Attendance: - Students must have 75% of attendance in each Core and Elective course for appearing the examination. However student having 65% attendance with medical certificate may apply to the H.O.D. for commendation of attendance.

Registration for Service Course:-
i) The student will register the service course of his interest after the start of semester in the concerned department on official registration form. The teacher in-charge of the respective course will keep the record of the students registered. Maximum fifteen days period will be given from the date of admission for completion of registration procedure. The Departmental

Committee shall follow a selection procedure after counseling to the students etc. to avoid overcrowding to particular course(s) at the expense of some other courses.

ii) No student shall be permitted to register for more than one service course in a semester.

iii) The University department shall decide the maximum number of students in each service course taking into account the teachers and Physical facilities available in the Department.

iv) The University may make available to all students a listing of all the courses offered in every semester specifying the credits, the prerequisites, a brief description or list of topics the course intends to cover, the instructor who is giving the courses, the time and place of the classes for the course. This information shall be made available on the University website.

v) Normally no service course shall be offered unless a minimum of 10 Students are registered.

vi) The student shall have to pay the prescribed fee per course per semester/year for the registration as decided by the University.

Departmental Committee:-
Every P.G. program of the University/College shall be monitored by a committee constituted for this purpose by the Department. The Committee shall consist of H.O.D. as a Chairman and some/all the teachers of the Department. as its members .

Results Grievances Redressal Committee:-
The University shall form a Grievance Redressal Committee for each course in each department with the Course Teacher and the HOD. This Committee shall solve all grievances relating to the Assessment of the students.

Grade Awards:-
(i) A ten point rating scale shall be used for the evaluation of the performance of the student to provide letter grade for each course and overall grade for the Master's Program. Grade points are based on the total number of marks obtained by him/her in all the heads of examination of the course. These grade points and their equivalent range of marks are shown separately in Table-I.

Table I: Ten point grades and grade description

Sr. No.	Equivalent percentage	Grade points	Grade	Grade description
1.	90.00-100	9.00-10	O	Outstanding
2.	80.00-89.99	8.00-8.99	A^{++}	Excellent
3.	70.00-79.99	7.00-7.99	A$^+$	Exceptional
4.	60.00-69.99	6.00-6.99	A	Very good
5.	55.00-59.99	5.50-5.99	B$^+$	Good
6.	50.00-54.99	5.00-5.49	B	Fair
7.	45.00-49.99	4.50-4.99	C+	Average
8.	40.01-44.99	4.01-4.49	C	Below average
9.	40	4.00	D	Pass
10.	< 40	0.00	F	Fail

ii.) Non appearance in any examination/ assessment shall be treated as the students have secured zero mark in that subject examination/assessment.

iii.) Minimum D grade (4.00 grade points) shall be the limit to clear /pass the course/subject. A student with F grade will be considered as 'failed' in the concerned course and he/she has to clear the course by

reappearing in the next successive semester examinations. There will be no revaluation or recounting under this system.

iv.) Every student shall be awarded Grade points out of maximum 10 points in each subject (based on 10 Point Scale). Based on the Grade points obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) shall be computed. Results will be announced at the end of each semester and cumulative Grade card with CGPA will be given on completion of the course.

Computation of SGPA (Semester grade point average) &CGPA (Cumulative grade point average)

The computation of SGPA &CGPA,will be as below:

a. Semester Grade Point Average (SGPA) is the weighted average of points obtained by a student in a semester and will be computed as follows:

$$SGPA = \frac{Sum(CourseCredit * Number of Points in concern course gained by the student)}{Sum(CourseCredit)}$$

OR

$$SGPA = \sum_i C_i G_i / \sum_i C_i$$

Where, C_i=credit for i^{th} course; G_i=grade point secured by the student.

$\sum$ is overall the courses credited by the student in the semester.

The Semester Grade Point Average (SGPA) for all the four semesters willbe mentioned at the end of every semester.

b. The Cumulative Grade Point Average (CGPA) will be used to describe the overall performance of a student in all semesters of the course and will be computed as under:

$$CGPA = \frac{Sum(All four semester SGPA)}{Total Number of Semesters}$$

OR

$$CGPA = \sum_k C_k G_k / \sum_k C_k$$

Where, C_k = credit for k^{th} course, G_k = grade point secured by the student.

$\sum$ is overall the courses credited by the student in all the completed semesters.

The SGPA and CGPA shall be rounded off to the second place of decimal.

Evaluation method:-

Each theory course will be of 100 Marks and be divided in to internal examination (Sessional) of 20 Marks and Semester end examination of 80 Marks. (20+80 = 100 Marks). Each Practical course will be of 50 marks. Research project if any, will be of 100 marks.

a. Internal Evaluation Method
   There shall be two mid semester examinations, first based on 40 percent syllabus taught and second based on 60 percent syllabus taught. The setting of the question papers and the assessment will be done by the concerned teacher who has taught the syllabus. Average score obtained out of two mid semester examinations will be considered for the preparation of final sessional marks/grade.
b. Term end examination and evaluation

 i. Semester end examination time table will be declared by the departmental committee and accordingly the concern course teacher will have to set question paper, conduct theory examination, conduct practical examination with external expert, evaluate, satisfy the objection / query of the student (if any) and submit the result to DC.
 ii. The semester end examination theory question paper will have two parts (20+60 = 80 Marks)
 Part A will carry short question of 2-3 marks (fill in the blanks/ multiple choice questions/ match columns / state true or false / answer in one sentence) as <u>compulsory questions</u> and it should cover entire syllabus. (20 Marks)
 Part B will carry 7 questions out of which there shall be at least one question from each unit, student will have to answer any five questions out of 7
 iii. Semester end Practical examinations will be of 50 marks each and students will be examined by one external and one internal examiner. Seminar and Project work (if any) will be evaluated by the external examiners along with guide.
 iv. At the end of each semester the Committee of Department shall assign grade points and grades to the students.
 v. The Committee of Department shall prepare the copies of the result sheet in duplicate.
 vi. Every student shall have the right to scrutinize answer scripts of
       Mid semester/Term endsemester examinations and seek clarifications from the teacher regarding evaluation of the scripts immediately thereafter or within 3 days of receiving the evaluated scripts.
 vii. The Head of the department shall display the grade points and grades for the notice of students.
 viii. The head of the department shall send all records of evaluation for Safekeeping to the Controller of Examinations as soon as all the formalities are over.

Grade Card
The University shall issue at the beginning of each semester a grade card for the student, containing the grades obtained by the student in the previous semester and his Semester Grade Point Average (SGPA). The grade card shall list:
(a) The title of the courses along with code taken by the student
(b) The credits associated with the course,
(c) The grade and grade points secured by the student,
(d) The total credits earned by the student in that semester.
(e) The SGPA of the student,
(f) The total credits earned by the students till that semester and
(g) The CGPA of the student (At the end of the IVth Semester).

Cumulative Grade Card
   At the end of the IVth semester, the University shall issue Cumulative Grade Card to the Students showing details of Grades obtained by the student in each subject in all semesters along with CGPA and total credits earned.

M. Sc. Computer Science Course Structure:

Sem-I	Sem-II	Sem-III	Sem-IV
Advanced Java	Data Structure and Analysis of Algorithm	Java Network Programming	Pattern Recognition
Neural Network	Advanced Neural Network and Fuzzy System	Advanced Software Engineering and Technology	Major Project
Digital Signal Processing	Image Processing	Computer Vision	Seminar
Advanced Operating System	Parallel Computing	Elective - I: (Select any one from list of elective I) 1. Advanced Embedded System 2. Data Ware Housing 3. GIT 4. Biometric Techniques 5. Mobile Computing	Elective -II: (Select any one from list of elective II) 1. Theoretical Computer Science 2. Decision Support System & Intelligent System 3. Data Mining 4. Cryptography and Network Security 5. Introduction to MEMS Pro+

Semester-I

Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks:100	
				External	Internal
CSC401	Advanced Java	4	4	80	20
CSC402	Neural Network	4	4	80	20
CSC403	Digital Signal Processing	4	4	80	20
CSC404	Advanced Operating System	4	4	80	20
CSC451	Practical Based on CSC401	2	4 (Per Batch)	50	-
CSC452	Practical Based on CSC402	2	4 (Per Batch)	50	-
CSC453	Practical Based on CSC403	2	4 (Per Batch)	50	-
CSC454	Practical Based on CSC404	2	4 (Per Batch)	50	-
Total No of Credits in Sem-I		24	--	--	--

Semester-II

Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks:100	
				External	Internal
CSC405	Data Structure and Analysis of Algorithm	4	4	80	20
CSC406	Advanced Neural Network and Fuzzy System	4	4	80	20
CSC407	Image Processing	4	4	80	20
CSC408	Parallel Computing	4	4	80	20
CSC455	Practical Based on CSC405	2	4 (Per Batch)	50	-
CSC456	Practical Based on CSC406	2	4 (Per Batch)	50	-
CSC457	Practical Based on CSC407	2	4 (Per Batch)	50	-
CSC458	Practical Based on CSC408	2	4 (Per Batch)	50	-
Total No of Credits in Sem-II		24	--	--	--

Semester-III

Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks:100	
				External	Internal
CSC501	Java Network Programming	4	4	80	20
CSC502	Advanced Software Engineering and Technology	4	4	80	20
CSC503	Computer Vision	4	4	80	20
CSC504	Elective - I: (Select any one from list of elective I)	4	4	80	20
CSC551	Practical Based on CSC501	2	4 (Per Batch)	50	-
CSC552	Practical Based on CSC502	2	4 (Per Batch)	50	-
CSC553	Practical Based on CSC503	2	4 (Per Batch)	50	-
CSC554	Practical Based on CSC504	2	4 (Per Batch)	50	-
Total No of Credits in Sem-III		**24**	--	--	--

Semester-IV

Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks:100	
				External	Internal
CSC505	Pattern Recognition	4	4	80	20
CSC506	Elective -II: (Select any one from list of elective II)	4	4	80	20
CSC555	Practical Based on CSC505	2	4 (Per Batch)	50	-
CSC556	Practical Based on CSC506	2	4 (Per Batch)	50	-
CSC557	Major Project	8	16 (Per Batch)	50	-
CSC558	Seminar	4	8 (Per Batch)	50	-
Total No of Credits in Sem-IV		**24**	--	--	--

Total credits of the course =104 (24+24+24+24+8)

Elective I					
Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks:100	
				External	Internal
CSC421	Advanced Embedded System	4	4	80	20
CSC422	Practical Based on CSC421	2	4 (Per Batch)	50	-
CSC423	Data Ware Housing	4	4	80	20
CSC424	Practical Based on CSC423	2	4 (Per Batch)	50	-
CSC425	GIT	4	4	80	20
CSC426	Practical Based on CSC425	2	4 (Per Batch)	50	-
CSC427	Biometric Techniques	4	4	80	20
CSC428	Practical Based on CSC427	2	4 (Per Batch)	50	-
CSC429	Mobile Computing	4	4	80	20
CSC430	Practical based on CSC429	2	4 (Per Batch)	50	-

Elective II					
Course Code	**Course Title**	**No. of Credits**	**No. of Hours / Week**	**Total Marks: 100**	
				External	**Internal**
CSC431	Theoretical Computer Science	4	4	80	20
CSC432	Practical based on CSC431	2	4 (Per Batch)	50	-
CSC433	Decision Support System& Intelligent System	4	4	80	20
CSC434	Practical based on CSC433	2	4 (Per Batch)	50	-
CSC435	Data Mining	4	4	80	20
CSC436	Practical based on CSC435	2	4 (Per Batch)	50	-
CSC437	Cryptography and Network Security	4	4	80	20
CSC438	Practical based on CSC437	2	4 (Per Batch)	50	-
CSC439	Introduction to MEMS Pro+	4	4	80	20
CSC440	Practical based on CSC439	2	4 (Per Batch)	50	-

Service Courses:
The student should opt service course of 8 credits either from parent department or from other department.

Course Code	**Course Title**	**No. of Credits**	**No. of Hours / Week**	**Total Marks:100**	
				External	**Internal**
CSC441	Introduction to MATLAB	2	2	80	20
CSC442	Practical Based on CSC441	2	4 (Per Batch)	50	-
CSC443	Aptitude	2	2	80	20
CSC444	Practical Based on CSC443	2	4 (Per Batch)	50	-
CSC445	Personality Development	2	2	80	20
CSC446	Practical Based on CSC445	2	4 (Per Batch)	50	-
CSC447	Communication Skill	2	2	80	20
CSC448	Practical Based on CSC447	2	4 (Per Batch)	50	-
CSC449	Programming in VB.NET	2	2	80	20
CSC450	Practical Based on CSC449	2	4 (Per Batch)	50	-

Subject Reference No No of Credits	CSC401 4 Theory, 2Practical	Subject Title Assignment/ Sectionals (Internal)	Advanced Java 20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective
This course assumes that students are aware of core java programming and hence it starts from threading and goes up to web programming. It covers some advance topics of reflection, applets, swings, JDBC, Networking, JSP and Servlet.

At Course Completion
After complication of this course students can write good application based on java. Students can appear for java certification examinations. Student can also work on networking and web projects.

Prerequisites
Student should know the programming in core java.

UNIT I:
Threading: Threading Basics: Java Thread Model, Creating and Running Threads, Manipulating Thread State, Thread Synchronization, Volatile Fields vs. Synchronized Methods, wait and notify, join and sleep, The Concurrency API, Atomic Operations **Reflection:** Uses for Meta-Data, The Reflection API, The Class<T> Class, The java.lang.reflect Package, Reading Type Information, Navigating Inheritance Trees, Dynamic Instantiation, Dynamic Invocation, Reflecting on Generics

UNIT II:
Java Database Connectivity: JDBC, JDBC Architecture (type 1, type 2, Type 3, type 4) the java.sql.* package, Connection, ResultSet, Statements

UNIT III:
Servlets: Web Application Basics: How the Web works, Thin Clients, TCP/IP, HTTP overview, Brief HTML review, Overview of Java EE, servlets & Web applications., Servlet Basics, Servlet API:-HTML Forms, HTTP: Request-response, headers, GET, POST, Overview: How Servlets Work, Servlet Lifecycle: init(), service(), destroy(), Requests and responses, Core Servlet API: GenericServlet, ServletRequest, and ServletResponse, HTTP Servlets: HttpServletRequest, HttpServletResponse and HttpServlet, Accessing Parameters, Additional Servlet Capabilities, HTTP headers and MIME types RequestDispatcher: Including and forwarding, Sharing data with the request object attributes, Sharing data with ServletContext attributes, Error Handling

UNIT IV:
Java Server Pages: Basics and Overview, JSP architecture, JSP tags and JSP expressions, Fixed Template Data, Lifecycle of a JSP, Model View Controller (MVC), Model 1/Model 2 Architecture, Data Sharing among servlets & JSP: Object scopes or "buckets", Request, application, session and page scope, Predefined JSP implicit objects (request, session, application, page), <jsp:useBean>, <jsp:getProperty>, <jsp:setProperty>, <jsp:include>, <jsp:forward>, More JSP Capabilities and Session Management, HTTP as a stateless protocol, Hidden form fields, Cookies: Overview, API, Using cookies, Session overview: Cookies and session tracking, HttpSession, Putting data into a session object, Retrieving data from a session object, Using session data in servlets and JSPs Additional JSP Capabilities, Exception handling and error pages, Directives (page, include, others), Import declarations, Multithreading considerations

and data safety, SingleThreadModel interface, Additional JSP Capabilities, JSP Directives, JSP Error Pages, JSP and Java Declarations, Scriptlet overview, Scriptlet syntax

UNIT V:
JSTL: Using Custom Tags, Custom tags overview, Reducing JSP complexity, Tag Libraries, Tag Library Descriptor (TLD), Loading a tag library in a web app, The JSTL, JSP Expression Language (EL), Using custom tags, The c:url, c:param, c:forEach, c:out tags, Overview of JSTL libraries, The JSTL Expression Language, Expressions, Type Coercion, Operators, String concatenation, Implicit Objects, The Core JSTL Library, General Purpose: c:out, c:set, c:catch, Conditional: c:if, c:choose,, Overview of other capabilities, Additional Topics : Servlet Filter overview, Filtering examples, lifecycle, & filter chains, Filter API, Modifying a request, Modifying a response, Struts Overview Advanced MVC – Struts overview, Command and State patterns, Struts View and Controller elements

Books
1. Java 2 Complete Reference by Herbert Schieldt (Sixth Edition)
2. Core Java Vol 1: Sun Press
3. Core Java Vol 2: Sun Press

Additional Web Reference
http://www.javapassion.com/javaintro/
Presentation Slides (Available in .ppt format)

E-book:
1. Java 2 Complete Reference by Herbert Schieldt (Fourth Edition)

Lab Exercise: CSC451 Practical based on CSC401
At least two experiments should be carried out on each unit.

Subject Reference no	CSC402	Subject Title	Neural Network
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To study learning and modeling of the algorithms of Neural Networks.

Prerequisite: Basic knowledge of linear algebra, calculus and logic.

UNIT I:
INTRODUCTION: Feedforward Neural Networks: Artificial Neurons, **Neural Networks and Architectures:** Neuron Abstraction, Neuron Signal Functions, Mathematical Preliminaries, Neural Networks Defined, Architectures: Feed forward and Feedback, Salient Properties and Application Domains of Neural Network **Geometry of Binary Threshold Neurons and Their Network:**Patterns Recognition and Data Classification, Convex Sets, Convex Hulls and Linear Separability, Space of Boolean Functions, Binary Neurons are pattern Dichotomizes, Non-linearly separable Problems, Capacity of a simple Threshold Logic Neuron, Revisiting the XOR Problem, Multilayer Networks.

UNIT II:
SUPERVISED LEARNING: Supervised Learning I: Perceptrons and LMS: Learning and Memory, From Synapses to Behaviour: The Case of Aplysia, Learning Algorithms, Error Correction and Gradient Descent Rules, The Learning Objective for TLNs, Pattern space and Weight Space, Perceptron Learning Algorithm, Perceptron Convergence Theorem, Perceptron learning and Non-separable Sets, Handling Linearly Non-Separable sets, α-Least Mean Square Learning, MSE Error Surface and its Geometry, Steepest Descent Search with Exact Gradient Information, μ-LMS: Approximate Gradient Descent, Application of LMS to Noise Cancellation,

UNIT III:
Supervised Learning II: Backpropagation and Beyond: Multilayered Network Architectures, Backpropagation Learning Algorithm, Structure Growing Algorithms, Fast Relatives of Backpropagation, Universal Function Approximation and Neural Networks, Applications of Feedforward Neural Networks, Reinforcement Learning

UNIT IV:
Neural Networks: A Statistical Pattern Recognition Perspective: Introduction, Bayes Theorem, Classification Decisions With Bayes Theorem, Probabilistic Interpretation Of A Neuron Discriminant Function, Interpreting Neuron Signals As Probabilities, Multilayered Networks, Error Functions And Posterior Probabilities, Error Functions For Classification Problems

UNIT V:
Generalization: Support Vector Machines and Radial Basis Function Networks: Learning from Examples and Generalization, Statistical Learning Theory Briefer, Support Vector Machines, Radial Basis Function Networks, Regularization Theory Route to RRBFNs, Generalized Radial Basis Function Network, Learning In RRBFNs, Image Classification Application, Other Models for Valid Generalization

BOOKS:
1. Neural Network- A Classroom Approach, Satish Kumar, Tata McGraw Hill
2. Introduction to neural networks using MATLAB 6.0 by Sivanandam, S Sumathi, S N Deepa, TATA McGraw HILL

REFERENCES:
1. Neural networks A comprehensive foundations, Simon Hhaykin, Pearson Education 2nd edition 2004
2. Artificial neural networks - B.Yegnanarayana, Prentice Hall of India P Ltd 2005.
3. Neural networks in Computer intelligence, Li Min Fu, TMH 2003.
4. Neural networks James A Freeman David M S kapura, Pearson education 2004.
5. C++ Neural Network and Fuzzy Logic 2nd Edition, Valluru B. Rao,Hayagriva V. Rao, Henry Holt and Co.
6. Neural Networks and Fuzzy Systems: A Dynamical Systems Approach to Machine Intelligence, Bart Kosko

Lab Exercise: CSC452 Practical based on CSC402
At least two experiments should be carried out on each unit.

Subject Reference no	CSC403	Subject Title	Digital Signal Processing
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective
To study the fundamental aspects, representation and analysis of digital signal and it's processing.
Prerequisite: Basics of signal theory, linear algebra, calculus and logic.

UNIT- I:
Multirate Signal Processing: Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rateconversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design &Implementation for sampling rate conversion, Applications of Multirate Signal Processing.
Review of DFT, FFT, IIR Filters, FIR Filters,

UNIT- II:
Non-Parametric methods of Power Spectral Estimation: Estimation of spectra from finite durationobservation of signals, Non-parametric Methods: Bartlett, Welch & Blackman & Tukey methods, Comparison of all Non-Parametric methods

UNIT -III:
Parametric Methods of Power Spectrum Estimation: Autocorrelation & Its Properties, Relation between autocorrelation & model parameters, AR Models - Yule-Waker& Burg Methods, MA & ARMA models for powerspectrum estimation.

