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### Basaveshwar Engineering College (Autonomous), Bagalkot
#### Department of Computer Applications (MCA)
##### Scheme and Syllabus for V Semester MCA

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PCA331C: Computer Networks

4 credits (4-0-0)

CIE Marks: 50  SEE Marks: 100
Total Hours: 52  SEE Hours: 03

UNIT I  
13Hours


UNIT II  
13Hours

UNIT III


UNIT IV


Text Books:


Reference books:

PCA332C: Introduction to Java

4 credits (4-0-0)

CIE Marks: 50
SEE Marks: 100
Total Hours: 52
SEE Hours: 03

UNIT I

13 Hours


UNIT II

13 Hours


UNIT III

13 Hours

UNIT IV

Multithreaded Programming: Multithreading fundamentals, The Thread Class and Runnable Interface, Creating Thread, Thread Priorities, Synchronization, using Synchronization Methods, The Synchronized Statement, Thread Communication using notify(), wait() and notify All(), suspending, Resuming and stopping Threads.

Applets: Applet basics, A complete Applet Skeleton, Applet Initialization and Termination, A key Aspect of an Applet Architecture, Requesting Repainting, using the status window, Passing parameters to Applets.


Text book


Reference books


PCA333C: System Software

4 credits (4-0-0)

CIE Marks: 50
Total Hours: 52

SEE Marks: 100
SEE Hours: 03

UNIT I

13 Hours


UNIT II

13 Hours

Assembler Design Options - One-Pass Assembler, Multi-Pass Assembler.


UNIT III

13 Hours

Symbol Values and Actions, The LEXER, Compiling and Running a Simple Parser, Arithmetic Expressions and Ambiguity, Variables and Typed Tokens.

UNIT IV  
13 Hours


Text Book

2. John.R.Levine, Tony Mason and Doug Brown, Lex and Yacc, O'Reilly, SPD, 1999

Reference Book

UNIT I 13 Hours

**Databases and Database Users:** Introduction, An Example, Characteristics of the Database Approach, Actors on the scene, Workers behind the scene, Advantages of using the DBMS approach, A brief history of database applications, When not to use a DBMS,

**Database System Concepts and Architecture:** Data models, schemas and instances, Three-schema architecture and data independence, Database language and interfaces, The database system environment. **Data Modeling Using the Entity-Relationship (ER) Model:** Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationships, Relationship Types, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design for the COMPANY Database; ER Diagrams, Naming Conventions and Design Issues.

UNIT II 13 Hours

**The Relational Data Model and Relational Database Constraint:** Relational Model Concepts, Relational Constraints and Relational Database Schemas, Update Operations, Transactions, and Dealing with Constraint Violations. Relational Algebra and Relational Calculus: Unary Relational Operations, Relational Algebra Operations from Set Theory, Binary Relational Operations, Additional Relational Operations; Examples of Queries in Relational Algebra. **Relational Database Design Using ER and EER to-Relational Mapping:** Relational Database Design Using ER to Relational Mapping. **SQL-99:** **Schema Definition, Constraints, Queries and Views:** SQL Data Definition and Data types, Specifying Constraints in SQL, Schema Change statement in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Specifying Constraints as Assertion and Triggers, Views (Virtual Tables) in SQL, Additional Features of SQL.

UNIT III 13 Hours

**Functional Dependencies and Normalization for Relational Database:** Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form. **Relational Database Design Algorithms and Further Dependencies:**
Properties of Relational Decompositions, Algorithms for Relational Database Schema Design; Multi-valued Dependencies and fourth normal form, Join Dependencies and fifth normal form, Inclusion Dependencies; Other Dependencies and Normal Forms.


**UNIT IV** 13 Hours


**Text books**


**Reference books**


1. Simulate a three nodes point-to-point network with a duplex link between them. Set the queue size and vary the bandwidth and find the number of packets dropped.

2. Simulate a four node point-to-point network, and connect the links as follows: n0 - n2, n1 - n2 and n2 - n3. Apply TCP agent between n0 - n3 and UDP n1 - n3. Demonstrate relevant applications over TCP and UDP agents, changing the parameters and determine the number of packets sent by TCP/UDP.

3. Simulate the different types of Internet traffic such as FTP, TELNET over a network and analyze the throughput.

4. Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.

5. Simulate an Ethernet LAN using N nodes (6 - 10), change error rate and data rate and compare throughput.

6. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and determine collisions across different nodes.

7. Write a C program for shortest path routing algorithm.

8. Write a C program for distance vector routing algorithm to find suitable path for transmission.

9. Write a C program to convert plain text to cipher text, using Caesar cipher.

10. Write a C program to perform character stuffing and destuffing on a given set of data.

11. Write a C program to find a minimum spanning tree of a given subnet.

12. Write a C program for frame sorting technique used in the buffer.
1. Write a simple java program to read a input from keyboard and implement the following:
   a) Boxing and UnBoxing.
   b) Calculate employee salary.

2) Write a JAVA program:
   a) Use scanner class to calculate gross pay, based on number of hours employee worked and hourly pay rate by considering following constraints:
      1. If hours less than 40 hours then no salary calculation.
      2. If hours more than 40 hours then 33% as extra.
      3. If hours are more than 60 hours then no salary calculation.
   b) Write a JAVA program check number is palindrome or not.

3) Write a JAVA program to demonstrate the following:
   a) Using the constructor create class called account (initial balance as the parameter and initial balance should not be less than 500) and demonstrate the debit and credit operations.
   b) Write a JAVA program to add sum of digits of a given number.

4) a) Write a JAVA program for String handling which performs the following:
    1. Checks the capacity of StringBuffer objects.
    2. Reverse the content of a String
    3. Read second String from the console and append it to reversed String.
   b) Write a JAVA program to number is prime or not.

5) a) Write a JAVA program to demonstrate the queue operations.
   b) Write a JAVA program to calculate even sum and odd sum from given array of integers.

6) a) Write a JAVA code to create thread by extending the thread class.
   b) Write a JAVA code to add two matrixes.

7) a) Write a JAVA program to implement stack operations using exception handling mechanism.
   b) Write a java code for String sorting using for-each.
8)  a) Write a JAVA code to demonstrate the parameter passing to the applet.

b) Write a JAVA program to read a file convert the characters to uppercase without using built in functions and write the result to second file.

9)  a) Write a JAVA program to implement the binary search.

b) Write a JAVA program to demonstrate the use of packages. Create a package called student which includes student class to read student details such as usn, name, semester and address. Create another package called CIE which includes class called CIE to read three subjects CIE details and check eligibility for SEE.

10) Write a JAVA program to implement Linked List using java.util package.
1. Consider the following relations of medical consultation centre:

   FACULTY (F_id, F-name, F-designation).

   PATIENT (P_id, P_name