UNIT –IV:
Linear Prediction : Forward and Backward Linear Prediction – Forward Linear Prediction, Backward LinearPrediction, Optimum reflection coefficients for the Lattice Forward and Backward Predictors. Solution of theNormal Equations: Levinson Durbin Algorithm, Schur Algorithm. Properties of Linear Prediction Filters

UNIT V:
Finite Word Length Effects: Analysis of finite word length effects in Fixed-point DSP systems – Fixed,Floating Point Arithmetic – ADC quantization noise & signal quality – Finite word length effect in IIR digitalFilters – Finite word-length effects in FFT algorithms.

TEXT BOOKS:
1. Digital Signal Processing: Principles, Algorithms & Applications - J.G.Proakis&D.G.Manolokis, 4th ed.,PHI.
2. Discrete Time signal processing - Alan V Oppenheim & Ronald W Schaffer, PHI.
3. DSP – A Pratical Approach – Emmanuel C.Ifeacher, Barrie. W. Jervis, 2 ed., Pearson Education.

Lab Exercise: CSC453 Practical based on CSC403
At least two experiments should carried out on each unit.

Subject Reference no	CSC404	Subject Title	Advanced Operating System
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course objective: This course explores the learners about operating system and their components. This covers the fundamental functionality of Operating system like memory management, process management, I/O management, storage management. Make them ready to analyze the real perspective of operating system in network, distributed, parallel and multi core environment.

Prerequisite: Computer system Architecture, basics of disk operating system.

UNIT I:
Overview: Introduction, history of operating system, **Memory Management:** Processes in memory, Logical addresses, Partitions: static *versus* dynamic, free space management, external fragmentation, Segmented memory, Paged memory: concepts, internal fragmentation, page tables, Demand paging/segmentation, Replacement strategies: FIFO, LRU (and approximations), NRU, LFU/MFU, MRU,

UNIT II:
Cache Management: Allocation and de-allocation techniques, coherence technique, **Processes and Scheduling:** Job/process concepts, Scheduling basics: CPU-I/O interleaving, (non-)preemption, context switching, Scheduling algorithms: FCFS, SJF, SRTF, priority scheduling, round robin, Combined schemes Process details like creation PCB, process view, Thread and interprocess Communication, **Lower Process Management:** Process Synchronization, Deadlocks, Live locks,

UNIT III:
I/O Subsystem: General structure, Polled mode *versus* interrupt-driven I/O, Application I/O interface: block and character devices, buffering, blocking *versus* non-blocking I/O, Other issues: caching, scheduling, spooling, performance, File-system Interface, File System Implementation, Mass Storage Structure, File concept, Directory and storage services, File names and meta-data, Directory name-space: hierarchies, DAGs, hard and soft links, File operations, Access control, Existence and concurrency control,

UNIT IV:
Protection and Security: Requirements, Subjects and objects, Design principles, Authentication schemes, Access matrix: ACLs and capabilities, Combined scheme, Covert channels, **Distributed System:** Distributed system Structures, Distributed File Systems, Distributed coordinated,

UNIT V:
Case Studies:
- The Linux System
Windows XP

Book:
1. Abraham Silberscatz, Peter Baer Galvin and Greg Gagne, " Operating System Concepts ", 7th Ed John Wiley and Sons, Inc 2005.
2. William Stallings, "Operating Systems: Internals and design Principles", 5th Ed Prentice –hall, 2005.
3. Andrew Tanenbaum, "Modern operating systems" 3rd Ed, Pearson Education.

Lab Exercise: CSC454 Practical based on CSC404
At least two experiments should carried out on each unit.

Subject Reference No	CSC405	Subject Title	Data Structure and Analysis of Algorithm
No of Credits	4 Theory, 2Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: This course provides an introduction to mathematical modeling of computational problems. It covers the common algorithms, algorithmic paradigms, and data structures used to solve these problems. The course emphasizes the relationship between algorithms and programming, and introduces basic performance measures and analysis techniques for these problems.

Prerequisite: Programming language concepts, discrete mathematical structure.

UNIT I:
Overview: Introduction to Algorithm, Analysis of algorithm, Designing of algorithm, the Correctness of Algorithms and the Complexity of Algorithms

UNIT II:
Linear Data Structures: Stack, Queue, Array, Linked list, Priority Queue, Deque, Doubly linked list, circular linked list **Searching and sorting Techniques**
Test1: Part 1, 2 and 3

UNIT III:
Graphs: Introduction to Graph Theory, Graph isomorphism, Graph data structures: Adjacency lists,Adjacency matrices Elementary graph Algorithms: BFS, DFS, Topological sort, strongly connected components **Trees:** Introduction to Trees, Tree traversals (preorder, inorder and postorder), Binary trees, **Balanced trees**: Avl etc., B and B+ tree Application of trees, Minimum Spanning Trees, Single source shortest path, All pair shortest path.
Test1: Part 4 and 5

UNIT IV:
Strings: The string abstract data type, Brute force string pattern matching, regular expression pattern matching, finite automata **Hashing :** Hash function, collision resolution, Heap

UNIT V:

Dynamic programming and greedy algorithms NP vs P: The spaces P and NP, polynomial reduction, NP complete problem **Final Exam: Total syllabus**

Book:
1) "Introduction to Algorithms", Thomas Cormen.
2) "Data structures and Algorithms", Alfred V.Aho,
3) "Fundamentals of Data Structures in c++", Ellis Horowitz.
Lab Exercise: CSC455 Practical based on CSC405
At least two experiments should carried out on each unit.

Subject Reference no	CSC406	Subject Title	Advanced Neural Network and Fuzzy System
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: Modeling and deployment of the applications through Neural Networks, Fuzzy and Genetic algorithms.

Prerequisite:
UNIT I:
Dynamic Systems Review: States, State Vectors and Dynamics, State Equations, Attractors And Stability, Linear Dynamical Systems, Non-Linear Dynamical Systems, Lyapunov Stability, Neurodynamical Systems, The Cohen-Grossberg Theorem

UNIT II:
Attractor Neural Networks: Introduction, Associative Learning, Attractor Neural Network Associative Memory, Linear Associative Memory, Hopfield Network, Content Addressable Memory, Two Handworked Examples, Example of Recall of Memories in Continuous Time, Spurious Attractors, Error Correction with Bipolar Encoding, Error Performance of Hopfield Networks, Applications of Hopfield Networks, Brain-State-in-a-Box Neural Network, Simulated Annealing, Boltzmann Machine, Bidirectional Associative Memory, Handworked Example, BAM Stability Analysis, Error Correction in BAMs, Memory Annihilation of Structured Maps in BAMs, Continuous BAMs, Adaptive BAMs, Application: Pattern Association,

UNIT III:
Adaptive Resonance Theory: Noise-Saturation Dilemma, Solving the Noise-Saturation Dilemma, Recurrent On-Center-Off-Surround Netowrks, Building Blocks of Adaptive Resonance, Substrate of Resonance, Structural Details of the Resonance Model, Adaptive Resonance Theory I (ART I), Handworked Example, MATLAB Code Description, A Breezy Review of ART Operating Principles, Neurophysiological Evidence for ART Mechanisms, Applications

UNIT IV:
Self-Organizing Feature Map: Self Organization, Maximal Eigenvector Filtering, Extracting Principal Components: Sanger's Rule, Generalized Learning Laws, Competitive Learning Revisited, Vector Quantization, Mexican Hat Networks, Self Organizing Feature Maps, Applications of the Self Organizing Map

UNIT V:
Pulsed Neuron Models; The New Generation: Introduction, Spiking Neuron Model, Integrate-and-Fire Neurons, Conductance Based Models, Computing with Spiking Neurons, Reflections, **Fuzzy Sets, Fuzzy Systems and Application:** Need for Numeric and Linguistic Processing, Fuzzy Uncertainty and the Linguistic Variable, Fuzzy Set, Membership Functions, Geometry of Fuzzy Sets, Simple Operations on Fuzzy Sets, Fuzzy Rules for Approximate Reasoning, Rule Composition and Deffuzification, Fuzzy Engineering
Neural Networks and the Soft Computing Paradigm: Soft Computing= Neural + Fuzzy + Evolutionary, Neural Networks: A Summary, Genetic Algorithms, Neural Networks and Fuzzy Logic, Neuro-Fuzzy-Genetic Integration

BOOKS:
1. Neural Network- A Classroom Approach, Satish Kumar, Tata McGraw Hill
2. Introduction to neural networks using MATLAB 6.0 by Sivanandam, S Sumathi, S N Deepa, TATA McGraw HILL

REFERENCES:
1. Neural networks A comprehensive foundations, Simon Hhaykin, Pearson Education 2nd edition 2004
2. Artificial neural networks - B.Yegnanarayana, Prentice Hall of India P Ltd 2005.
3. Neural networks in Computer intelligence, Li Min Fu, TMH 2003.
4. Neural networks James A Freeman David M S kapura, Pearson education 2004.
5. C++ Neural Network and Fuzzy Logic 2nd Edition, Valluru B. Rao,Hayagriva V. Rao, Henry Holt and Co.
6. Neural Networks and Fuzzy Systems: A Dynamical Systems Approach to Machine Intelligence, Bart Kosko,

Lab Exercise: CSC456 Practical based on CSC406
At least two experiments should carried out on each unit.

Subject Reference no	CSC407	Subject Title	Image Processing
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: The course begins with low level processing and works its way up to the beginnings of image interpretation. This approach is taken because image understanding originates from a common database of information. The learner will be required to apply their understating of the concepts involved through the process of building applications that manipulate bi-level and gray scale images through the use of suitable packages (e.g. MATLAB).

Prerequisite: To learn this course basic knowledge of Digital Signal Processing, Mathematics and Statistical Techniques is must.

Unit 1: Image Processing Fundamentals: Digital image, digital image processing, History of digital image processing, State of the art examples of digital image processing, Key stages in digital image processing, The human visual system, Light and the electromagnetic spectrum, Image representation, Image sensing and acquisition, Sampling, quantisation and resolution.

Unit 2: Image Enhancement (Histogram Processing, Point Processing and Spatial Filtering): image enhancement, Different kinds of image enhancement, Histogram processing, Point processing, Neighbourhood operations, Negative images, Thresholding, Logarithmic transformation, Power law transforms, Grey level slicing, Bit plane slicing, Neighbourhood operations, spatial filtering, Smoothing operations, What happens at the edges?, Correlation and convolution, Sharpening filters, 1st derivative filters, 2nd derivative filters, Combining filtering techniques.

Unit 3: Image Enhancement (Frequency Filtering): Jean Baptiste Joseph Fourier, The Fourier series & the Fourier transform, Image Processing in the frequency domain, Image smoothing, Image sharpening, Fast Fourier Transform

Unit 4: Image Restoration (Noise Removal): image restoration, Noise and images, Noise models, Noise removal using spatial domain filtering, Periodic noise, Noise removal using frequency domain filtering,

Unit 5: Segmentation, Morphology and color (Points, Lines, Edges & Thresholding): The segmentation problem, Finding points, lines and edges, thresholding, Simple thresholding, Adaptive thresholding, morphology, Simple morphological operations, Compound operations, Morphological algorithms, Colour fundamentals, Colour models.

Text Book
1. Digital Image Processing, 3/e, Rafael C. Gonzalez, Richard E. Woods. Pearson Education, ISBN: 9788131726952

Lab Exercise: CSC457 Practical based on CSC407
At least two experiments should be carried out on each unit.

Subject Reference no	CSC408	Subject Title	Parallel Computing
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective: the objective of this course is to make student aware of entirely new paradigm of parallel programming and computing.

Prerequisite: Programming Language Concepts, Threading and Concepts of Operating Systems.

UNIT I:
 Introduction to Parallel Computing: Motivating Parallelism, The Computational Power Argument - from Transistors to FLOPS, The Memory/Disk Speed Argument, The Data Communication Argument,

Scope of Parallel Computing, Applications in Engineering and Design, Scientific Applications, Commercial Applications, Applications in Computer Systems, Organization and Contents of the Text, **Parallel Programming Platforms:** Implicit Parallelism: Trends in Microprocessor Architectures, Pipe lining and Superscalar Execution, Very Long Instruction Word Processors, Limitations of Memory System Performance*, Improving Effective Memory Latency Using Caches, Impact of Memory Bandwidth, Alternate Approaches for Hiding Memory Latency, Tradeoffs of Multithreading and Prefetchin, Dichotomy of Parallel Computing Platforms, Control Structure of Parallel Platforms, Communication Model of Parallel Platforms, Physical Organization of Parallel Platforms, Architecture of an Ideal Parallel Computer, Interconnection Networks for Parallel Computers, Network Topologies, Evaluating Static Interconnection Networks, Evaluating Dynamic Interconnection Networks, Cache Coherence in Multiprocessor Systems, Communication Costs in Parallel Machines, Message Passing Costs in Parallel Computers, Communication Costs in Shared-Address-Space Machines, Routing Mechanisms for Interconnection Networks, Impact of Process-Processor Mapping and Mapping Techniques,Mapping Techniques for Graphs, Cost-Performance Tradeoffs

UNIT II:
Principles of Parallel Algorithm Design: Preliminaries, Decomposition, Tasks, and Dependency Graphs, Granularity, Concurrency, and Task-Interaction, Processes and Mapping, Processes versus Processors, Decomposition Techniques, Recursive Decomposition, Data Decomposition, Exploratory Decomposition, Speculative Decomposition, Hybrid Decompositions, Characteristics of Tasks and Interactions, Characteristics of Tasks, Characteristics of Inter-Task Interactions, Mapping Techniques for Load Balancing, Schemes for Static Mapping, Schemes for Dynamic Mapping,Methods for Containing Interaction Overheads, Maximizing Data Locality, Minimizing Contention and Hot Spots, Overlapping Computations with Interactions, Replicating Data or Computations, Using Optimized Collective Interaction Operations, Overlapping Interactions with Other Interactions, Parallel Algorithm Models, The Data-Parallel Model, The Task Graph Model, The Work Pool Model, The Master-Slave Model, The Pipeline or Producer-Consumer Model, Hybrid Models, **Basic Communication Operations:**One-to-All Broadcast and All-to-One Reduction, Ring or Linear Array, Mesh, Hypercube, Balanced Binary Tree Detailed Algorithms, Cost Analysis, All-to-All Broadcast and Reduction, Linear Array and Ring, Mesh, Hypercube, Cost Analysis, All-Reduce and Prefix-Sum Operations, Scatter and Gather, All-to-All Personalized Communication, Ring, Mesh, Hypercube, Circular Shift, Mesh, Hypercube, Improving the Speed of Some Communication Operations, Splitting and Routing Messages in Parts, All-Port Communication,

UNIT III:
Analytical Modeling of Parallel Programs: Performance Metrics for Parallel Systems, Execution Time, Total Parallel Overhead, Speedup,Efficiency,Cost, The Effect of Granularity on Performance, Scalability of Parallel Systems, Scaling Characteristics of Parallel Programs, The 1soefficiency Metric of Scalability, Cost-Optimality and the Isoefficiency Function, A Lower Bound on the IsoefficiencyFunction,The Degree of Concurrency and the Isoefficiency Function, Minimum Execution Time and Minimum Cost-Optimal Execution Time, Asymptotic Analysis of Parallel Programs, Other Scalability Metrics, **Programming Using the Message-Passing Paradigm:** Principles of Message-Passing Programming, The Building Blocks: Send and Receive Operations   , Blocking Message Passing Operations,Non-Blocking Message Passing Operations, MPI: the Message Passing Interface, Starting and Terminating the MPI Library, Communicators, Getting Information, Sending and Receiving Messages, Example: Odd-Even Sort, Topologies and Embedding, Creating and Using Cartesian Topologies, Example: Cannon's Matrix-Matrix Multiplication, Overlapping Communication with Computation   ,   Non-Blocking Communication Operations, Collective Communication and Computation Operations, Barrier   , Broadcast, Reduction, Prefix, Gather, Scatter, All-to-All, Example: One-Dimensional Matrix- Vector Multiplication, Example: Single-Source Shortest-Path, Example: Sample Sort, Groups and

Communicators, Example: Two-Dimensional Matrix- Vector Multiplication,

UNIT IV:
Programming Shared Address Space Platforms: Thread Basics, Why Threads? The POSIX Thread API, Thread Basics: Creation and Termination, Synchronization Primitives in Pthreads, Mutual Exclusionfor Shared Variables, Condition Variables for Synchronization, Controlling Thread and Synchronization Attributes, Attributes Objectsfor Threads, Attributes Objects for Mutexe, Thread Cancellation, Composite Synchronization Constructs, Read-Write Locks, Barriers, Tips for Designing Asynchronous Programs, OpenMP: a Standard for Directive Based Parallel Programming, The OpenMP Programming Model, Specifying Concurrent Tasks in OpenMP, Synchronization Constructs in OpenMP, Data Handling in OpenMP, OpenMP Library Functions, Environment Variables in OpenMP, Explicit Threads versus OpenMP Based Programming **Dense Matrix Algorithms:** Matrix- Vector Multiplication,Rowwise 1-D Partitioning, 2-D Partitioning, Matrix-Matrix Multiplication, A Simple Parallel Algorithm,Cannon's Algorithm, The DNS Algorithm, Solving a System of Linear Equations, A Simple Gaussian Elimination Algorithm, Gaussian Elimination with Partial Pivoting, Solving Q Triangular System: Back-Substitution, Numerical Considerations in Solving Systems of Linear Equations**Sorting:** Issues in Sorting on Parallel Computers, Where the Input and Output Sequences are Stored,How Comparisons are Performed, Sorting Networks, Bitonic Sort, Mapping Bitonic Sort to a Hypercube and a Mesh Bubble Sort and its Variants, Odd-Even Transposition, Shellsort,Quicksort, Parallelizing Quicksort, Parallel Formulationfor a CRCW PRAM, Parallel Formulationfor Practical Architectures, Pivot Selection,Bucket and Sample Sort,Other Sorting Algorithms, Enumeration Sort,Radix Sort.
UNIT V:
Graph Algorithms: Single-Source Shortest Paths: Dijkstra's Algorithm**Search Algorithms for Discrete OptimizationProblems:** Definitions and Examples,Sequential Search Algorithms, Depth-First Search Algorithms, Best-First Search Algorithms, Search Overhead Factor, Parallel Depth-First Search, Important Parameters of Parallel DFS, A General Frameworkfor Analysis of Parallel DFS, Analysis of Load-Balancing Schemes, Termination Detection, Experimental Results, Parallel Formulations of Depth-First Branch-and-Bound Search,Parallel Formulations of IDA *, Parallel Best-First Search, Speedup Anomalies in Parallel Search Algorithms, Analysis of Average Speedup in Parallel DFS **Dynamic Programming:** Overview of Dynamic Programming, Serial Monadic DP Formulations, The Shortest-Path Problem, The Oil Knapsack Problem, Nonserial Monadic DP Formulations, The Longest-Common-Subsequence Problem, Serial Polyadic DP Formulations, Floyd's All-Pairs Shortest-Paths Algorithm, NonserialPolyadic DP Formulations, The Optimal Matrix-Parenthesization Problem, **Fast Fourier Transform:** The Serial Algorithm, The Binary-Exchange Algorithm, A Full Bandwidth Network, Limited Bandwidth Network, Extra Computations in Parallel FFT, The Transpose Algorithm, Two-Dimensional Transpose Algorithm, The Generalized Transpose Algorithm

Books:
1. Introduction to Parallel Computing, AnanthGrama, Pearson Education

References:
1. Fundamental of Paralle Processing, Harry F. Jordan, Gita Alaghband, Pearson Education
2. Parallel Programming, Michael Allen, Barry Wilkinson, Pearson Education

Lab Exercise: CSC458 Practical based on CSC408
At least two experiments should carried out on each unit.

Subject Reference No	CSC501	Subject Title	Java Network Programming
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective

This course assumes that students are aware of core java programming, advanced java and hence it starts from Network Basics and goes up to Network programming. It covers some topics related to client/server concepts.

At Course Completion

After complication of this course students can write good network based application using java. Students can appear for java certification examinations. Student can also work on networking and web projects.

Prerequisites

Student should know the programming in core java and advanced java.

UNIT I:

Introduction to Networking: Basic Network Concepts: Networks, The Layers of a Network, IP, TCP, and UDP, The Internet, The Client/Server Model, Internet Standards, Basic Web Concepts: URIs, HTML, SGML, and XML, HTTP, MIME Media Types, Server-Side Programs

UNIT II:

Looking Up Internet Addresses: The InetAddress Class, Inet4Address and Inet6Address, The NetworkInterface Class, Some Useful Programs, URLs and URIs: The URL Class, TheURLEncoder and URLDecoder Classes, The URL Class, Proxies, Communicating with Server-Side Programs Through GET, Accessing Password-Protected Sites

UNIT III:

Sockets for Clients: Socket Basics, Investigating Protocols with Telnet, The Socket Class, Socket Exceptions, Socket Addresses, Examples, Sockets for Servers, The ServerSocket Class, Some Useful Servers, **Secure Sockets:** Secure Communications, Creating Secure Client Sockets, Methods of the SSLSocket Class, Creating Secure Server Sockets, Methods of the SSLServerSocket Class, Non-Blocking I/O, An Example Client, An Example Server, Buffers, Channels, Readiness Selection

UNIT IV:

UDP Datagrams and Sockets: The UDP Protocol, The DatagramPacket Class, The DatagramSocket Class, Some Useful Applications, DatagramChannel, Multicast Sockets:What Is a Multicast Socket, Working with Multicast Sockets, Two Simple Examples, URLConnections: Opening URLConnections, Reading Data from a Server, Reading the Header, Configuring the Connection, Configuring the Client Request HTTP Header, Writing Data to a Server, Content Handlers, The Object Methods, Security Considerations for URLConnections, Guessing MIME Content Types, HttpURLConnection, Caches, JarURLConnection

UNIT V:

Protocol Handlers: What Is a Protocol Handler, The URLStreamHandlerClass,Writing a Protocol Handler, More Protocol Handler Examples and Techniques, The URLStreamHandlerFactory Interface, **Content Handlers:** What Is a Content Handler, The ContentHandler Class, The ContentHandlerFactory Interface, A Content Handler for the FITS Image Format, Remote Method Invocation: What Is Remote Method Invocation, Implementation, Loading Classes at Runtime, The java.rmi Package, The java.rmi.registry Package, The java.rmi.server Package,

The JavaMail **API:** What Is the JavaMail API, Sending Email, Receiving Mail, Password Authentication, Addresses, The URLName Class, The Message Class, The Part Interface, Multipart Messages and File Attachments, MIME Messages, Folders

Books
1. Java Network Programming, Third Edition, O'Reilly Media, Oct 2004
2. Java Network Programming and Distributed computing, Addison Wesley, March 2002

Additional Reference
1. www.java.com
2. http://www.dct.udn.vn/daotao/Resource/82487.pdf (E-book of Java Network Programming and distributed Computing)

Lab Exercise: CSC551 Practical based on CSC501
        At least two experiments should carried out on each unit.

Subject Reference no	CSC502	Subject Title	Advanced Software Engineering and Technology
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To learn object oriented Software engineering skills through UML.
Prerequisite: The student must aware of software development paradigms.

UNIT I:
Introduction: Software Engineering, Software Engineering Concepts, Software Engineering Development Activities, Managing Software Development, **Modeling with UML:** An Overview of UML, Use Case Diagrams Class Diagrams, Interaction Diagrams, State Machine Diagrams, Activity Diagrams, **Modeling Concepts:** Systems, Models, and Views,Data Types, Abstract Data Types, and Instances,Classes, Abstract Classes, and Objects, Event Classes, Events, and Messages,Object-Oriented Modeling, Falsification and Prototyping.

UNIT II:
Requirements Elicitation Concepts : Functional Requirements, Nonfunctional Requirements, Completeness, Consistency, Clarity, and Correctness, Realism, Verifiability, and Traceability, Greenfield Engineering, Reengineering, and Interface Engineering, **Requirements Elicitation Activities :** Identifying Actors, Identifying Scenarios, Identifying Use Cases, Refining Use Cases, Identifying Relationships among Actors and Use Cases, Identifying Initial Analysis Objects, Identifying Nonfunctional Requirements, **Managing Requirements Elicitation :** Negotiating Specifications with Clients: Joint Application Design,   Maintaining Traceability, Documenting Requirements

Elicitation,Analysis Concepts: Analysis Object Models and Dynamic Models, Entity, Boundary, and Control Objects, Generalization and Specialization, **Analysis Activities:** Identifying Entity Objects, Identifying Boundary Objects, Identifying Control Objects, Mapping Use Cases toObjects with Sequence Diagrams, Modeling Interactions among Objects with CRC Cards, Identifying Associations, Identifying Aggregates, Identifying Attributes, Modeling State-Dependent Behavior of Individual Objects, Modeling Inheritance Relationships between Objects

UNIT III:
System Design: UML Deployment Diagrams, **System Design Activities:** Addressing Design Goals, Managing System Design, Object Design, **Reuse Concepts:** Solution Objects, Inheritance, and Design Patterns, **Reuse Activities:** Selecting Design Patterns and Components, **Interface Specification Concepts:** Class Implementer, Class Extender, and Class User, Types, Signatures, and Visibility, Contracts: Invariants, Preconditions, and Post conditions, Object Constraint Language, OCL Collections: Sets, Bags, and Sequences, **Interface Specification Activities:** Identifying Missing Attributes and Operations, Specifying Types, Signatures, and Visibility, Specifying Pre- and Post conditions, Specifying Invariants, Inheriting Contracts, **Managing Object Design:** Documenting Object Design, Assigning Responsibilities

UNIT IV:
Mapping Models to Code Mapping Concepts: Model Transformation, Refactoring, Forward Engineering, Reverse Engineering, Transformation Principles, **Mapping Activities:** Optimizing the Object Design Model, Mapping Associations to Collections, Mapping Contracts to Exceptions, Mapping Object Models to a Persistent Storage Schema, **Managing Implementation:** Documenting Transformations, Assigning Responsibilities **Testing:** Faults, Erroneous States, and Failures, Test Cases, Test Stubs and Drivers, Corrections, **Testing Activities:** Component Inspection, Usability Testing, Unit Testing, Integration Testing, System Testing, **Managing Testing:** Planning Testing, Documenting Testing, Assigning Responsibilities, Regression Testing, Automating Testing, Model-based Testing

UNIT V:
Configuration Management: Configuration Management Concepts, Configuration Management Activities, Managing Configuration Management, Management **Project Management:** Project Management Concepts, Classical Project Management Activities, Agile Project Management Activities

Books:
1) Object-Oriented Software Engineering: Using UML, Patterns and Java, B. Bruegge& A. H. Dutoit, Prentice Hall
2) Object Oriented Software Engineering: A Use Case Driven Approach By Ivar Jacobson, Pearson publication.
3) Software Engineering: A Practitioners approach 7THEditionby R. S. Pressman.
Lab Exercise: CSC552 Practical based on CSC502
At least two experiments should be carried out on each unit.

Subject Reference no	CSC503	Subject Title	Computer Vision
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To provide the mechanics for representation and analysis of Multispectral data.

Prerequisite: Student must have knowledge of Signal Processing, Image Processing, Neural Networks and Artificial Intelligence.

UNIT I:
CAMERAS: Pinhole Cameras, Perspective Projection, Affine Projection, **GEOMETRIC CAMERA MODELS:** Elements of Analytical Euclidean Geometry, Coordinate Systems and Homogeneous Coordinates, Coordinate System Changes and Rigid Transformations, Camera Parameters and the Perspective Projection, Intrinsic Parameters, Extrinsic Parameters, A Characterization of Perspective Projection Matrices, Affine Cameras and Affine Projection Equations, Affine Cameras, Affine Projection Equations, A Characterization of Affine Projection Matrices, **GEOMETRIC CAMERA CALIBRATION:** Least-Squares Parameter Estimation, Linear Least-Squares Methods, Nonlinear Least-Squares Methods, A Linear Approach to Camera Calibration, Estimation of the Projection Matrix, Estimation of the Intrinsic and Extrinsic Parameters, Degenerate Point Configurations, Taking Radial Distortion into Account, Estimation of the Projection Matrix, Estimation of the Intrinsic and Extrinsic Parameters, Degenerate Point Configurations, Analytical Photogrammetry, An Application: Mobile Robot Localization **RADIOMETRY-MEASURING LIGHT**: Light in, Foreshortening, Solid Angle, Radiance, Light at Surfaces, Simplifying Assumptions, The Bidirectional Reflectance Distribution Function, Example: The Radiometry of Thin Lenses, Important Special Cases, Radiosity, Directional Hemispheric Reflectance, Lambertian Surfaces and Albedo, Specular Surfaces, The Lambertian + Specular Model. **SOURCES, SHADOWS, AND SHADING:** Qualitative Radiometry, Sources and Their Effects, Radiometric, Properties of Light Sources, Point Sources, Line Sources, Area Sources, Local Shading Models, Local Shading Models for Point Sources, Area Sources and Their Shadows, Ambient Illumination, Application: Photometric Stereo, Normal and Albedo from Many Views, Shape from Normals, Interreftections: Global Shading Models, An Interreflection Model, Solving for Radiosity, The Qualitative Effects of Interreftections, **COLOR:** The Physics of Color, Radiometry for Colored Lights: Spectral Quantities, The Color of Sources, The Color of Surfaces, Human Color Perception, Color Matching, Color Receptors, Representing Color, Linear Color Spaces, Non-linear Color Spaces, Spatial and Temporal Effects, A Model for Image Color, Cameras, A Model for Image Color, Application: Finding Specularities, Surface Color from Image Color, Surface Color Perception in People, Inferring Lightness, Surface Color from Finite-Dimensional Linear Models

UNIT II:
LINEAR FILTERS: Linear Filters and, Convolution, Shift Invariant Linear Systems, Discrete Convolution, Continuous Convolution., Edge Effects in Discrete Convolutions, Spatial Frequency and Fourier Transforms, Fourier Transforms, Sampling and Aliasing,Sampling, Aliasing, Smoothing and Resampling, Filters as Templates, Convolution as a Dot Product, Changing Basis, Technique: Normalized Correlation and Finding Patterns, Controlling the Television by Finding Hands by Normalized Correlation, Technique: Scale and Image Pyramids, The Gaussian Pyramid, Applications of Scaled Representations, **TEXTURE:** Representing Texture, Extracting Image Structure with Filter Banks, Representing Texture Using the Statistics of Filter Outputs, Analysis (and Synthesis) Using Oriented Pyramids,The Laplacian Pyramid, Filters in the Spatial Frequency Domain, Oriented Pyramids, Application: Synthesizing Textures for Rendering, Homogeneity,, Synthesis by Sampling Local Models, **THE GEOMETRY OF MULTIPLE VIEWS:** Two Views, Epipolar Geometry, The Calibrated Case, Small Motions, The Uncalibrated Case, Weak Calibration, Three Views, Trifocal Geometry, The Calibrated Case, The

Uncalibrated Case, Estimation of the Trifocal Tensor, **STEREOPSIS:** Reconstruction, Image Rectification, Human Stereopsis, Binocular Fusion, Correlation, Multi-Scale Edge Matching, Using More Cameras Three Cameras, Multiple Cameras,

AFFINE STRUCTURE FROM MOTION: Elements of Affine Geometry, Affine Spaces and Barycentric Combinations, Affine Subspaces and Affine Coordinates, Affine Transformations and Affine Projection Models, Affine Shape, Affine Structure and Motion from Two Images, Geometric Scene Reconstruction, Algebraic Motion Estimation, Affine Structure and Motion from Multiple Images, The Affine Structure of Affine Image Sequences, A Factorization Approach to Affine Structure from Motion, From Affine to Euclidean Images, Euclidean Constraints and Calibrated Affine Cameras, Computing Euclidean Upgrades from Multiple Views, Affine Motion Segmentation, The Reduced Row-Echelon Form of the Data Matrix, The Shape Interaction Matrix, **PROJECTIVE STRUCTURE FROM MOTION:** Elements of Projective Geometry, Projective Spaces, Projective Subspaces and Projective Coordinates, Affine and Projective Spaces, Hyperplanes and Duality, Cross-Ratios and Projective Coordinates, Projective Transformations, Projective Shape, Projective Structure and Motion from Binocular Correspondences, Geometric Scene Reconstruction, Algebraic Motion Estimation, Projective Motion Estimation from Multilinear Constraints, Motion Estimation from Fundamental Matrices, Motion Estimation from Trifocal Tensors, Projective Structure and Motion from Multiple Images, A Factorization Approach to Projective Structure from Motion, Bundle Adjustment, From Projective to Euclidean Images

UNIT III:
APPLICATION: IMAGE-BASED RENDERING: Constructing 3D Models from Image Sequences, Scene Modeling from Registered Images, Scene Modeling from Unregistered Images, Transfer-Based Approaches to Image-Based Rendering, Affine View Synthesis, Euclidean View Synthesis, The Light Field, **SEGMENTATION BY CLUSTERING** What Is Segmentation? Model Problems, Segmentation as Clustering, Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction, Background Subtraction, Shot Boundary Detection, Image Segmentation by Clustering Pixels, Segmentation Using Simple Clustering Methods, Clustering and Segmentation by K-means, Segmentation by Graph-Theoretic Clustering, Terminology for Graphs, The Overall Approach, Affinity Measures, Eigenvectors and Segmentation, Normalized Cuts, **SEGMENTATION BY FITTING A MODEL:** The Hough Transform, Fitting Lines with the Hough Transform, Practical Problems with the Hough Transform, Fitting Lines, Line Fitting with Least Squares, Which Point Is on Which Line?, Fitting Curves, Implicit Curves, Parametric Curves, Fitting as a Probabilistic Inference Problem, Robustness, M-estimators, RANSAC, Example: Using RANSAC to Fit Fundamental Matrices, An Expression for Fitting Error, Correspondence as Noise, Applying RANSAC, Finding the Distance, Fitting a Fundamental Matrix to Known Correspondences

UNIT IV:
SEGMENTATION AND FITTING USING PROBABILISTIC METHODS: Missing Data Problems, Fitting, and Segmentation, Missing Data Problems, The EM Algorithm, The EM Algorithm in the General Case, The EM Algorithm in Practice, Example: Image Segmentation, Revisited, Example: Line Fitting with EM, Example: Motion Segmentation and EM, Example: Using EM to Identify Outliers, Example: Background Subtraction Using EM, Example: EM and the Fundamental Matrix, Difficulties with the EM Algorithm, Model Selection: Which Model Is the Best Fit? Basic Ideas, AIC-An Information Criterion, Bayesian Methods and Schwartz' BIC, Description Length, Other Methods for Estimating Deviance, **APPLICATION: FINDING IN DIGITAL LIBRARIES:** Background: Organizing Collections of Information, How Well Does the System Work?, What Do Users Want?, Searching for Pictures, Structuring and Browsing, Summary Representations of the Whole Picture, Histograms and Correlograms, Textures and Textures of Textures, Representations of Parts of the Picture, Segmentation, Template Matching, Shape and Correspondence, Clustering and Organizing Collections, Video **TRACKING WITH LINEAR DYNAMIC MODELS:** Tracking as an Abstract Inference Problem, Independence Assumptions, Tracking as Inference, Overview, Linear

Dynamic Models, Drifting Points, Constant Velocity, Constant Acceleration, Periodic Motion, Higher Order Models, Kalman Filtering, The Kalman Filter for a ID State Vector, The Kalman Update Equations for a General State Vector, Forward-Backward Smoothing, Data Association, Choosing the Nearest-Global Nearest Neighbours, Gating and Probabilistic Data Association, Applications and Examples, Vehicle Tracking

UNIT V:
MODEL-BASED VISION: Initial Assumptions, Obtaining Hypotheses, Obtaining Hypotheses by Pose Consistency, Pose Consistency for Perspective Cameras, Affine and Projective Camera Models, Linear Combinations of Models, Obtaining Hypotheses by Pose Clustering, Obtaining Hypotheses Using Invariants, Invariants for Plane Figures, Geometric Hashing, Invariants and Indexing, Verification, Edge Proximity, Similarity in Texture, Pattern and Intensity, Application: Registration in Medical Imaging Systems, Imaging Modes, Applications of Registration, Geometric Hashing Techniques in Medical Imaging, Curved Surfaces and Alignment **FINDING TEMPLATES USING CLASSIFIERS:** Classifiers, Using Loss to Determine Decisions, Overview: Methods for Building Classifiers, Example: A Plug-in Classifier for Normal Class-conditional Densities, Example: A Nonparametric Classifier Using Nearest Neighbors, Estimating and Improving Performance, Building Classifiers from Class Histograms, Finding Skin Pixels Using a Classifier, Face Finding Assuming Independent Template Responses, Feature Selection, Principal Component Analysis, Identifying Individuals with Principal Components Analysis, Canonical Variates, Neural Networks, Key Ideas, Minimizing the Error, When to Stop Training, Finding Faces Using Neural Networks, Convolutional Neural Nets, Support Vector Machines for Linearly Separable Daiasets, Finding Pedestrians Using Support Vector Machines **ASPECT GRAPHS:** Visual Events: More Differential Geometry, The Geometry of the Gauss Map, Asymptotic Curves, The Asymptotic Spherical Map, Local Visual Events, The Bitangent Ray Manifold, Multilocal Visual Events, Computing the Aspect Graph, Step I: Tracing Visual Events, Step 2: Constructing the Regions, Remaining Steps of the Algorithm, An Example, Aspect Graphs and Object Localization

Books:
1. Computer Vision: A Modern Approach, Forsyth Ponce   , Pearson Education
2. Image Processing, Analysis and Machine Vision, Milan Sonka, Thomson Learning

References:
1. Machine Vision, Jain R C Kasturi R, McGrawHill
2. Three Dimensional Computer Vision, Y Shirai, Springer Verlag
3. Computer And Robot Vision Vo I and II, Haralick R M And Shapiro L G, Addison Wesley
4. Computational Vision, Wechsler, Academic Press
5. Robot Vision, Horn B K P, Cambridge MIT press
6. Digital Image Processing & Computer Vision, Robert J Schalkoff, John Willey Publication

Lab Exercise: CSC553 Practical based on CSC503
At least two experiments should be carried out on each unit.

Subject Reference no	CSC421	Subject Title	Advanced Embedded System
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: Studying the various practical aspects of micro controller and microprocessor in terms of Embedded Systems design.

Prerequisite: Student must aware of microprocessor programming using ALP, Microprocessor Architecture, Instruction set and machine code generations, and C Programming.

UNIT I:
Introduction to Embedded Systems: Embedded Systems, Processor Embedded into a System, Embedded Hardware Units and Devices in a System, Embedded Software in a System, Examples of Embedded Systems, Embedded System-on-chip (Soc) and Use of VLSI Circuit Design Technology, Complex Systems Design and Processors, Design Process in Embedded System, Formalization of System Design, Design Process and Design Examples, Classification of Embedded Systems, Skills Required for an Embedded System Designer **8051 and Advanced Processor Architectures, Memory Organization and Real-world Interfacing:** 8051 Architecture, Real World Interfacing, Introduction to Advanced Architectures, Processor and Memory Organization, Instruction-Level Parallelism, Performance Metrics, Memory-Types, Memory-Maps and Addresses, Processor Selection, Memory Selection, **Devices and Communication Buses for Devices Network** :Types and Examples, Serial Communication Devices, Parallel Device Ports, Sophisticated Interfacing Features in Device Ports, Wireless Devices, Timer and Counting Devices, Watchdog Timer, Real Time Clock, Networked Embedded Systems, Serial Bus Communication Protocols, Parallel Bus Device Protocols-Parallel Communication Network Using ISA, PCI, PCI-X and Advanced Buses, Internet Enabled Systems-Network Protocols, Wireless and Mobile System Protocols

UNIT II:
Device Drivers and Interrupts Service Mechanism: Programmed-I/O Busy-wait Approach without Interrupt Service Mechanism, ISR Concept, Interrupt Sources, Interrupt Servicing (Handling) Mechanism, Multiple Interrupts, Context and the Periods for Context Switching, Interrupt Latency and Deadline, Classification of Processors Interrupt Service Mechanism from Context-Saving Angle, Direct Memory Access, Device Driver Programming, **Programming Concepts and Embedded Programming in C, C++ and Java**: Software Programming in Assembly Language (ALP) and in High-Level Language 'C' 235 , C Program Elements: Header and Source Files and Preprocessor Directives, Program Elements: Macros and Functions, Program Elements: Data Types, Data Structures, Modifiers, Statements, Loops and Pointers, Object-Oriented Programming, Embedded Programming in C++, Embedded Programming in Java, **Program Modeling Concepts:** Program Models, DFG Models, State Machine Programming Models for Event-controlled Program Flow, Modeling of Multiprocessor Systems, UML Modelling

UNIT III:
Interprocess Communication and Synchronization of Processes, Threads and Tasks: Multiple Processes in an Application, Multiple Threads in an Application, Tasks, Task States, Task and Data, Clear-

cut Distinction between Functions, ISRS and Tasks by their Characteristics, Concept of Semaphores, Shared Data, Interprocess Communication, Signal Function, Semaphore Functions, Message Queue Functions, Mailbox Functions, Pipe Functions, Socket Functions, RPC Functions, **Real-Time Operating Systems** : OS Services, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and 10 Subsystems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls, Real-time Operating Systems, Basic Design Using an RTOS, Rtos Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues,

UNIT IV:
*R*eal-time Operating System Programming-I: MicrodOS-II and VxWorks, Basic Functions and Types of RTOSES, RTOS mCOS-II, RTOS VxWorks, **Real-time Operating System Programming-II:** Windows CE, OSEK and Real-time Linux Functions,Windows CE, OSEK, Linux 2.6.x and RTLinux, **Design Examples and Case Studies of Program Modeling and Programming with RTOS-l:** Case Study of Embedded System Design and Coding for an Automatic, Chocolate Vending Machine (ACYM) Using Mucos RTOS, Case Study of Digital Camera Hardware and Sofware Architecture, Case Study of Coding for Sending Application Layer Byte Streams on a TCPIIP Network Using RTOS Vxworks

UNIT V:
Design Examples and Case Studies of Program Modeling and Programming with RTOS-2: Case Study of Communication Between Orchestra Robots, Embedded Systems in Automobile, Case Study of an Embedded System for an Adaptive Cruise Control (ACC) System in a Car, Case Study of an Embedded System for a Smart Card, Case Study of a Mobile Phone Software for Key Inputs, **Embedded Software Development Process and Tools:** Introduction to Embedded Software Development Process and Tools, Host and Target Machines, Linking and Locating Software, Getting Embedded Software into the Target System, Issues in Hardware-Software Design and Co-design, **Testing, Simulation and Debugging Techniques and Tools:** Testing on Host Machine: Simulators, Laboratory Tools

Books:
1. Embedded Systems: Architecture, Programming and Design, Raj Kamal, McGraw Hill

References:
1. "Embedded System Design" Frank Vahid&Tony Givargis; John Wiley &sons, Inc.
2. "Real – Time Systems and software"Alan C. Shaw ; John Wiley &Sons Inc
3. "Fundamentals of embedded Software", Daniel W. Lewis, Pearson
4. "Real time Systems", J. W. S. Liu, Pearson
5. "Embedded Realtime System Programming", S. V. Iyer and P. Gupta, TMH
6. "An Embedded System Primer" David E. Simon; Addison-Wesley Pub
7.   "Embedded System Design" Steve Heath; Butterworth-Heinemann Pub.
8. "Embedded System Computer Architecture" Graham Wilson, Butterworth-Heinemann

Lab Exercise: CSC422 Practical based on CSC421
At least two experiments should be carried out on each unit.

Subject Reference no	CSC423	Subject Title	Data Warehousing
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective:

A student completing this course unit should:

1) Have an understanding of the foundations, the design, the maintenance, the evolution and the use of data warehouses, by looking at these topics in a rigorous way.
2) Have mastered the basic range of techniques for creating, controlling and navigating dimensional business databases, by being able to use a powerful tool for dimensional modeling and analysis.

Prerequisite: Student must aware of Relational Database management system, its organization and management using Queries

UNIT I:

Data Warehousing Concepts: Data Warehouse Architectures, **Logical Design in Data Warehouses:** Logical Versus Physical Design in Data Warehouses, Data Warehousing Schemas, Data Warehousing Objects, **Physical Design in Data Warehouses:** Physical Design, Data Segment Compression, Integrity Constraints, Indexes and Partitioned Indexes, Materialized Views, Dimensions

UNIT II:

Hardware and I/O Considerations in Data Warehouses: Overview of Hardware and I/O Considerations in Data Warehouses, Automatic Striping, Manual Striping, Local and Global Striping, Analyzing Striping, Striping Goals, RAID Configurations, Striping, Mirroring, and Media Recovery, RAID 5, The Importance of Specific Analysis, **Parallelism and Partitioning in Data Warehouses:** Granules of Parallelism, Block Range Granules, Partition Granules, Partitioning Design Considerations, Types of Partitioning, Partitioning Methods, Performance Issues for Range, List, Hash, and Composite Partitioning, Partitioning and Data Segment Compression, Data Segment Compression and Bitmap Indexes, Partition Pruning, Avoiding I/O Bottlenecks, Partition-Wise Joins, Full Partition-Wise Joins, Miscellaneous Partition Operations, **Indexes:** Bitmap Indexes, Benefits for Data Warehousing Applications, Cardinality, Bitmap Join Indexes, Bitmap Join Index Restrictions, B-tree Indexes, Local Indexes Versus Global Indexes

UNIT III:

Integrity Constraints: Overview of Constraint States, Typical Data Warehouse Integrity Constraints, UNIQUE Constraints in a Data Warehouse, FOREIGN KEY Constraints in a Data Warehouse, RELY Constraints, Integrity Constraints and Parallelism, Integrity Constraints and Partitioning, **Materialized Views:** Creating, Registering Existing Materialized Views, Partitioning Materialized Views, Materialized Views in OLAP Environments, Choosing Indexes for Materialized Views, Invalidating Materialized Views Security Issues with Materialized Views, Altering Materialized Views, Dropping Materialized Views, Analyzing Materialized View Capabilities, **Dimensions:** Creating Dimensions, Viewing Dimensions, Using Dimensions with Constraints, Validating Dimensions, Altering Dimensions, Deleting Dimensions, Using the Dimension Wizard, **Overview of Extraction, Transformation, and Loading:** Overview of ETL, ETL Tools

UNIT IV:
Managing the Warehouse Environment: Overview of Extraction, Transformation and Loading, Extraction in Data Warehouses Transportation in Data Warehouses, Loading and Transformation, Maintaining the Data Warehouse, Change Data Capture, Summary Advisor, **Loading and Transformation:** Overview of Loading and Transformation in Data Warehouses, Loading Mechanisms, Transformation Mechanisms, Loading and Transformation Scenarios. **Maintaining the Data Warehouse:** Using Partitioning to Improve Data Warehouse Refresh, Optimizing DML Operations During Refresh, Refreshing Materialized Views, Using Materialized Views with Partitioned Tables, **Change Data Capture:** About Change Data Capture, Installation and Implementation, Security, Columns in a Change Table, Change Data Capture Views, Synchronous Mode of Data Capture, Publishing Change Data, Managing Change Tables and Subscriptions, Subscribing to Change Data, Export and Import Considerations

UNIT V:
Summary Advisor: Overview of the Summary Advisor in the DBMS_OLAP Package, Using the Summary Advisor, Estimating Materialized View Size, Is a Materialized View Being Used Summary Advisor Wizard, **Warehouse Performance:** Schema Modeling Techniques, SQL for Aggregation in Data Warehouses, SQL for Analysis in Data Warehouses, OLAP and Data Mining, Using Parallel Execution, Query Rewrite, **SQL for Aggregation in Data Warehouses:** Overview of SQL for Aggregation in Data Warehouses, ROLLUP Extension to GROUP BY, CUBE Extension to GROUP BY, GROUPING Functions, GROUPING SETS Expression, Composite Columns, Concatenated Groupings, Considerations when Using Aggregation, Computation Using the WITH Clause

REFERENCES:
 1. Kimball, Reeves Ross, Thornthwaite, The Data Warehouse Lifecycle Toolkit, John Wiley & Sons, 1998.
 2. Jiawei Han and MichelineKamber, Data Mining Concepts and Techniques, Elsevier Second edition.
 3. Arun K Pujari, Data Mining Techniques, University Press, Tenth edition 2006, ISBN 81 7371 380 4
 4. *Oracle9i* Data Warehousing Guide Release 2 (9.2) Part Number A96520-01 by Oracle Press.

Lab Exercise: CSC424 Practical based on CSC423
At least two experiments should carried out on each unit.

Subject Reference no	CSC425	Subject Title	Geographical Information Technology
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To provide the mechanics for representation and analysis of remotely sensed data.

Prerequisite:

UNIT I:
GIT: A CONCEPTUAL FRAMEWORK Introduction to GIT: Earth-A Unique Planet, Socio-Economic Challenges, Operation, Administration and Maintenance, Environmental and Natural Resource Management**, History and Evolution:** Ancient Period, Modern Period, Development of Computers, Development of

Remote Sensing, Indian Space Research, **Surveying and Mapping:** Measuring Techniques, Distance and Angle Measurements, Theodolites, Total Station, Data Accuracy and Precision, **Global Positioning System:** How GPS Works, Triangulation from Satellites, Satellite Signals, Code Measurement, Common Errors,, Differential Global Positioning System (DGPS), GPS Receivers,

UNIT II:
Projections and Coordinate Systems: Coordinates, Geographic Reference, Datum, Projection, Types of Map Projection, Cylindrical Projection, Conic Projections, Azimuthal Projections, **Data Diversity and Standards:** Modeling the Spatial Phenomena, Modeling Spatial Features, From Conceptualization to Implementation, Spatial Registration, Metadata, Data Standards, **Maps and Themes:** Map Symbols, Colour, Map Layout, Text, Thematic Representaiton of Data Maps, **GEOGRAPHIC INFORMATION SYSTEM: AN INSIGHT- Fundamentals of GIS:** GIS Database, The Real World Vs. GIS, Data Model, **GIS Data Models:** Vector Model, Digital Coding in GIS, Spaghetti Model, Topology Model, Raster Model, Advanced Models, GIS Processes,

UNIT III:
Data Quality: GIS Data Quality, Positional accuracy, Attribute Accuracy, Logical Consistency, Resolution/Precision, Completeness, Old Maps, Map Scales, Data Representation Format, Aerial Coverage, Accessibility, **Database Management System:** Database Fundamentals, Data Organization in the Computer, File-Based Systems, Databases and the Relational Model, File-Based Systems, Database Systems, Three-Level Architecture of Databases, Mappings Between Levels, Relational Data Structure, Characteristics of Relations, Entity and Entity Type, Relationship and Relationship Types, Relational Database Design Methodology, Creating the External Design, Creating the Conceptual Design, Creating the Internal Design, Structured Query Language (SQL), Spatial Database, **Hardware and Software:** ERDAS, Autocad Map, Planning Phase, Analysis Phase, Implementation Phase, Critical Success Factors for GIS, **Spatial Analysis:** Overlay Analysis of Raster Data, Overlay Analysis of Vector Data, Reclassification and Rebuilding, Shape and Measurement Analysis, Surface Analysis, Surface Models, Grid and TIN Data Structures,

UNIT IV:
GIS and the Internet: Annexure: GIS: An Analytical Case Study, **REMOTE SENSING General Background of Remote Sensing, Techniques of Remote Sensing:** Principle of Remote Sensing, Interaction of Earth Surface Features with EMR, Interactions with the Atmosphere, Atmospheric Windows, Spectral Characteristics of Water, Soil, Rocks and Vegetation Cover, Thermal Remote Sensing,**Remote Sensing Platforms and Sensors:** Across-Track Scanning (Whiskbroom), Along-Track Scanning (Pushbroom), False Colour Composite, Landsat Multispectral Scanner and the Matic Mapper, Return Beam Vidicon Camera (RBV), Multispectral Scanner (MSS), Thematic Mapper (TM), Spot, IRS-Series, Sensors in Microwave Region, SeasatSar, High Resolution Satellites,

UNIT V:
Digital Image Processing: What is Digital Image Processing, Why Digital Image Processing, Image Rectification, Image Enhancement, Digital Data Formats, **Aerial Photographs:** Process of Aerial Photography, Types of Aerial Photographs, Photo Indexing, Mosaics, Photo Scale, Stereoscope, Relief (Radial) Displacement, Vertical Exaggeration, Parallax, Some Terms Associated with Aerial Photograph, **Image Interpretation:** Image Elements or Photo-Recognition Elements, Terrain Elements, Process of Interpretation, Applications of Remote Sensing

Books:
1. An Introduction To Geographic Information Technology, SujitChoudhary, IK International
2. Fundamental Of Remote Sensing, George Joseph, Universities Press

References:
1. Principles of geographical information systems, P. A. Burrough and R. A. Mcdonnel, Oxford.
2. Remote sensing of the environment, J. R. Jensen, Pearson
3. Exploring Geographic Information Systems, Nicholas Chrismas, John Wiley & Sons.
4. Getting Started with Geographic Information Systems, Keith Clarke, PHI.
5. An Introduction to Geographical Information Systems, Ian Heywood, Sarah Cornelius, and Steve Carver. Addison-Wesley Longman

Lab Exercise: CSC426 Practical based on CSC425
At least two experiments should be carried out on each unit.

Subject Reference no	CSC427	Subject Title	Biometrics
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective
Biometric recognition, or simply biometrics, is a rapidly evolving field with applications ranging from accessing one's computer, to gaining entry into a country. Biometric systems rely on the use of physical or behavioral traits, such as fingerprints, face, voice and hand geometry, to establish the identity of an individual. The deployment of large-scale biometric systems in both commercial (e.g., grocery stores, amusement parks, airports) and government (e.g., US-VISIT) applications, increases the public's awareness of this technology. This rapid growth also highlights the challenges associated with designing and deploying biometric systems. Indeed, the problem of biometric recognition is a grand challenge in its own right. The past five years have seen a significant growth in biometric research resulting in the development of innovative sensors, robust and efficient algorithms for feature extraction and matching, enhanced test methodologies and novel applications. These advances have resulted in robust, accurate, secure and cost effective biometric systems. The main objective of this course is study the basics and advanced development of biometrics.

Prerequisite: Student must aware with image processing, pattern recognition methods.

Course Contents
UNIT I:
Foreword by James L. Wayman, San Jose State University.- Preface.- Introduction to Biometrics.- Fingerprint Recognition.- Face Recognition.- Iris Recognition.- Hand Geometry Recognition.- Gait Recognition.-

UNIT II:
The Ear as a Biometric.- Voice Biometrics.- A Palmprint Authentication System.- On-Line Signature Verification.- 3D Face Recognition.-

UNIT III:
Automatic Forensic Dental Identification.- Hand Vascular Pattern Technology.-

UNIT IV:
Introduction to Multibiometrics.- Multispectral Face Recognition.- Multibiometrics Using Face and Ear.- Incorporating Ancillary Information in Multibiometric Systems.-

UNIT V:
The Law and the Use of Biometrics.- Biometric System Security.- Spoof Detection Schemes.- Linkages between Biometrics and Forensic Science.- Biometrics in Government Sector.- Biometrics in the Commercial Sector.- Biometric Standards.- Biometrics Databases.- Index.

Text Book
1. Handbook of Biometrics, Jain, Anil K.; Flynn, Patrick; Ross, Arun A. (Eds.), 2008, Springer, ISBN 978-0-387-71040-2

Lab Exercise: CSC428 Practical based on CSC427
At least two experiments should be carried out on each unit.

Subject Reference no	CSC429	Subject Title	Mobile Computing
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To study and provide mechanism of wireless computing.
Prerequisite: Student must aware with computer networking, computer communication basics.

UNIT I:
Mobile Communications: An Overview: Mobile Communication, Mobile Computing, Mobile Computing Architecture, Mobile Devices, Mobile System Networks, Data Dissemination, Mobility Management, Security **Mobile Devices and Systems:** Mobile Phones, Digital Music Players, Handheld Pocket Computers, Handheld Devices: Operating Systems, Smart Systems, Limitations of Mobile Devices, Automotive Systems **GSM and Similar Architectures:** GSM-Services and System, Architecture, Radio Interfaces, Protocols, Localization, Calling Handover, Security, New Data Services, General Packet Radio Service, High-speed Circuit Switched Data, DECT

UNIT II:
Wireless Medium Access Control and CDMA-based Communication: Medium Access Control, Introduction to CDMA-based Systems, Spread Spectrum in CDMA Systems, Coding Methods in CDMA, IS-95 cdmaOne System, IMT-2000, i-mode, OFDM, **Mobile IP Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunnelling and Encapsulation Route Optimization, Dynamic Host Configuration Protocol, Mobile Transport Layer, Conventional TCP/IP Transport, Layer Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Methods of TCP-layer Transmission for Mobile Networks, TCP Over 2.5G/3G Mobile Networks,

UNIT III:
Databases: Database Hoarding Techniques, Data Caching, Client-Server Computing and Adaptation, Transactional Models, Query Processing, Data Recovery Process, Issues relating to Quality of Service, **Data Dissemination and Broadcasting Systems:** Communication Asymmetry, Classification of Data-Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Techniques, Digital Audio Broadcasting, Digital Video Broadcasting, **Data Synchronization in Mobile Computing Systems:** Synchronization, Synchronization Software for Mobile Devices, Synchronization Protocols, SyncML Synchronization Language for Mobile Computing, Sync4J (Funambol), Synchronized Multimedia

Markup Language (SMIL),

UNIT IV:
Mobile Devices-Server and Management: Mobile Agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems, Security, **Mobile Ad-hoc and Sensor Networks**: Introduction to Mobile Ad-hoc Network, MANET, Wireless Sensor Networks, Applications **Wireless LAN, Mobile Internet Connectivity, and Personal Area Network:** Wireless LAN (WiFi) Architecture and Protocol Layers, WAP 1.1 and WAP 2.0, Architectures, XHTML-MP (Extensible Hypertext Markup Language Mobile Profile), Bluetooth-enabled Devices Network, Layers in Bluetooth Protocol, Security in Bluetooth Protocol, IrDA, ZigBee

UNIT V:
Mobile Application Languages-XML, Java, J2ME, and JavaCard: Introduction, XML, JAVA, Java 2 Micro Edition (J2ME), JavaCard, **Mobile Operating Systems :** Operating System PalmOS, Windows CE, Symbian OS, Linux for Mobile Devices 530

Books:
1. Mobile Computing, Raj Kamal, Oxford University Press

References:
1. Mobile Communications Jochen Schiller, Addison-Wesley.
2. Handbook of Wireless Networks and Mobile Computing, Stojmenovic and Cacute, Wiley,
3. Mobile Computing Principles: Designing and Developing Mobile
4. Applications with UML and XML, Reza Behravanfar, Cambridge University Press,

Lab Exercise: CSC430 Practical based on CSC429
At least two experiments should carried out on each unit.

Semester-IV:

Subject Reference no	CSC505	Subject Title	Pattern Recognition
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To provide the general mechanism and design of Automatic system recognition.
Prerequisite: Student must have knowledge of Digital image processing, neural networks, function analysis.

UNIT I:
Introduction to Pattern Recognition, Bayesian decision theory: Classifiers, Discriminant functions, Decision surfaces, Normal density and Discriminant functions, discrete features

UNIT II:
Maximum Likelihood and Bayesian Estimation: Parameter estimation methods, Maximum-Likelihood estimation, Bayesian estimation, Bayesian Parameter Estimation, Gaussian Case, General Theory, Problem of Dimensionality, Accuracy, Dimension, and Training Sample Size, Computational

Complexity and Overfitting, Component Analysis and Discriminants, Principal Component Analysis (PCA), Expectation Maximization (EM), Hidden Markov models for sequential pattern classification, First-Order Markov Models, First-Order Hidden Markov Models, Hidden Markov Model Computation, Evaluation, Decoding and Learning.

UNIT III:
Non-parametric : Density estimation, Parzen-window method, Probabilistic Neural Networks (PNNs), K-Nearest Neighbour, Estimation and rules, Nearest Neighbour and Fuzzy Classification. **Linear Discriminant function based classifiers:** Perceptron, Linear Programming Algorithm, Support Vector Machines (SVM)

UNIT IV:
Multilayer Neural Network: Feed Forward Classification, Back Propagation Algorithm, Error Surface
Stochastic Data: Stochastic search, Boltzmann Learning, Evolutionary method and Genetic
Programming.

UNIT V:
Non-metric methods for pattern classification: Decision trees, Classification and Regression Trees (CART) and other tree methods, String recognition and Rule Based method. **Unsupervised learning and clustering :** Mixture Densities and Identifiability, Maximum Likelihood estimation, Application Normal Mixture, Unsupervised Bayesian Learning, Data Description and Clustering, Hierarchical Clustering, Graph theory method, Problem of validity, Component analysis

Books Recommended:
1. R.O.Duda, P.E.Hart and D.G.Stork, "Pattern Classification 2nd Edition", John Wiley, 2007
2. Christopher M. Bishop, "Neural Network for Pattern Recognition", Oxford Ohio Press.

References:
1. E. Gose, R. Johansonbargh, "Pattern Recognition and Image Analysis", PHI
2. EthenAlpaydin, "Introduction to Machine Learning", PHI
3. SatishKumar,"Neural Network- A Classroom Approach", McGraw Hill.
4. Dr. Rao&Rao,Neural Network & Fuzzy Logic
5. S.Theodoridis and K.Koutroumbas, "Pattern Recognition", 4th Ed., Academic Press,
6. C.M.Bishop, "Pattern Recognition and Machine Learning", Springer, 2006
Web:1. http://www.rii.ricoh.com/~stork/DHS.html

Lab Exercise: CSC555 Practical based on CSC505
        At least two experiments should be carried out on each unit.

Elective-II

Subject Reference no	CSC-431	Subject Title	Theoretical Computer Science
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs. /Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To understand syntax and semantics of programming languages to build system software.

Prerequisite: Student must aware with discrete mathematical structures, set theory, set operations.

UNIT-I:
Introduction: Strings, Alphabets & Languages, Graphs & Trees, Set Notations, Relations.

UNIT-II:
Finite Automata & Regular Expressions: Definition, Description, Transition Systems, Transition Function, DFA, NFA, Finite Automata with Є-Moves, Regular Expressions, Convert Regular Expression into FA, Construct FA from Regular Expression, Applications of Finite Automata.

UNIT-III:
Regular Expression: Pumping Lemma for Regular Sets, Applications of Pumping Lemma, Closure properties of Regular Sets, Decision Algorithm for regular Sets.

UNIT-IV:
Context Free Grammars: Introduction to Context free grammars, Derivations Trees, Simplification of Context free grammar, Useless Symbols, Є Production, Unit Production, Normal forms for CFG, Chomsky Normal Form (CNF),Greibach Normal Form (GNF).

UNIT-V:
Pushdown Automata: Informal Description, Definitions, Pushdown Automata & Context free languages.
Turing Machines: Basics, Turing Machine Model, Representation of Turing Machines, Language Acceptability by Turing Machines.

Text Books:
>   1) Theory of Computer Science, By-K.L.P. Mishra, N. Chandrasekaran.
>   2) Introduction to Computer Theory, By-Daniel A. Cohen.

References:
>   1) Introduction to Automata theory, Languages & Computations, By-John E. Hopcraft, Jeffery D. Ullman.
>   2) Theory of Computer Science, By-Dr. Shirish S. Sane.

Lab Exercise: CSC432 Practical based on CSC431
At least two experiments should be carried out on each unit.

Subject Reference no	CSC433	Subject Title	Decision Support System and Intelligent system
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To design and implement the logic based frameworks for Decision Support and Intelligent systems.
Prerequisite:

UNIT I:
Decision Support and Business Intelligence- Decision Support Systems and Business Intelligence: Opening Vignette: Toyota Uses Business Intelligence to Excel, Changing Business Environments and Computerized Decision Support, Managerial Decision Making, Computerized Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems (DSS), A Framework for Business Intelligence (BI), A Work System View of Decision Support, The Major Tools and Techniques of Managerial Decision Support, Implementing Computer-Based Managerial Decision Support Systems, **Computerized Decision Support, Decision Making, Systems, Modeling, and Support:** Opening Vignette: Decision Making at the U.S. Federal Reserve, Decision Making: Introduction and Definitions, Models, Phases of the Decision Making Process, Decision Making: The Intelligence Phase, Decision Making: The Design Phase, Decision Making: The Choice Phase, Decision Making: The Implementation Phase, How Decisions are Supported, **Decision Support Systems Concepts, Methodologies, and Technologies: An Overview:** Opening Vignette: Decision Support System Cures for Healthcare, DSS Configurations, DSS Description, DSS Characteristics and Capabilities, Components of DSS, The Data Management Subsystem, The Model Management Subsystem, The User Interface (Dialog) Subsystem, The Knowledge-Based Management Subsystem, The User, DSS Hardware, DSS Classifications

UNIT II:
Modeling and Analysis: Opening Vignette: "Winning Isn't Everything... But Losing Isn't Anything:" Professional Sports Modeling for Decision Making, MSS Modeling, Static and Dynamic Models, Certainty, Uncertainty, and Risk, MSS Modeling with Spreadsheets, Decision Analysis with Decision Tables and Decision Trees, The Structure of Mathematical Models for Decision Support, Mathematical Programming Optimization, Multiple Goals, Sensitivity Analysis, What-IF, and Goal Seeking Problem Solving Search Methods, Simulation, Visual Interactive Simulation, Quantitative Software Packages and Model, Base Management, **Business Intelligence Special Introductory Section: The Essentials of Business Intelligence:** A Preview of the Content of Chapters, The Origins and Drivers of Business Intelligence, The General Process of Intelligence Creation and Use, The Major Characteristics of Business Intelligence, Towards Competitive Intelligence and Advantage, The Typical Data Warehouse and BI User Community, Successful BI Implementation, Structure and Components of BI, Conclusion: Today and Tomorrow **Data Warehousing:** Opening Vignette: Continental Airlines Flies High with Its Real-Time Data Warehouse, Data Warehousing Definitions and Concepts, Data Warehousing Process Overview, Data Warehousing Architectures, Data Integration, and the Extraction, Transformation, and Load (ETL) Process, Data Warehouse Development, Real-Time Data Warehouses, Data Warehouse Administration and Security Issues

UNIT III:
Business Analytics and Data Visualization: Opening Vignette: Lexmark International Improves Operations with BI, The Business Analytics Field-An Overview, Online Analytical Processing (OLAP), Reporting and Queries, Multidimensionality, Advanced Business Analytics, Data Visualization, Geographic Information Systems, Real-Time Business Intelligence, Automated Decision Support, and Competitive Intelligence, Business Analytics and the Web: Web Intelligence and Web Analytics, Usage, Benefits, and Success of Business Analytics **Data, Text, and Web Mining:** Opening Vignette: Highmark, Inc., Data Mining Concepts and Applications, Data Mining Techniques and Tools, Data Mining Project Process, Text Mining, Web Mining **Neural Networks for Data Mining:** Opening Vignette: Using Neural Networks to Predict Beer Flavors From Chemical Analysis, Basic Concepts of Neural Networks, Learning in Artificial Neural Networks, Developing Neural Network Systems, A Sample Neural Network Project, Other Neural Networks Paradigms, Applications of Neural Networks, A Neural Network Software Demonstration **Business Performance Management:** Opening Vignette: Cisco and the Virtual Close,

Business Performance Management Overview, Strategize: Where Do We Want to Go? Plan: How Do We Get There? Monitor: How are We Doing? Act and Adjust: What Do We Need to Do Differently? Performance Measurement, Bpm Methodologies, Bpm Architecture and Applications, Performance Dashboards, Business Activity Monitoring (BAM)

UNIT IV:
Collaboration, Communication, Group Support Systems, and Knowledge Management-Collaborative Computing-Supported Technologies and Group Support Systems: Opening Vignette: Collaborative Design at Boein-Rocketdyne, Making Decisions in Groups: Characteristics, Process, Benefits, and Dysfunctions, Supporting Groupwork with Computerized Systems, Tools for Indirect Support of Decision Making, Integrated Groupware Suites, Direct Computerized Support for Decision Making: From GDSS to GSS, Products and Tools for GDSS/GSS and Successful, Implementation, Emerging Collaboration Support Tools: From VoIP to Wikis, Collaborative Efforts in Planning, Design, and the Project Management, Creativity, Idea Generation and Computerized Support **Knowledge Management:** Opening Vignette: Simens Knows What It Knows through Knowledge Management, Introduction to Knowledge Management, Organizational Learning and Transformation, Knowlege Management Activities, Approached to Knowledge Management, Information Technology in Knowledge Management, Knowledge Management Systems Implementation, Roles of People in Knowledge Management, Ensuring the Success of Knowledge Management Efforts, **Intelligent Systems-Artificial Intelligence and Expert Systems:** Opening Vignette: Cigna Uses Business Rules to Support Treatment Request Approval, Concepts and Definition of Artificial Intelligence, The Artificial Intelligence Fields, Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, How Expert Systems Work- Inference Mechanisms, Problem Areas Suitable for Expert Systems, Development of Expert Systems, Benefits, Limitations and Success Factors of Expert Systems, Expert Systems on the Web

UNIT V:
Advanced Intelligent Systems: Opening Vignette: Improving Urban Infrastructure Management in the City of Verdum, Machine Learning Techniques, Case-based Reasoning, Genetic Algorithms Fundamentals, Developing Genetic Algorithm Applications, Fuzzy Logic Fundamentals, Natural Language Processing, Voice Technologies, Developing Integrated Advanced System. **Intelligent Systems over the Internet:** Opening Vignette: NetFlix Gains High Customer Satisfaction from DVD Recommendation, Web-Based Intelligent Systems, Intelligent Agents: An Overview, Characteristics of Intelligent Agents, Why Use Intelligent Agents, Classification and Types of Intelligent Agents, Internet-Based Software Agents, DSS Agents and Multi-agents, Semantic Web: Representing Knowledge for Intelligent Agents, Web-Cased Recommendation Systems, Managerial Issues of Intelligent Agents **Implementing Decision Support Systems- Systems Development and Acquisition:** Opening Vignette: Osram Sylvania Thinks Small, Strategizes Big- Develops the InfoNet HR Portal System, What Types of Support Systems Should We Build? The Landscape and Framework of MSS Applications Development, Development Options for MSS Applications, Prototyping: A Practical MSS Development Methodology, Criteria For Selecting a Development Approach, Third-Party Providers of MSS Software Packages and Suites, Connecting to Databases and Other Enterprise Systems, Rise of Web Services, XML, and Service-Oriented Architecture, End-user Developed MSS, Vendor and Software Selection and Management, Putting the MSS Together and Implementation Issues **Integration, Impacts, and the Future of Management Support Systems:** Opening Vignette: Elite-Care Supported by Intelligent Systems, Systems Integration: An Overview, Types of MSS Integration, Integration with Enterprise Systems and Knowledge Management, The Impacts of MSS: An Overview, MSS Impacts on Organizations, MSS Impacts on Individuals, Automating Decision Making and the Manager's Job, Issues of Legality, Privacy, and Ethics, Intelligent and Automated Systems and Employment Levels, Other Societal Impacts and the Digital Divide, The Future of Management Support Systems

Books:
1. Decision Support and Business Intelligence Systems

References:
1. Decision Support Systems, George M. Marakas, 2nd Edition, Pearson Education
2. Decision Support Systems, Janakiraman V.S. and Sarukesi. K., Prentice Hall of India
3. Decision Support System and Management, Lofti, McGraw Hill Inc., International Edition, New Delhi.

Lab Exercise: CSC434 Practical based on CSC433
At least two experiments should be carried out on each unit.

Subject Reference no	CSC435	Subject Title	Data Mining
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective:
To develop an understanding of the strengths and limitations of popular data mining techniques and to be able to identify promising business applications of data mining. Students will be able to actively manage and participate in data mining projects executed by consultants or specialists in data mining. A useful take away from the course will be the ability to perform powerful data analysis.

Prerequisite: Student must aware with Database management systems

UNIT I:
Introduction to Data Mining: Why Mine Data? Commercial Viewpoint, Scientific Viewpoint Motivation, Definitions, Origins of Data Mining, Data Mining Tasks, Classification, Clustering, Association Rule Discovery, Sequential Pattern Discovery, Regression, Challenges of Data Mining, **Data Mining-Data:** What is Data? Attribute Values, Measurement of Length, Types and Properties of Attributes, Discrete and Continuous Attributes, Types of data sets, Data   Quality,   Data   Preprocessing,   Aggregation, Sampling, Dimensionality Reduction, Feature subset selection, Feature creation, Discretization and Binarization, Attribute Transformation, Density.

UNIT II:
Data Mining: Exploring Data: Data Exploration Techniques, Summary Statistics, Frequency and Mode, Percentiles, Measures of Location: Mean and Median, Measures of Spread: Range and Variance, Visualization, Representation, Arrangement, Selection, Visualization Techniques: Histograms, Box Plots, Scatter Plots, Contour Plots, Matrix Plots, Parallel Coordinates, Other Visualization Techniques, OLAP : OLAP Operations, **Data Mining Classification: Bask Concepts, Decision Trees, and Model Evaluation:** Classification: Definition, Classification Techniques, Tree Induction, Measures of Node Impurity, Practical Issues of Classification, ROC curve, Confidence Interval for Accuracy, Comparing Performance of Two Models, Comparing Performance of Two Algorithms.

UNIT III:

Data Mining Classification: Alternative Techniques: Rule-Based Classifier, Rule Ordering Schemes, Building Classification Rules,   Instance-Based Classifiers, Nearest Neighbor Classifiers, Bayes Classifier, Naive Bayes Classifier, Artificial Neural Networks (ANN), Support Vector Machines.

UNIT IV:
Data Mining Association Analysis: Basic Concepts and Algorithms: Association Rule Mining, Frequent Itemset Generation, Association Rule Discovery : Hash tree, Factors Affecting Complexity, Maximal Frequent Horible Closed Itemset, Alternative Methods for Frequent Itemset Generation, FP-growth Algorithm, Tree Projection, Rule Generation, Pattern Evaluation,   Statistical Independence, Properties of A Good Measure, Support-based Pruning, Subjective Interestingness Measure.

UNIT V:
Data Mining Cluster Analysis: Basic Concepts and Algorithms: Applications of Cluster Analysis, Types of Clusters, **Clustering Algorithms:** K-means and its variants, Hierarchical clustering, Density-based clustering. Graph-Based Clustering, Limitations of Current Merging Schemes, Characteristics of Spatial Data Sets, Shared Near Neighbor Approach, ROCK (RObust Clustering using linKs), Jarvis-Patrick Clustering, SNN Clustering Algorithm, **Data Mining Anomaly Detection:** Anomaly/Outlier Detection, Importance, Anomaly Detection Schemes, Density-based: LOF approach

REFERENCES:
1. Introduction to Data Mining by Tan, Steinbach, Kumar.
2. Data Mining: Concepts and Techniques by Jiawei Han, MichelineKamber, Morgan Kaufmann Publishers.
3. Data Mining: Practical Machine Learning Tools and Techniques by Ian H. Witten and Eibe Frank, Morgan Kaufmann, 2nd Edition (2005).
4. Principles of Data Mining: David Hand, HeikkiMannila&Padhraic Smyth, PHP Publication.

Lab Exercise: CSC436 Practical based on CSC435
At least two experiments should be carried out on each unit.

Subject Reference no	CSC437	Subject Title	Cryptography and Network Security
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To study the main security threats of communication networks. To establish certain security mechanisms that avoids or considerably diminishes these threats. To introduce modern cryptography techniques. To study specific cryptography techniques that guarantee security in certain applications (e-mail, e-commerce, web access, etc.). To introduce the most widely known standards for each case.

Prerequisite: Student must aware of data communication principals, computer networks , communication basics and concept of information theory is mandatory.

UNIT I:
Introduction: Security Trends, the OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A model for network security.

UNIT II:
Symmetric Ciphers: Symmetric Cipher Model, Substitution Techniques, Transposition techniques, Steganography, Block Cipher Principles, The data Encryption Standard, Block Cipher Design Principles.

UNIT III:
Public-Key Encryption And Hash Functions: Introduction to Number Theory, Public-Key Cryptography and RSA, Key Management; Other Public –Key Cryptosystems, Message Authentication and Hash Functions, Digital Signatures and Authentication Protocols.

UNIT IV:
Network Security Practice And System Security: Electric Mail Security, IP Security, Web Security

UNIT V:
System Secutity: Intruders, Malicious Software, Firewalls.

Practical:

A) Seminar Presentation: In this a group of 2-3 students is required to read some new materials that are not covered in the class, and then present it in the class| each presentation lasts 20 minutes, including questions. Student also has to write a formal report (about 15 pages) of your presentation material and hand in before the final exam. The total number of presentation projects allowed in this course is 3- the topics will be given by instructor, and students choose topics based on First Coming First Service (FCFS).

B) Programming project: In this project, each student is required to program some existing protocols. Your program has to run correctly to be graded. You have to hand in the documentation of your programming in addition to the code itself.

Text Book:
1. Cryptography and Network Security: Principles and Practice; Fourth or Fifth Edition. By William Stallings, Prentice Hall, Hardcover.
2. Cryptography: Theory and Practice by Douglas R. Stinson, CRC press, hardcover, Published March, 1995. ISBN 0-8493-8521-0.
3. Network Security Essentials: Applications and Standards by William Stallings.Prentice Hall, Hardcover, Published November 1999, 366 pages, ISBN 0130160938.

Lab Exercise: CSC438 Practical based on CSC437
At least two experiments should be carried out on each unit.

Subject Reference no	CSC439	Subject Title	Introduction to MEMS Pro+
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To learn the MEMS Technology for Nanotechnology applications.
Prerequisite:

UNIT-I:
Introduction: history of MEMS, market for MEMS, overview of MEMS processes properties of silicon, a sample MEMS process, **Basics of Microtechnology:** definitions and terminology, a sample process, lithography and etching.MEMS **Biosensors:** Bio Flow Sensors, MEMS Images. Introduction to MEMS Pro design software. **Micromachining:** subtractive processes (wet and dry etching), additive processes (evaporation, sputtering, epitaxial growth). Fundamental Devices and Processes: basic mechanics and electrostatics for MEMS, parallel plate actuators, pull-in point, comb drives.

UNIT-II:
Fundamental Devices and Processes: more electrostatic actuators; MEMS foundries, Cronos MUMPs (multi user MEMS process). **MUMPs Multi User MEMS Process:** JDS Uniphase MUMPs processing sequence and design rules. **MUMPs and SUMMIT:** design rules; applications; micro hinges and deployment actuators.

UNIT-III:
CMOS MEMS: CMOS foundry processes, integrated IC/MEMS, MEMS postprocessing, applications. Cleanroom lab techniques: clean rooms, gowning procedures; safety, fire, toxicity; acids and bases; photolithography. MicroOptoElectroMechanical Systems (MOEMS): micro scanners, digital mirror display, retinal scanning display. Grating light valve, corner cube retroreflector, optical switches, other micro-optical devices.

UNIT-IV:
Thermal Transducers: bimorphs, "heatuators", cilia arrays, Piezoresistivity; **Scanning Probe Microscopy:** scanning tunneling microscope (STM), atomic force microscope (AFM), Scaling Laws **Wireless MEMS:** mechanical and electrical resonators, Q-factor, switches, filters. **Power for MEMS:** thin film batteries, micro fuel cells, energy fields.

UNIT-V:
MEMS Packaging and Assembly: microassembly: serial and parallel, deterministic and stochastic; **Microgrippers:** HexSil process; packaging techniques, **The Future of MEMS:** bioMEMS - neural implants, gene chips, diagnostic chips; MEMS in space; mechanical computers; invisible and ubiquitous computing.

Text Book
1. HSU, TAI RAN, MEMS AND MICROSYSTEMS Design And Manufacture, Tata McGraw-Hill,2002.
2. Mems and Moems Technology and Applications,Rai-Choudhury, Prosenjit; SPIE 2000.
3. Http://jntu.ac.in/dap/syl.html

Lab Exercise: CSC440 Practical based on CSC439
At least two experiments should be carried out on each unit.

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M. Sc. Information Technology

Vertical Relative Distribution of Courses

Sem-I	Sem-II	Sem-III	Sem-IV
Object Oriented Programming in C++	Programming in Core Java	Programming in Advanced Java	VB.Net Technology
Computer System Architecture	Software Engineering and CASE tools	Decision Support System and Intelligent System	Major Project
Operating System	Data Structure and Algorithms	Network Security	Seminar
Relational Database Management System	Computer Network	Elective I:(Any one from list of Elective I) 1. XML.Net 2. Image Processing 3. Operating System for Mobile 4. ASP.Net 5. WML	Elective II: (Any one from list of Elective II) 1. Programming J2ME 2. Open Source Web Programming Using PHP 3. CORBA 4. GIS 5. Biometrics

Core Courses:

Semester-I

Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks: 100	
				External	Internal
CSI401	Object Oriented Programming in C++	4	4	80	20
CSI402	Computer System Architecture	4	4	80	20
CSI403	Operating System	4	4	80	20
CSI404	Relational Database Management System	4	4	80	20
CSI451	Practical Bases on CSI401	2	4 (Per Batch)	50	-
CSI452	Practical Bases on CSI402	2	4 (Per Batch)	50	-
CSI453	Practical Bases on CSI403	2	4 (Per Batch)	50	-
CSI454	Practical Bases on CSI404	2	4 (Per Batch)	50	-
Total No of Credits in Sem-I		24	--	--	--

Semester II:

Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks: 100	
				External	Internal
CSI405	Programming in Core Java	4	4	80	20
CSI406	Software Engineering and CASE Tools	4	4	80	20
CSI407	Data Structure and Algorithms	4	4	80	20
CSI408	Computer Networks	4	4	80	20
CSI455	Practical Bases on CSI405	2	4 (Per Batch)	50	-
CSI456	Practical Bases on CSI406	2	4 (Per Batch)	50	-
CSI457	Practical Bases on CSI407	2	4 (Per Batch)	50	-
CSI458	Practical Bases on CSI408	2	4 (Per Batch)	50	-
Total No of Credits in Sem-II		24	--	--	--

Semester III:

Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks: 100	
				External	Internal
CSI501	Programming in Advanced Java	4	4	80	20
CSI502	Decision Support System and Intelligent System	4	4	80	20
CSI503	Network Security	4	4	80	20
CSI504	Elective I:(Any one from list of Elective I)	4	4	80	20
CSI551	Practical Bases on CSI501	2	4 (Per Batch)	50	-
CSI552	Practical Bases on CSI502	2	4 (Per Batch)	50	-
CSI553	Practical Bases on CSI503	2	4 (Per Batch)	50	-
CSI554	Practical Bases on CSI504	2	4 (Per Batch)	50	-
Total No of Credits in Sem-III		24	--	--	--

Semester IV:

Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks: 100	
				External	Internal
CSI505	VB.Net Technology	4	4	80	20
CSI506	Elective II: (Any one from list of Elective II)	4	4	80	20
CSI555	Practical Based on CSI505	2	4 (Per Batch)	50	-
CSI556	Practical Based on CSI505	2	4 (Per Batch)	50	-
CSI557	Major Project	8	16 (Per Batch)	50	-
CSI558	Seminar	4	8 (Per Batch)	50	-
Total No of Credits in Sem-IV		24	--	--	--

Elective I:

Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks: 100	
				External	Internal
CSI421	XML.NET	4	4	80	20
CSI422	Practical Based on CSI 421	2	4 (Per Batch)	50	-
CSI423	Image Processing	4	4	80	20
CSI424	Practical Based on CSI423	2	4 (Per Batch)	50	-
CSI425	Operating System for Mobile	4	4	80	20
CSI426	Practical Based on CSI425	2	4 (Per Batch)	50	-
CSI427	ASP.NET	4	4	80	20
CSI428	Practical Based on CSI427	2	4 (Per Batch)	50	-
CSI429	WML	4	4	80	20
CSI430	Practical Based on CSI429	2	4 (Per Batch)	50	-

Elective II

Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks: 100	
				External	Internal
CSI431	Programming J2ME	4	4	80	20
CSI432	Practical Based on CSI 431	2	4 (Per Batch)	50	-
CSI433	Open source Web Programming using PHP	4	4	80	20
CSI434	Practical Based on CSI433	2	4 (Per Batch)	50	-
CSI435	CORBA	4	4	80	20
CSI436	Practical Based on CSI435	2	4 (Per Batch)	50	-
CSI437	GIS	4	4	80	20
CSI438	Practical Based on CSI437	2	4 (Per Batch)	50	-
CSI439	Biometrics	4	4	80	20
CSI440	Practical Based on CSI429	2	4 (Per Batch)	50	-

Service Courses:

The student should opt service courses of 8 credits either from parent department or other department.

Course Code	Course Title	No. of Credits	No. of Hours / Week	Total Marks: 100	
				External	Internal
CSI441	Aptitude	2	2	80	20
CSI442	Practical Based on CSI441	2	4 (Per Batch)	50	-
CSI443	Personality Development	2	2	80	20
CSI444	Practical Based on CSI443	2	4 (Per Batch)	50	-
CSI445	Communication Skills	2	2	80	20
CSI446	Practical Based on CSI445	2	4 (Per Batch)	50	-
CSI447	Computer Animation & Simulation	2	2	80	20
CSI448	Practical Based on CSI447	2	4 (Per Batch)	50	-
CSI449	Introduction to MATLAB	2	2	80	20
CSI450	Practical Based on CSI449	2	4 (Per Batch)	50	-

Subject Reference no	CSI401	Subject Title	Object Oriented Programming in C++
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objectives: By the end of the course students will be able to:

- Write C++ programs using the more esoteric language features.
- Utilize Object Oriented techniques to design C++ programs.
- Use the standard C++ library.
- Exploit advanced C++ techniques

Prerequisite: Student must aware of Programming using C and Programming language concepts.

UNIT I:

Principle of Object Oriented Programming: Introduction, Procedural Vs Object Oriented Programming, Classes, Object, Data Abstraction,Encapsulation, Inheritance, Polymorphism,Dynamic Binding, Message Passing, Object Oriented Languages, Object Based languages. **Basics of C++:** A Brief History of C & C++, C Vs C++, A Simple C++ Program, Application of C++, Structure & Class, Compiling &Linking, Tokens, Keywords, Identifiers & Constants, Basic Data Types, User-Defined Data Types, Symbolic Constant, Type Compatibility, Reference Variables, Operator in C++, Scope Resolution Operator, Member Dereferencing Operators, Memory Management Operators, Manipulators, Type Cast Operator.

UNIT II:

Decision making and looping Structures: If statement, if-else construct, use of logical operators and Compound Relational Tests, Nested if statements, The else if construct, the relational operators, the conditional expression (ternary) operator, The switch statement with or without break, The for statement, Nested for Loop, for loop variants, the while statement, Increment/decrement operators, Use of Break and Continue, the do-while loop. **Functions In C++:** The Main Function, Function Prototyping, Call by Reference Call by Address, Call by Value, Return by Reference, Inline Function, Default Arguments, Const Arguments, Function Overloading,Friend Function.

Arrays and Pointers: Declaration, Referring individual elements, Entering data into an array, reading data from an array, Array Initialization, Bounds checking, Passing array elements to a function, Introduction to Pointers, Pointers and Structures, Pointers and Functions, Pointers and Arrays, Operation on Pointers, Pointers to Functions, Two Dimension Arrays and pointers.

UNIT III:

Structures: Declaring structure, initializing structure, structure variables, accessing structure elements, Arrays of structure,   Functions and Structures, Structures within structures, Structures containing arrays, Union, **Classes & Object:** A Sample C++ Program with class, Defining Member Functions, Making an Outside Function Inline, Nesting of Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Object as Function Arguments,   Returning Objects, **Constructor & Destructor:** Constructor,

Parameterized Constructor, Multiple Constructor in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructor, Const Object Destructor.

UNIT IV:
Operator Overloading & Type Conversion: Defining operator Overloading, Overloading Unary Operator, Overloading Binary Operator, Overloading Binary Operator Using Friends, Manipulating of String Using Operators, Type Conversion, Rules for Overloading Operators, **Inheritance:** Defining Derived Classes, Single Inheritance, Making a Private Member Inheritable, Multilevel Inheritance, Hierarchical Inheritance, Multiple Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, **Virtual Function & Polymorphism:** Introduction, Pointer to Object, This pointer, Pointer to Derived Class, Virtual Function, Pure Virtual Function, Early Vs Late Binding. **The C++ I/O System Basics:** C++ Streams, C++ Stream Classes, Unformatted I/O Operation, Formatted I/O Operation, Managing Output with Manipulators.

UNIT V:
Working with Files: Introduction, Classes for File Stream Operation, Opening & Closing Files, Detection of End of File, More about Open( ): File modes, File pointer & manipulator, Sequential Input & output Operation, Updating a File : Random Access, Command Line Arguments. **Exception handling And Template:** Exception Handling Fundamentals, The try Block, the catch Exception Handler, The throw Statements, The try/throw/catch sequence, Exception Specification, Unexpected Exception, Catch – All Exception Handlers, Throwing an exception from handler, Uncaught Exception, Generic Function, A function with Two Generic Data Types, Explicitly Overloading a Generic Function, Overloading a Function Template

Books :
1. C++: The Complete Reference by Herbert Schildt

References:
1. Turbo C++ ByLafore R.
2. Let us C++ By KanetkarYashvant.
3. Object Oriented Programming with C++ : E. Balagurusamy
4. C++ Primer : Stanley Lippman & Lajoi
5. C++ Programming Language : BjarneStroustrup
6. C++ Programming Bible : Al Stevens & Clayton Walnum

Lab Exercise: CSI451 Practical based on CSI401
At least two experiments should be carried out on each unit.

Subject Reference no	CSI-402	Subject Title	Computer System Architecture
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs. /Week	4 Theory, 4 Practical/Per Batch	External (Semester Exam)	80%

Objective: To study the basic working and organization of various components of computer systems.
Prerequisite: Student must aware of basics of digital electronics, microprocessor architecture, ALP
UNIT I:

Data Representation: Introduction, Data types, Complements, Fixed Point and Floating Point representation, Error Detecting Codes.

UNIT II:
Digital Logic Circuits: Digital Computers, Logic Gates, Boolean algebra, Map Simplification, Combinational Circuits, Flip-Flops Sequential Circuits.

UNIT III:
Digital Components: Integrated Circuits, Decoders, Multiplexers, Registers,Shift Registers, Binary Counters, Memory Unit.

UNIT IV:
Central Processing Unit: Introduction, general Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer(RISC).

UNIT V:
I/O& Memory Organization: Peripheral Devices, Input Output Interface, Asynchronous Data Transfer, Modes of Transfer, Direct Memory Access, Input-Output Processor, and Serial Communication, Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Text Book:
1. Computer System Architecture-M. Morris Mano, PHI Publication, ISBN-81-203-0855-7.Third Edition.
References:
1. Computer Organization and Architecture- William Stallings – Fifth Edition.
2. Structured Computer Education – Andrew S Tanenbaum-(Prentice Hall)-Fourth Edition.

Lab Exercise: CSI452 Practical based on CSI402
At least two experiments should be carried out on each unit.

Subject Reference no	CSI403	Subject Title	Operating System
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective: This course explores the learners about operating system and their components. This covers the fundamental functionality of Operating system like memory management, process management, I/O management, storage management. Make them ready to analyze the real perspective of operating system in network, distributed, parallel and multi core environment.
Prerequisite: Student must know Computer system architecture in order to understand functioning of operating system and must have knowledge of disk operating systems.
UNIT I:
Overview: Introduction, history of operating system, **Memory Management:** Processes in memory. Logical addresses. Partitions: static *versus* dynamic, free space management, external fragmentation,

Segmented memory. Paged memory: concepts, internal fragmentation, page tables. Demand paging/segmentation. Replacement strategies: FIFO, LRU (and approximations), NRU, LFU/MFU, MRU.

UNIT II:
Cache Management: Allocation and de-allocation techniques, coherence technique, **Processes and Scheduling:** Job/process concepts. Scheduling basics: CPU-I/O interleaving, (non-)preemption, context switching, **Scheduling algorithms:** FCFS, SJF, SRTF, priority scheduling, round robin, Combined schemes Process details like creation PCB, process view, Thread and interprocess Communication.

UNIT III:
Lower Process Management: Process Synchronization, Deadlocks, Live locks, **I/O Subsystem:** General structure. Polled mode *versus* interrupt-driven I/O, Application I/O interface: block and character devices, buffering, blocking *versus* non-blocking I/O, **Other issues:** caching, scheduling, spooling, performance, File-system Interface, File System Implementation, Mass Storage Structure, File concept, Directory and storage services, File names and meta-data, Directory name-space: hierarchies, DAGs, hard and soft links, File operations, Access control, Existence and concurrency control.

UNIT IV:
Protection and Security: Requirements, Subjects and objects, Design principles, Authentication schemes, **Access matrix:** ACLs and capabilities, Combined scheme, Covert channels.

UNIT V:
Case Studies:
- The Linux System
- Windows XP

Books:
1. Abraham Silberscatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts ", 7thed John Wiley and Sons, Inc 2005.
2. William Stallings, "Operating Systems: Internals and design Principles", 5th Ed Prentice –hall, 2005.
3. Andrew Tanenbaum, "Modern operating systems" 3rd Ed, Pearson Education.

Lab Exercise: CSI453 Practical based on CSI403
At least two experiments should be carried out on each unit.

Subject Reference no	CSI404	Subject Title	Relational Database Management System
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: The course aims to give the students both the theoretical and practical foundation in Data Base Management Systems. Student will also learn advanced concepts as well as new trends in the field. This course has two main objectives:
- To provide students with an understanding of the relational model, relational database design, and SQL.
    Students will construct SQL queries using SQL.

- To provide students with a working knowledge of the underlying architecture and implementation of modern database systems.
  Students will study different concepts like, Integrity Constraints, indexing methods, transaction management, query processing, etc.

Prerequisite: Before attending this course student must aware with basics of database management systems, working with queries etc.

UNIT I:
Overview of Database Concepts: Introduction, Basic Concepts, View of data, Data models, E-R diagrams, DBA, DB Users, Mapping Cardinalities, Keys, Database Languages, **Relational Model:** Structure of relational database models, Relational Algebra, Modification of database, Views, **SQL:** Background, Basic Structure, Different Operations, Functions, Queries, Relations, Views, **Indexing and Hashing:** Basic Concepts, Indexing, Types of Indexing, Hashing, B+, B- Trees, Static Hashing, Dynamic Hashing.

UNIT II:
Relational Database Design: Functional Dependencies, Normalization, Types of Normalization, **Query Processing:** Overview, Transformation of relational expressions, evaluation of expressions, measures of query cost, architecture of query processing model, distributed query processing

UNIT III:
Transactions: Concept, Transaction States, ACID property, Concept of Serializability, testing for serializability, analysis of different types of schedules like : conflict equivalent, conflict serializable, concept of conflict serializability, etc. **Concurrency Control:** Protocols for Concurrency control: Timestamp, Lock-based, granting of locks, two phase locking protocol, graph based protocol, etc, Concept pf multiple granularity, Deadlock handling.

UNIT IV:
Database Recovery : Failure Classification, Storage structure, recovery and atomicity, check points, types of recovery like, log based recovery, shadow paging etc. **Database System Architectures:** Centralized Systems, Client-Server systems, Parallel and distributed systems, Network types, **Distributed Databases:** Distributed data storage, data replication, data fragmentation.

UNIT V:
New Applications: DSS, MIS, Data Mining, Data Warehousing, Types of Databases, New Trends in databases, **Introduction to RDBMS:** Concept, types, examples, applications.

Books:
1. Silberschatz, Korth, &Sudarshan, ***Database System Concepts***, 5th edition, McGraw-Hill (2005).
2. Elmasri&Navathe, *Fundamentals of Database Systems*.
3. Introduction to Database Systems,Bipin C. Desai

Web references:
1. http://www.bell-labs.com/topic/books/db-book
2. www.mit.ocw.edu/

Lab Exercise: CSI454 Practical based on CSI404
At least two experiments should be carried out on each unit.

Subject Reference no No of Credits	CSI405 4 Theory, 2 Practical	Subject Title Assignment/ Sectionals (Internal)	Programming in Core Java 20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course objective

The course provides students with the knowledge and skills needed to develop applications in Java for the Microsoft and sun platform. The course focuses on fundamental concepts, designing user interfaces, program structure, language syntax, and implementation details. This is the first course in the Java Certification Exam and will serve as the entry point for other Advance Java Courses.

Audience

This course is intended for both novice and experienced programmers who have a minimum of three months programming experience of Object Oriented Programming.

At Course Completion

After completing this course, students will be able to:
•   Create a simple Java Application based on the Java Foundations.
•   Use of Java forms and controls to create a user interface.
•   Create and use variables and arrays.
•   Create and use Class, Interfaces, Packages and predefined utility classes.
•   Implement decision structures and loops by using conditional expressions.
•   Validate user input for fields, controls, and forms.
•   Apply object-oriented programming techniques to create classes, add methods, and add behavior to the classes
•   Resolve syntax, run-time, and logic errors by using the structured exception handling.
•   Enhance the user interface by adding menus, status bars, and toolbars.

Prerequisites

Before attending this course, students must have:
•   Student should know the Object oriented programming Concepts
– Or –
•   Understanding of the basics of structured programming, including concepts such as flow control, variables and parameters, and function calls.

UNIT I:

A. Java Introduction: The Java Environment – Overview, Writing a Java Program, Obtaining The Java Environment, Setting up your Java Environment, Creating a Class That Can Run as a Program, The main() Method, Useful Stuff Necessary to go Further, System.out.println(), Using the Java Documentation, **B. Java Basics:** Basic Java Syntax: General Syntax Rules, Java Statements, Blocks of Code, Comments, Variables:,Data types, Primitive Data Types, Object Data Types, Literal Values, Constants and the final keyword, Mathematics in Java: Expressions, Operator Precedence, Multiple Assignments, Order of Evaluation, Bitwise Operators, Compound Operators, Expressions that Mix Data Types: Typecasting Creating and Using Methods, Creating Methods, Variable Scope

UNIT II:

A. Java Objects: Objects: Object-Oriented Languages, Object-Oriented Programs, Encapsulation, Creating and Using an Instance of an Object, References Defining a Class, Constructors, Method

Overloading, The this Keyword, static Elements, Garbage Collection, Java Packages, Dealing with Keyboard Input, String, StringBuffer, and StringBuilder, Creating Documentation, Comments and Using javadoc, Javadoc Comments **B. Comparisons And Flow Control Structures:** Controlling Program Flow: Boolean-Valued Expressions, Complex boolean Expressions, Simple Branching, Two Mutually Exclusive Branches, Nestedif... elseStatements - Comparing a Number of MutuallyExclusive Options, Comparing a Number of Mutually ExclusiveOptions - The switchStatement, Comparing Objects, Conditional Expression, while and do. . .while Loops, for Loops, Additional Loop Control: break and continue, Breaking Out of a Loop, Continuing a Loop, Classpath, Code Libraries, and Jar files, Using CLASSPATH Creating a jar File (a Library) **C. Arrays and Vectors:** Arrays : Defining and Declaring Arrays, Instantiating Arrays, Initializing Arrays, Working With Arrays, Array Variables, Copying Arrays, Arrays of Objects, Enhanced for Loops - the For-Each Loop, Multi-Dimensional Arrays, Multidimensional Arrays in Memory, Example - Printing a Picture, Typecasting with Arrays of Primitives, Using Vectors: Defining Vectors and using Vectors

UNIT III:
A. Inheritance: Inheritance: Derived Class Objects, Polymorphism, Inheritance and References Dynamic Method Invocation, Creating a Derived Class, Inheritance and Access Inheritance and Constructors - the super Keyword, Derived Class Methods That Override Base Class Methods Inheritance and Default Base Class Constructors, The Instantiation Process at Runtime, Typecasting with Object References: Typecasting, Polymorphism, and Dynamic Method Invocation, More on Overriding, Object Typecasting Example, Checking an Object's Type: Using instanceof, Typecasting with Arrays of Objects, Other Inheritance-Related Keywords: abstract, final, Methods Inherited from Object **B. Packages and Interfaces:** Interfaces: Creating an Interface Definition, Implementing Interfaces: Implementing Interfaces – Example, Reference Variables and Interfaces, Calling an Interface Method, Interfaces and Inheritance: Some Uses for Interfaces, Interfaces and Event-HandlingInterfaces and "Pluggable Components", Packages: Creating and using packages, Access **C. Inner Classes:** Inner Classes, Nested Classes,Inner Class Syntax, Instantiating an Inner Class Instance from Within the Enclosing Class, Inner Classes Referenced from Outside the Enclosing Class Working with Inner Classes **D. Exceptions:** Exceptions: Handling Exceptions, Exception Objects: Attempting Risky Code - try and catch, Guaranteeing Execution of Code - the finally Block, Letting an Exception be Thrown to the Method Caller, Throwing an Exception, Exceptions and Inheritance, Exception Class, Constructors and Methods, Creating and Using Your Own Exception Classes, Rethrowing Exceptions, Initializer Blocks, Static Initializer Blocks, Assertions

UNIT IV:
A. Utility Classes: Collection Interfaces, Concrete collections, Collections framework, Algorithms, Legacy Collections Streams: Output Streams, Input Streams, Filter Streams, Readers and Writers **B. Applet and Swings:** Applet: Applet Life Cycle, Passing Parameters to Applet, Delegation Event Model, Awt Components, Awt Events, using listeners, Working with Graphics, Loading Image and Multimedia objects in applets.

UNIT V:
Working with Swings: Using JFC Foundations**,** Preparing Frame, Panel**,** working with Graphics, Adding Components, Adding Events**,** Creating and Using Menu-bar, toolbars, SDI and MDI Java Frames.

Text books:
Books
1. Java 2 Complete Reference by Herbert Schieldt (Sixth Edition)
2. Core Java Vol 1: Sun Press, Eighth Edition
3. Core Java Vol 2: Sun Press

Additional Reference
1. **Programmer's Guide to Java™ Certification, A: A Comprehensive Primer,** Khalid A. Mughal, Rolf W. Rasmussen, **Second Edition,** August 04, 2003, Addison Wesley.

Web Reference
1. **http://www.javapassion.com/javaintro/**
2. Presentation Slides (Available in .ppt format)

E-book:
1. Java 2 Complete Reference by Herbert Schieldt (Fourth Edition)

Lab Exercise: CSI455 Practical based on CSI405
At least two experiments should be carried out on each unit.

Subject Reference no	CSI406	Subject Title	Software Engineering and CASE Tools
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective :
This course aims to give students both a theoretical and a practical foundation in software engineering. In the theoretical part, students will learn about the principles and methods of software engineering, including current and emerging software engineering practices and support tools. In the practical part, students will become familiar with the development of software products from an industry perspective, including generation of appropriate documents, under tight schedules and limited resources. Because this is a writing component course, there will be heavy emphasis on written communication skills.

Prerequisite :
Basic understanding of software development process.

UNIT-I:
Software and software process models: software categories and characteristics, legacy software, software myths, Software engineering- A layered technology, A process framework, waterfall model, incremental and evolutionary models. *Requirement engineering:* Requirement engineering task, initiating the requirement engineering process, eliciting requirements, developing use cases, building analysis model, Negotiating requirements, validating requirements, data modeling, functional modeling and behavioral modeling.

UNIT-II:
Design Engineering: Design process and design quality, design concepts, design model, architectural design, Interface design.

UNIT-III
Testing Strategies and Tactics: Unit testing, integration testing, validation testing, system testing, white box testing, black box testing.

UNIT-IV:

Product Metrics: Software quality, framework for product metrics, Metrics for analysis model, Metrics for design model, Metrics for source code, Metrics for testing, metrics for maintenance.

UNIT-V:
Managing Software Projects: Management spectrum, people, product, process, project, software project estimation, decomposition techniques, Empirical estimation, project scheduling and tracking, risk management, Quality management and change management.

Textbooks:
1. R. Pressman, Software Engineering: A Practioner's Approach, 6th Edition.2005.

Lab Exercise: CSI456 Practical based on CSI406
At least two experiments should be carried out on each unit.

Subject Reference no	CSI407	Subject Title	Data Structure and Algorithms
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective
This course is designed for the students to learn principals of Data structure, Algorithms and understand issues related to allocation of memory, optimization of Algorithms, Time and Space Complexity associated with Algorithms, Sorting, Searching Algorithms applied on data structures. The course covers fundamental data structures, including lists, stacks, queues, trees, and graphs, and it examines classic algorithms that use these structures for tasks such as sorting, searching, pattern matching, and data compression. Techniques for analyzing the efficiency of algorithms are also studied. Key notions of object-oriented programming, including encapsulation and abstract data types, are emphasized.

At Course Completion
After completing this course, students will be able to:
•Understand structure and behavior of Algorithms
•Better scope to write effective programs
•The course content helpful in the preparation of UGC-SET/NET, DRDO entry level Examinations
•This course will be the basic course for learning Algorithms and Approximation of Algorithms related research

Prerequisites
Before attending this course, students must have introductory concepts of like set theory, Principals of programming languages, Introductory Object oriented programming paradigm

Course Outline

UNIT-I:
Introduction: Need of Data structures and Algorithms, Writing Algorithms, Testing Algorithms using Hand runs, Building Algorithms, Data Structures types like Linear, Non Linear, and Abstract Data Types, Data Structure operations like Traversing, Searching, Sorting, insertion, Deletion.

UNIT –II:
Elementary Data Structures: Arrays- Ordered List, Sparse Metrics, Array Representations, Stacks and Queues: -Organization, Operations, multiple stacks, types of queues, **Linked Lists:**- Singly Linked List, Doubly Linked List, Doubly Linked List and Dynamic Storage management, Garbage collection and Compaction.

UNIT –III:
Trees: Terminology, Binary Trees, Tree representation, Tree traversal, Threaded Binary Trees, Binary Search trees, B Tree, **Binomial Heaps:** Binomial Heap Operations, **Fibonacci Heap:** Mergable Heap operations.

UNIT –IV:
Graph Algorithms: Terminology and Representation, **Traversal:** BFS, DFS, Connected Components and Spanning trees, **Shortest path:** Dijkstra's, Bellman-ford, Single Source Shortest Path, All Pair shortest path Floyd-Warshall Algorithm, Transitive closure

UNIT –V:
Searching and Sorting: Linear Vs Binary search, Sorting: - Insertion Sort, Merge Sort, Quick sort, Radix Sort, **Design and Analysis Techniques:** Dynamic Programming:- Elements of Dynamic Programming, Matrix Multiplication, Longest Common Subsequence Problem, Introduction to Greedy Algorithms, Amortized Analysis Methods, time and Space Complexity of Algorthm.

Text Books
1. Fundamentals of Data Structures by Ellis Horowitz and SartajSahani.
2. Introduction to Algorithms by Thomas H Coreman et.al, PHI Publication

Home work (Term Work)
Every student is required to prepare a separate notebook for the course. Home work will be given after completion of the unit and student has to submit the home work on the date declared in the class.
Lab Exercise: CSI457 Practical based on CSI407
At least two experiments should be carried out on each unit.

Subject Reference no	CSI408	Subject Title	Computer Network
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To Study various structure and topologies of communication mediums
Prerequisite: Student must have knowledge of operating systems and data communications.
UNIT I:
Introduction to Computer Networks: Types of Network, Topologies, Client Server Model, Connection-oriented, connection less services, Transmission Media-Guided, Unguided, types of it, types of cables, VLANs, VPNs, Multiplexing, Bit rate, Baud Rate, Bandwidth etc. **Network Hardware Components:** Hub, Switch, Bridge, Router, Repeater, Gateway, etc. **Reference Models:** Introduction, ISO-OSI Reference

model, TCP/IP reference model, comparison of OSI and TCP/IP models, **Asynchronous Transfer Mode (ATM):** Cells, Header and Cell Formats, Layers in ATM

UNIT II:
Data Link Layer: Introduction, DLL Protocols, Frame Relay, X.25 protocol, MAC subs layer protocols, Local Area Networks (LANs): IEEE 802.4 and 802.5 Protocols, Performance of Ethernet and Token ring protocols, FDDI Protocol, Distributed Queue Dual Bus (DQDB) protocol, Network layer and Transport layer Introduction, Routing Algorithms, Congestion Control, TCP and UDP services, Multicasting, Spanning Tree.

UNIT III:
IP Addressing & DNS: What are IP address?, The hierarchical scheme pf IP addresses, class A,B,C,D IP Address, Subnetting Network, Subnet Masks, MAC address, IPv4 and IPv6 IP address, The Domain Name System, zones of DNS, **Switching:** Switching concept, Circuit Switching, Packet Switching, Virtual circuits & data grams, Message switching, Queuing models, ASN(abstract syntax Notation).

UNIT IV:
Network Security: Cryptography, Algorithms: Secret key and Public key, DNS-Domain Name Service, Digital Signature, Firewalls, Proxy server.

UNIT V:
Special Topics: Next Generation Networks, Data Centers, Cloud Computing, Bluetooth Technology, Green Networking, GSM, GIS, etc.

Books:
1. Computer Networks – A. Tanenbaum, (PHI pub.)
2. Data and Computer Communication – Willam Stallings, PHI pub.

References:

1. Data Communication & Network – Forouzan (TMH)
2. Internetworking with TCP/IP Vol-I – Comer (PHI pub.)
3. Data Communications and distributed Networks-V.B, Black, (Prentice Hall pub.)

Lab Exercise: CSI458 Practical based on CSI408
At least two experiments should be carried out on each unit.

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Subject Reference No	CSI501	Subject Title	Programming in Advance Java
No of Credits	4 Theory, 2Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective

This course assumes that students are aware of core java programming and hence it starts from threading and goes up to web programming. It covers some advance topics of reflection, applets, swings, JDBC, Networking, JSP and Servlet.

At Course Completion

After complication of this course students can write good application based on java. Students can appear for java certification examinations. Student can also work on networking and web projects.

Prerequisites

Student should know the programming in core java.

UNIT I:

Threading: Threading Basics: Java Thread Model, Creating and Running Threads, Manipulating Thread State, Thread Synchronization, Volatile Fields vs. Synchronized Methods, wait and notify, join and sleep, The Concurrency API, Atomic Operations, **Reflection:** Uses for Meta-Data, The Reflection API, The Class<T> Class, The java.lang.reflect Package, Reading Type Information, Navigating Inheritance Trees, Dynamic Instantiation, Dynamic Invocation, Reflecting on Generics

UNIT II:

Java Database Connectivity: JDBC, JDBC Architecture (type 1, type 2, Type 3, type 4) the java.sql.* package, Connection, ResultSet, Statements

UNIT III:

Servlets: Web Application Basics: How the Web works, Thin Clients, TCP/IP, HTTP overview, Brief HTML review, Overview of Java EE, servlets & Web applications., Servlet Basics, Servlet API:-HTML Forms, **HTTP:** Request-response, headers, GET, POST, Overview: How Servlets Work, Servlet Lifecycle: init(), service(), destroy(), Requests and responses, Core Servlet **API:** GenericServlet, ServletRequest, and ServletResponse, HTTP **Servlets:** HttpServletRequest, HttpServletResponse and HttpServlet, Accessing Parameters, Additional Servlet Capabilities, HTTP headers and MIME types RequestDispatcher: Including and forwarding, Sharing data with the request object attributes, Sharing data with ServletContext attributes, Error Handling.

UNIT IV:

Java Server Pages: Basics and Overview, JSP architecture, JSP tags and JSP expressions, Fixed Template Data, Lifecycle of a JSP, Model View Controller (MVC), Model 1/Model 2 Architecture, **Data Sharing among servlets & JSP:** Object scopes or "buckets", Request, application, session and page scope, Predefined JSP implicit objects (request, session, application, page), <jsp:useBean>, <jsp:getProperty>, <jsp:setProperty>, <jsp:include>, <jsp:forward>, More JSP Capabilities and Session Management, HTTP as a stateless protocol, Hidden form fields, Cookies: Overview, API, Using cookies, **Session overview:** Cookies and session tracking, HttpSession, Putting data into a session object, Retrieving data from a session object, Using session data in servlets and JSPs Additional JSP Capabilities, Exception handling

and error pages, Directives (page, include, others), Import declarations, Multithreading considerations and data safety, SingleThreadModel interface, Additional JSP Capabilities, JSP Directives, JSP Error Pages, JSP and Java Declarations, Scriptlet overview, Scriptlet syntax

UNIT V:
JSTL: Using Custom Tags, Custom tags overview, Reducing JSP complexity, Tag Libraries, Tag Library Descriptor (TLD), Loading a tag library in a web app, The JSTL, JSP Expression Language (EL), Using custom tags, The c:url, c:param, c:forEach, c:out tags, Overview of JSTL libraries, The JSTL Expression Language, Expressions, Type Coercion, Operators, String concatenation, Implicit Objects, The Core JSTL Library, General Purpose: c:out, c:set, c:catch, Conditional: c:if, c:choose,, Overview of other capabilities, Additional Topics : Servlet Filter overview, Filtering examples, lifecycle, & filter chains, Filter API, Modifying a request, Modifying a response, Struts Overview Advanced MVC – Struts overview, Command and State patterns, Struts View and Controller elements

Books:
1. Java 2 Complete Reference by Herbert Schieldt (Sixth Edition)
2. Core Java Vol 1: Sun Press
3. Core Java Vol 2: Sun Press

Additional Web Reference
http://www.javapassion.com/javaintro/
Presentation Slides (Available in .ppt format)

E-book:
1. Java 2 Complete Reference by Herbert Schieldt (Fourth Edition)

Lab Exercise: CSI55 Practical based on CSI501
At least two experiments should be carried out on each unit.

Subject Reference no	CSI502	Subject Title	Decision Support System and Intelligent system
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To provide the logic based frameworks for design and implementation of Decision Support System and Intelligent system
Prerequisite:

UNIT I:
Decision Support and Business Intelligence- Decision Support Systems and Business Intelligence: Opening Vignette: Toyota Uses Business Intelligence to Excel, Changing Business Environments and Computerized Decision Support, Managerial Decision Making, Computerized Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems (DSS), A Framework for Business Intelligence (BI), A Work System View of Decision Support, The Major Tools and Techniques of Managerial Decision Support, Implementing Computer-Based Managerial Decision Support Systems, **Computerized Decision Support, Decision Making, Systems, Modeling, and Support:** Opening Vignette: Decision Making at the U.S. Federal Reserve, Decision

Making: Introduction and Definitions, Models, Phases of the Decision Making Process, Decision Making: The Intelligence Phase, Decision Making: The Design Phase, Decision Making: The Choice Phase, Decision Making: The Implementation Phase, How Decisions are Supported, **Decision Support Systems Concepts, Methodologies, and Technologies: An Overview:** Opening Vignette: Decision Support System Cures for Healthcare, DSS Configurations, DSS Description, DSS Characteristics and Capabilities, Components of DSS, The Data Management Subsystem, The Model Management Subsystem, The User Interface (Dialog) Subsystem, The Knowledge-Based Management Subsystem, The User, DSS Hardware, DSS Classifications

UNIT II:
Modeling and Analysis: Opening Vignette: "Winning Isn't Everything... But Losing Isn't Anything:" Professional Sports Modeling for Decision Making, MSS Modeling, Static and Dynamic Models, Certainty, Uncertainty, and Risk, MSS Modeling with Spreadsheets, Decision Analysis with Decision Tables and Decision Trees, The Structure of Mathematical Models for Decision Support, Mathematical Programming Optimization, Multiple Goals, Sensitivity Analysis, What-IF, and Goal Seeking Problem Solving Search Methods, Simulation, Visual Interactive Simulation, Quantitative Software Packages and Model, Base Management, **Business Intelligence Special Introductory Section: The Essentials of Business Intelligence:** A Preview of the Content of Chapters, The Origins and Drivers of Business Intelligence, The General Process of Intelligence Creation and Use, The Major Characteristics of Business Intelligence, Towards Competitive Intelligence and Advantage, The Typical Data Warehouse and BI User Community, Successful BI Implementation, Structure and Components of BI, Conclusion: Today and Tomorrow **Data Warehousing:** Opening Vignette: Continental Airlines Flies High with Its Real-Time Data Warehouse, Data Warehousing Definitions and Concepts, Data Warehousing Process Overview, Data Warehousing Architectures, Data Integration, and the Extraction, Transformation, and Load (ETL) Process, Data Warehouse Development, Real-Time Data Warehouses, Data Warehouse Administration and Security Issues

UNIT III:
Business Analytics and Data Visualization: Opening Vignette: Lexmark International Improves Operations with BI, The Business Analytics Field-An Overview, Online Analytical Processing (OLAP), Reporting and Queries, Multidimensionality, Advanced Business Analytics, Data Visualization, Geographic Information Systems, Real-Time Business Intelligence, Automated Decision Support, and Competitive Intelligence, Business Analytics and the Web: Web Intelligence and Web Analytics, Usage, Benefits, and Success of Business Analytics **Data, Text, and Web Mining:** Opening Vignette: Highmark, Inc., Data Mining Concepts and Applications, Data Mining Techniques and Tools, Data Mining Project Process, Text Mining, Web Mining **Neural Networks for Data Mining:** Opening Vignette: Using Neural Networks to Predict Beer Flavors From Chemical Analysis, Basic Concepts of Neural Networks, Learning in Artificial Neural Networks, Developing Neural Network Systems, A Sample Neural Network Project, Other Neural Networks Paradigms, Applications of Neural Networks, A Neural Network Software Demonstration **Business Performance Management:** Opening Vignette: Cisco and the Virtual Close, Business Performance Management Overview, Strategize: Where Do We Want to Go? Plan: How Do We Get There? Monitor: How are We Doing? Act and Adjust: What Do We Need to Do Differently? Performance Measurement, Bpm Methodologies, Bpm Architecture and Applications, Performance Dashboards, Business Activity Monitoring (BAM)

UNIT IV:
Collaboration, Communication, Group Support Systems, and Knowledge Management-Collaborative Computing-Supported Technologies and Group Support Systems: Opening Vignette: Collaborative Design at Boein-Rocketdyne, Making Decisions in Groups: Characteristics, Process, Benefits, and Dysfunctions, Supporting Groupwork with Computerized Systems, Tools for Indirect

Support of Decision Making, Integrated Groupware Suites, Direct Computerized Support for Decision Making: From GDSS to GSS, Products and Tools for GDSS/GSS and Successful, Implementation, Emerging Collaboration Support Tools: From VoIP to Wikis, Collaborative Efforts in Planning, Design, and the Project Management, Creativity, Idea Generation and Computerized Support **Knowledge Management:** Opening Vignette: Simens Knows What It Knows through Knowledge Management, Introduction to Knowledge Management, Organizational Learning and Transformation, Knowlege Management Activities, Approached to Knowledge Management, Information Technology in Knowledge Management, Knowledge Management Systems Implementation, Roles of People in Knowledge Management, Ensuring the Success of Knowledge Management Efforts, **Intelligent Systems-Artificial Intelligence and Expert Systems:** Opening Vignette: Cigna Uses Business Rules to Support Treatment Request Approval, Concepts and Definition of Artificial Intelligence, The Artificial Intelligence Fields, Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, How Expert Systems Work- Inference Mechanisms, Problem Areas Suitable for Expert Systems, Development of Expert Systems, Benefits, Limitations and Success Factors of Expert Systems, Expert Systems on the Web

UNIT V:
Advanced Intelligent Systems: Opening Vignette: Improving Urban Infrastructure Management in the City of Verdum, Machine Learning Techniques, Case-based Reasoning, Genetic Algorithms Fundamentals, Developing Genetic Algorithm Applications, Fuzzy Logic Fundamentals, Natural Language Processing, Voice Technologies, Developing Integrated Advanced System. **Intelligent Systems over the Internet:** Opening Vignette: NetFlix Gains High Customer Satisfaction from DVD Recommendation, Web-Based Intelligent Systems, Intelligent Agents: An Overview, Characteristics of Intelligent Agents, Why Use Intelligent Agents, Classification and Types of Intelligent Agents, Internet-Based Software Agents, DSS Agents and Multi-agents, Semantic Web: Representing Knowledge for Intelligent Agents, Web-Cased Recommendation Systems, Managerial Issues of Intelligent Agents **Implementing Decision Support Systems- Systems Development and Acquisition:** Opening Vignette: Osram Sylvania Thinks Small, Strategizes Big- Develops the InfoNet HR Portal System, What Types of Support Systems Should We Build? The Landscape and Framework of MSS Applications Development, Development Options for MSS Applications, Prototyping: A Practical MSS Development Methodology, Criteria For Selecting a Development Approach, Third-Party Providers of MSS Software Packages and Suites, Connecting to Databases and Other Enterprise Systems, Rise of Web Services, XML, and Service-Oriented Architecture, End-user Developed MSS, Vendor and Software Selection and Management, Putting the MSS Together and Implementation Issues **Integration, Impacts, and the Future of Management Support Systems:** Opening Vignette: Elite-Care Supported by Intelligent Systems, Systems Integration: An Overview, Types of MSS Integration, Integration with Enterprise Systems and Knowledge Management, The Impacts of MSS: An Overview, MSS Impacts on Organizations, MSS Impacts on Individuals, Automating Decision Making and the Manager's Job, Issues of Legality, Privacy, and Ethics, Intelligent and Automated Systems and Employment Levels, Other Societal Impacts and the Digital Divide, The Future of Management Support Systems

Books:
1. Decision Support and Business Intelligence Systems, Turban, Pearson Education

References:
1. Decision Support Systems, George M. Marakas, 2nd Edition, Pearson Education
2. Decision Support Systems, Janakiraman V.S. and Sarukesi. K., Prentice Hall of India
3. Decision Support System and Management, Lofti, McGraw Hill Inc., International Edition, New Delhi.

Lab Exercise: CSI56 Practical based on CSI502
At least two experiments should be carried out on each unit.

Subject Reference no	CSI503	Subject Title	Network Security
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective: To learn various techniques to secure information while traveling through different communication mediums

Prerequisite: Student must know basics of data communications, protocols, and concepts of computer networks.

UNIT I:
1 - Overview
2 - Classical Encryption Techniques
3 - Block Ciphers

UNIT II:
4 - Advanced Encryption Standard
5 - Confidentiality Using Symmetric Encryption
6 - Number Theory

UNIT III:
7 - Public-Key Cryptography and RSA
8 - Public-Key Cryptosystems
9 - Hash Algorithms

UNIT IV:
10 - Digital Signatures
11 - Authentication Applications
12 - Electronic Mail Security

UNIT V:
14 - Web Security
15 - Intruders
16 - Malicious Software
17 - Firewalls

Textbook
1. The official course text is Cryptography and Network Security: Principles and Practice; Second Edition . By William Stallings, Prentice Hall, Hardcover
2. Network Security Essentials : Applications and Standards by William Stallings. Prentice Hall, Hardcover, Published November 1999, 366 pages, ISBN 0130160938

References:
1. Cryptography: Theory and Practice by Douglas R. Stinson, CRC press, hardcover.
2. Secrets and Lies: Digital Security in a Networked World by Bruce Schneier John Wiley, Published August 2000, 412 pages, ISBN 0471253111.

3. A Course in Number Theory and Cryptography (Graduate Texts in Mathematics),(Hardcover) by Neal Koblitz Number theory with computer applications, by Ramanjuachary Kumandari and Christina Romero (1998)

Assignments:
1. Get details of threats to information and system security. Discuss Virus, worms, Trojans etc in details.
2. Study any library for packet tearing and packet sniffing.
3. Implement Generic Cipher, Fiestal Cipher and DEC
4. Implement Packet Sniffing using the library studied in Assg No 2
5. Study of Firewall
6. Implementing firewall in Windows server/ Linux Server

Lab Exercise: CSI56 Practical based on CSI503
At least two experiments should be carried out on each unit.

Elective-I

Subject Reference no	CSI421	Subject Title	XML.NET
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective
XML is everywhere in the Microsoft® .NET Framework, from Remoting to Web services and from data access to configuration. Student will learn about the extensive XML core classes in .NET and find out how to program against its parser in-depth guide

At Course Completion
After completion of this course student can apply XML knowledge in scripting the web pages and write good applications using XML.NET

Prerequisite
Student must know web programming, design of web pages, client side scripts using VBScript of JavaScript.

Course Outline
UNIT I:
XML.NET Parsing Model: XML in DOTNET framework, Core classes for parsing, XML and ADO.NET, Application configuration, interoperability, XML API in DOTNET framework, DOTNET framework reader and writer, XML Reader, XML writer, **XML Reader:** Programming interface of Reader, the XmlReader Class, parsing with XmlTextReader Class, Parsing XML fragments, Writing custom XML readers.

UNIT II:
XML data Validation: the XmlValidatingReader Class, using DTD and XDR schemas, XML Schema API, **XML Writers:** Programming XML Writer Interface, XmlWriter base Class, XmlTextWriter base class, Writing Well formed XML text, Writing custom XML Writers, Read/Write XML streaming parser.

UNIT III:

XML Data Manipulation: XML DOM programming Interface: XmlDocument Class, XmlNodeBase class, XPath, XPath in XML DOM, the .NET XPath Navigation API, the XPathNavigator Class, XPath Iterators,
UNIT IV:
XML data Transformation: XSLT, Template programming, instruction, .NET framework XLT processor, XSLT Extension objects.
UNIT V:
XML and Data Access: Reading XML data from database, XML data readers, A disconnected XML data readers, writing XML data to databases, SQLXML managed classes.

Book:
1. Applied XML Programming for Microsoft® .NET, Dino Esposito, by Microsoft press.

Lab Exercise: CSI422 Practical based on CSI421
At least two experiments should be carried out on each unit.

Subject Reference no	CSI423	Subject Title	Image Processing
No of Credits	4 Theory, 3 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 3 Practical	External (Semester Exam)	80%

Objective: It focuses on material on Image Processing that is fundamental and has a broad scope of application.
Prerequisite: Student must aware of linear algebra, logic and digital signals.

Course Contents
UNIT I:
Digital Image Fundamentals, Image Enhancement in the Spatial Domain,

UNIT II:
Image Enhancement in the Frequency Domain, Image Restoration, Color Image Processing.

UNIT III:
Wavelets and Multiresolution Processing, Image Compression

UNIT IV:
Morphological Image Processing, Image Segmentation

UNIT V:
Representation and Description, Object Recognition

Text Book
1. Digital Image Processing, 3/e, Rafael C. Gonzalez, Richard E. Woods. Pearson Education, ISBN: 9788131726952

Lab Exercise: CSI424 Practical based on CSI423
At least two experiments should be carried out on each unit.

Subject Reference no	CSI425	Subject Title	Operating System for Mobile
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective: To learn the working of smart devices system software.
Prerequisite: Student must have basic knowledge of operating systems.

Course Outline

UNIT I:
Class Name Conventions on Symbian OS, **Leaves:** Symbian OS Exceptions, The Cleanup Stack

UNIT II:
Two-Phase Construction, **Descriptors:** Symbian OS Strings, Good Descriptor Style

UNIT III:
Dynamic Arrays and Buffers, Event-Driven Multitasking Using Active Objects, Active Objects under the Hood.

UNIT IV:
Symbian OS Threads and Processes, The Client–Server Framework in Theory, The Client–Server Framework in Practice, Binary Types, ECOM

UNIT V:
Panics, Bug Detection Using Assertions, Debug Macros and Test Classes, Compatibility

Text Book

1. Symbian OS Explained, Effective C++ Programming for Smartphones, Jo Stichbury, John Wiley & Sons, ISBN 0-470-02130-6

Lab Exercise: CSI426 Practical based on CSI425
At least two experiments should be carried out on each unit.

Subject Reference no	CSI427	Subject Title	ASP.NET
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective
The entire world is at fingertip of user due to easy access of internet. The design and development of web application has emerged with lots of potential. Students are exposed to the technology of Microsoft

ASP.NET which is widely adopted by the industry to build customized web applications. In this course student will learn how to use ASP.NET for building good web application using databases, security and web services.

At Course Completion
After completion of course student can build dynamic Web application and can undertake commercial web development.
Prerequisite
Student must have knowledge of HTML, DHTML, client side web scripting using VBScript and Java Script. Knowledge of ASP will be added advantage.

Course outline
UNIT I:
ASP.NET programming model: Introduction, event driven programming over http, http protocol, structure of ASP.NET page, ASP.NET component model, ASP.NET Provider model, Anatomy of ASP.Net Page: Invoking page, Page class, Page Life cycle.

UNIT II:
ASP.NET Core Server controls: Generalities of Server Controls, Properties, events and methods of Control class, **HTML controls:** Generalities of HTML controls, HTML Containers, HTML input controls, **Web controls:** Generalities of Web Control, core web control, misc web control, Validation controls: Generalities of validation controls, Gallery of controls, Programming with Web forms; HtmlFrom Class, Multiple forms, cross page postings, Page errors, Page Personalization.

UNIT III:
Ritch Page Composition: Working with master page, working with themes, working with wizards, ADO.NET data Providers, **Connecting to data sources:** connection strings, connection pooling, **Executing commands:** ADO Data Readers, Data Adapters, working with transactions, procedures etc. Data container objects: Data sets, Data tables, Data Relations, **Data binding models:** expressions and components.

UNIT IV:
Creating bindable grid of data: DataGrid Control, GridView control, **Managing list of records:** ListView control and **Managing views of records:** DetailView Control, FromView Control, **Initialization of Application:** HttpApplicationClass, Application module, methods and events of HttpApplication Class, The global.asax file, HttpContext Class, Server Object, HttpResponse Object, HttpRequest Object.

UNIT V:
ASP.NET state management: Application state, Session State: working with session state, customizing session state, view state of page. **ASP.NET caching:** Caching Application data, the Cache Class, **ASP.NET Security:** Using Form authentication, membership and role management API, Security related controls, AJAX Enabled web services: Web services as application specific services, remote call via web services,

Book:
1. Programming with Microsoft ASP.NET 3.5 by Dino Esposito, Microsoft Press
2. Programming with Microsoft ASP.NET 4.0 by Microsoft Press.

Web reference

1. http://msdn.microsoft.com/en-us/library/4w3ex9c2.aspx

Lab Exercise: CSI428 Practical based on CSI427
At least two experiments should be carried out on each unit.

Subject Reference no	CSI429	Subject Title	WML
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective:
To introduce wireless application protocol technology and applications.To introduce technology of mobile phones and pocket computers. To impart skills in WML and SDK
The next generation of mobile communicators is here, and delivering content to them will mean programming in WML (Wireless Markup Language) and WMLScript, the languages of the Wireless Application Environment (WAE). The WAE allows information in almost all applications to be formatted for display on mobile devices, such as cell phones, and enables the user to interact with the information. Why learn yet another technology? According to some estimates, 75 percent of web document viewing by the year 2002 will be through non-desktop devices, many using wireless technologies. Clearly, the future is wireless. For web developers who want to get up to speed quickly in these languages, Learning WML &WMLScript maps out in detail the WAE and its two major components, WML and WMLScript. Fortunately, the WAE provides a World Wide Web-like model for writing applications, incorporating several key features of the Web to ease the transition for developers. Almost all wireless applications can be written with WML, which replaces HTML in the wireless environment, and WMLScript, which replaces JavaScript. With this course, web developers with some knowledge of programming and C, Java, or JavaScript syntax can easily master both languages

Prerequisite:
Some knowledge of programming and C, Java, or JavaScript syntax

Course Contents:
UNIT I:
Basic concepts of WAP, WAP Client, WAP browser, working of WAP application, basic advantages, various applications, WAP Project elements.

UNIT II:
The WML language - character set, variable types, cards elements, attributes, entities, WML variables and contexts, tasks and events, WML user interaction, WML timers, Decks, templates, cards, Text and image formatting, Handling audio.

UNIT III:
WML Script Language: Character set, data types, identifiers, functions and events, operators, expressions, program control, standard libraries, browser library.

UNIT IV:
WAP application development with WML and WML Script, a calculator and a game development, SDK for WAP development

UNIT V:
Emerging topics in mobile communications – technology convergence in mobile phones- GSM standard telephones, WAP Gateway.

Text Book
1. Learning WML, and WMLScript, Martin Frost, October 1, 2000, O'Reilly Media, Inc.ISBN-13: 978-1-56592-947-0

Lab Exercise: CSI430 Practical Based on CSI429
At least two experiments should be carried out on each unit.

Semester-IV

Subject Reference no	CSI505	Subject Title	Programming VB.NET
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective
The course provides students with the knowledge and skills needed to develop applications in Microsoft Visual Basic .NET for the Microsoft .NET platform. The course focuses on user interfaces, program structure, language syntax, and implementation details. This is the first course in the Visual Basic .NET curriculum and will serve as the entry point for other .NET courses.

Audience
This course is intended for both novice and experienced programmers who have a minimum of three months programming experience and have basic Microsoft Windows navigation skills.

At Course Completion
After completing this course, students will be able to:
• Create a simple Visual Basic .NET–based application based on the Windows Application template.
• Use forms and controls to create a user interface.
• Create and use variables and arrays.
• Create and use Sub and Function procedures, including predefined functions.
• Implement decision structures and loops by using conditional expressions.
• Validate user input for fields, controls, and forms.
• Apply object-oriented programming techniques to create classes, add methods, and add properties.
• Resolve syntax, run-time, and logic errors by using the debugger and structured exception handling.
• Enhance the user interface by adding menus, status bars, and toolbars.
• Create a simple Visual Basic .NET–based Web Forms application that uses an XML Web Service.
• Access and manipulate data in a Microsoft Access or Microsoft SQL Server™ database by using Microsoft ADO.NET.
• Build, package, and deploy an application.A

Prerequisites
Before attending this course, students must have:
•   Windows navigation skills.

- Experience (at least three months) with developing applications in either a graphical or non-graphical environment.

– Or –

- Understanding of the basics of structured programming, including concepts such as flow control, variables and parameters, and function calls.

UNIT I:

Getting Started: This module introduces Visual Basic .NET and explains how it fits into the .NET platform. It explains how to use the programming tools in Microsoft Visual Studio .NET and provides enough practice so that students can create their first application in Visual Basic .NET.

- Basic .NET Concepts,
- Exploring the Development Environment
- Creating a Visual Basic .NET Project

Using Variables and Arrays: This module explains how to name, declare, assign values to, and use variables and constants. It explains how to declare variables with different levels of scope, how to create your own data structures, and how to convert variable values from one data type to another. It also describes how to store data in an array.

- Introduction to Data Types
- Using Variables
- Variable Scope
- Converting Data Types
- Creating and Using Structures
- Storing Data in Arrays

UNIT II:

Working with Procedures: This module describes how to create and use Sub and Function procedures, including predefined functions, and how to structure code for increased reusability.

- Creating Procedures
- Using Procedures
- Using Predefined Functions

Decision Structures and Loops: This module explains how to implement decision structures and loop structures to control program output and execution.

- Using Conditional Expressions
- Using Decision Structures
- Using Conditional Loop Structures

Validating User Input: This module explains how to validate user input at both the field level and the form level. It describes how to handle invalid input by providing error messages and guiding users through the process of finding and fixing errors. It describes how to use control properties and methods to restrict and validate data entry.

- Restricting User Input
- Validating Field Data
- Validating Form Data

UNIT III:

Object-Oriented Programming in Visual Basic .NET: This module explains how to create and use classes. The module explains the concepts of abstraction, encapsulation, instantiation, initialization, constructors, and destructors. This module also describes inheritance, polymorphism, and namespaces.

- Understanding Classes
- Working with Classes
- Using Shared Members

- Inheritance, Polymorphism, and Namespaces

Handling Errors and Exceptions: This module explains types of errors that can occur in a program and explains how to use the debugging tools provided with Visual Basic .NET to help diagnose and correct the errors. These tools include the Visual Studio .NET debugger, debugging windows, and structured exception handling.

- Types of Errors
- Using the Debugger
- Handling Exceptions

UNIT IV:

Working with Forms and Controls: This module explains fundamental programming concepts, including event-driven programming, classes, objects, properties, methods, and events. This module also explains how to use forms and controls to create a user interface. This includes the following: how to create a form, set properties, call methods, and write code for events; how to add controls to a form; how to manage multiple forms; how to use message boxes; how to use naming conventions; and how to format and document code.

- Understanding Programming Concepts
- Working with Windows Forms
- Working with Controls
- Styling Your Code

Enhancing the User Interface: This module explains how to create menus, status bars, and toolbars to enhance the usability of an application

- Creating Menus
- Creating Status Bars
- Creating Toolbars

UNIT V:

Using ADO.NET: This module explains how to use ADO.NET with a Windows Forms application to create, read, update, and delete records in Access and SQL Server databases.

- Database Concepts
- Overview of ADO.NET
- Working with Data

Deploying Applications: This module explains how to deploy applications by using Visual Studio .NET. The module also describes deployment options available in Visual Basic .NET, and how to create and configure a setup project for a Windows-based application.

- Introduction to Deployment
- Deploying a Windows-based Application

Lab Exercise: CSI555 Practical based on CSI505
At least two experiments should be carried out on each unit.

Elective-II:

Subject Reference No	CSI431	Subject Title	J2ME	
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)		20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)		80%

Objective
The key to Java 2 Micro Edition (J2ME) Application Development is the clear, concise explanations of the J2ME technology in relation to the existing Java platform. This course assumes proficiency with Java and presents strategies for understanding and deploying J2ME applications. The course presents numerous real-world examples, including health care and financial sector examples from the authors' professional experience.

Course Contents
UNIT I:
Java 2 Micro Edition Overview, Historical Evolution, Micro Edition–Related Java Specification Requests, J2ME Configurations and Profiles, Sun J2ME Software Development Kits, Tools and Third-Party Products for J2ME Application Development, Developing a Simple Application, The Connected Limited Device Configuration, General CLDC Limitations, CLDC Application Design, CLDC APIs, CLDC Profiles, Java Application Deployment, JAM on MIDP, JAM for PDAP.

UNIT II:
MIDP Programming, MIDlets, High-Level API, Low-Level API, MIDP 2.0 Additions, PDAP Programming, PDAP Application Life Cycle, PDA User Interface,

UNIT III:
Data Persistency, RMS Basics, Basic Functionality of the Class RecordStore, A Simple Diary Application Using RMS, Record Listeners, Storing Custom Objects, Ordered Traversal: Comparators and Record Enumerations, The Search Problem, Networking: The Generic Connection Framework, Creating a Connection—The Connector Class, Connection Types, GCF Examples, MIDP 2.0 Additions to the javax.microedition.io Package,

UNIT IV:
PIM: Accessing the Personal Information Manager, General PIM API Design, Addressbook API, Calendar API, ToDo API, Contact Sample Application, Chapter 8. Size Does Matter: Optimizing J2ME Applications, Reducing Class File Sizes, Freeing Unused Variables and Resources, Loop Condition Checking, Avoiding Recursion, Using Arrays Instead of Vectors, Using Record Stores Instead of Heap Memory, Distributing Functionality over Several Small MIDlets, Fragmentation Problems, User Interface Issues.
UNIT V:
Advanced Application: Blood Sugar Log, Requirement Analysis, Day Log, Persistent Storage: The LogStorage Class, The User Interface, Third-Party Libraries, XML, Simple Object Access Protocol: SOAP, MathFP, The Bouncy Castle Crypto API, User Interface Extensions.

Text Books:
1. Java™ 2 Micro Edition Application Development, Michael Kroll, Stefan Haustein, June 25, 2002, Sams Publishing, ISBN: 0-672-32095-9.

Lab Exercise: CSI432 Practical based on CSI431
At least two experiments should be carried out on each unit.

| Subject Reference no | CSI433 | Subject Title | Open Source Web Programming using PHP |

No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objectives
The objective of course is to provide genuine domain knowledge to students who wish to learn web based, application development, and using object oriented PHP as the programming environment. IIS and Apache as the web servers of choice with a clutch of DBMS as the data store underlay for the applications developed. As the required sources are available on web free of cost and widely referred as open source.

At Course Completion
After completion of course student can develop web application of open source platform and aware of configuration of tools required to development of web application.

Prerequisite
The student must aware of HTML, DHTML and client side scripting like VBScript and JavaScript.

Course Outline
UNIT I:
Introduction to PHP: What Does PHP Do, A Brief History of PHP, Installing PHP, A Walk Through PHP Language Basics: Lexical Structure, Data Types, Variables, Expressions and Operators, Flow-Control Statements, Including Code, Embedding PHP in Web Pages, Installing and Configuring PHP on Windows and Linux Platforms

UNIT II:
Functions: Calling a Function, Defining a Function, Variable Scope, Function Parameters, Return Values, Variable Functions, Anonymous Functions, Strings: Quoting String Constants, Printing Strings, Accessing Individual Characters, Cleaning Strings, Encoding and Escaping, Comparing Strings, Manipulating and Searching Strings, Regular Expressions, POSIX-Style Regular Expressions, Perl-Compatible Regular Expressions, **Arrays:** Indexed Versus Associative Arrays, Identifying Elements of an Array, Storing Data in Arrays, Multidimensional Arrays, Extracting Multiple Values, Converting Between Arrays and Variables, Traversing Arrays, Sorting, Acting on Entire Arrays, Using Arrays

UNIT III:
Classes and Objects: Terminology, Creating an Object, Accessing Properties and Methods, Declaring a Class, Introspection, Serialization, Web Techniques: HTTP Basics, Variables, Server Variables, Server Information, Processing Forms, Setting Response Headers, Session, cookies, files, Maintaining State, SSL, Using PHP to Access a Database: Relational Databases and SQL, Mysql database Basics, Advanced Database Techniques

UNIT IV:
Graphics: Embedding an Image in a Page, The GD Extension, Basic Graphics Concepts, Creating and Drawing Images, Images with Text, Dynamically Generated Buttons, Scaling Images, Color Handling, **PDF:** PDF Extensions, Documents and Pages, Text, Images and Graphics, Navigation, Other PDF Features

UNIT V:

XML : Lightning Guide to XML, Generating XML, Parsing XML, Transforming XML with XSLT, Web Services, **Security:** Global Variables and Form Data, Filenames, File Uploads, File Permissions, Concealing PHP Libraries, PHP Code, Shell Commands, Security Redux, Application Techniques, Code Libraries, Tinplating Systems, Handling Output, Error Handling, Performance Tuning.

Reference Book
1. PHP 5.1 for beginners by Evan Bayross and Sharman Shah, SPD Publications
2. Programming PHP by RasmusLerdorf and Kevin Tatroe, Orilly Publications

Lab Exercise: CSI434 Practical based on CSI433
At least two experiments should be carried out on each unit.

Subject Reference no	CSI435	Subject Title	CORBA
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Course Objective
Course Objective is to provide the details of CORBA in terms of client and server architecture to the students and use of Java ORB for implementation of CORBA. The case studies included in unit 3 gives clear idea about the functionality of CORBA using java ORB.

At Course Completion
After completion of course, student can write distributed application using Java ORB.

Prerequisite
Knowledge of Object oriented programming with C++ and Java is desirable.

Course Outline
UNIT I:
Introduction of CORBA, Distributed Objects, CORBA Components, Object Management Architecture, CORBA Services, CORBA Business objects. Object Web reference CORBA, CORBA and Java objects, CORBA Java/ IDL Mapping.

UNIT II:
Static CORBA, Mapping CORBA IDL to Java, ORBlets and Applets, CORBA-enabled Applet, Java ORB and C++ ORB. Dynamic CORBA: CORBA Naming services, CORBA Object naming. Client/ Server naming scenario, creating namespace, finding objects.
UNIT III:
Dynamic Invocations, Dynamic Invocation interfaces, CORBA Case studies with a) Socket vs CORBA/ Java ORB, Java sockets, java streams, Datagram socket, buffered socket, Data stream socket, b) HTTP/CGI versus CORBA/Java ORB, c) Servlet versus CORBA/Java ORB, d)RMI versus CORBA/Java ORB.

UNIT IV:
DOM versus CORBA/ Java ORB: Looking DCOM through CORBA, DCOM style interfaces, DCOM and Java, CORBA Initialization interfaces, Server side of CORBA: CORBA::BOA interface, CORBA::POA interface,

Object activation, POA Interfaces, Metadata: CORBA IDL, CORBA interface repository, CORBA IDL to Java Mapping: CORBA Modules, Exceptions, Parameter and Holder Classes, Helper Classes, Attributes.

UNIT V:
CORBA constant, CORBA Primitive types, CORBA Constructed types, interfaces, sequences, arrays, structures, enums, unions, typedefs, CORBA Serverside mapping: Inheritance, Delegations, CORBA pseudo objects: CORBA::ORB mapping, CORBA::Object mapping, CORBA::NamedValue Mapping, CORBA::NVList Mapping, CORBA::Request Mapping, CORBA:: ServerRequest and DSI mapping, CORBA::TypeCode

Reference Book
1. Client /Server Programming with Java and CORBA (Paperback) by Dan Harkey and Robert Orfali, John Wiley and Sons
2. Advance CORBA Programming with C++ by Michi Henning, Addison Wesley Professional Computing Series.

Lab Exercise: CSI436 Practical based on CSI435
At least two experiments should be carried out on each unit.

Subject Reference no	CSI437	Subject Title	GIS
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective
Introduction to Geographic Information Systems is a course designed to provide students in a solid foundation in both GIS concepts and the use of GIS. Introduction to GIS strikes careful balance between GIS concepts and hands-on applications. The main portion of the course presents GIS terms and concepts and helps students learn how each one fits into a complete GIS system. At the end of the course students can work with actual GIS exercises and the necessary data to solve the problem.
Prerequisite:

Course Contents:
UNIT I:
Introduction: Coordinate Systems, Vector Data Model, Raster Data Model

UNIT II:
GIS Data Acquisition, Geometric Transformation, Spatial Data Editing, Attribute Data Management

UNIT III:
Data Display and Cartography, Data Exploration, Vector Data Analysis, Raster Data Analysis

UNIT IV:
Terrain Mapping and Analysis, Viewsheds and Watershed, Spatial Interpolation

UNIT V:
Geocoding and Dynamic Segmentation, Path Analysis and Network Applications, GIS Models and Modeling

Text Book:
1. **Introduction to Geographic Information Systems with Data Files CD-ROM,** Kang-tsung Chang**,**2010, **Tata McGraw-Hill,** ISBN: 9780077294366

Lab Exercise: CSI438 Practical based on CSI437
At least two experiments should be carried out on each unit.

Subject Reference no	CSI439	Subject Title	Biometrics
No of Credits	4 Theory, 2 Practical	Assignment/ Sectionals (Internal)	20%
Total Contact Hrs/Week	4 Theory, 4 Practical	External (Semester Exam)	80%

Objective
Biometric recognition, or simply biometrics, is a rapidly evolving field with applications ranging from accessing one's computer, to gaining entry into a country. Biometric systems rely on the use of physical or behavioral traits, such as fingerprints, face, voice and hand geometry, to establish the identity of an individual. The deployment of large-scale biometric systems in both commercial (e.g., grocery stores, amusement parks, airports) and government (e.g., US-VISIT) applications, increases the public's awareness of this technology. This rapid growth also highlights the challenges associated with designing and deploying biometric systems. Indeed, the problem of biometric recognition is a grand challenge in its own right. The past five years have seen a significant growth in biometric research resulting in the development of innovative sensors, robust and efficient algorithms for feature extraction and matching, enhanced test methodologies and novel applications. These advances have resulted in robust, accurate, secure and cost effective biometric systems. The main objective of this course is study the basics and advanced development of biometrics.
Prerequisite: Student must have knowledge of image processing, pattern recognition and neural networks.

Course Contents
UNIT I:
Foreword by James L. Wayman, San Jose State University.- Preface.- Introduction to Biometrics.- Fingerprint Recognition.- Face Recognition.- Iris Recognition.- Hand Geometry Recognition.- Gait Recognition.-

UNIT II:
The Ear as a Biometric.- Voice Biometrics.- A Palmprint Authentication System.- On-Line Signature Verification.- 3D Face Recognition.-

UNIT III: Automatic Forensic Dental Identification.- Hand Vascular Pattern Technology.-

UNIT IV:
Introduction to Multibiometrics: Multispectral Face Recognition.- Multibiometrics Using Face and Ear.- Incorporating Ancillary Information in Multibiometric Systems.-

UNIT V:

The Law and the Use of Biometrics.- Biometric System Security.- Spoof Detection Schemes.- Linkages between Biometrics and Forensic Science.- Biometrics in Government Sector.- Biometrics in the Commercial Sector.- Biometric Standards.- Biometrics Databases.- Index.

Text Book
1. Handbook of Biometrics, Jain, Anil K.; Flynn, Patrick; Ross, Arun A. (Eds.), 2008, Springer, ISBN 978-0-387-71040-2

Lab Exercise: CSI440 Practical based on CSI439
At least two experiments should be carried out on each unit.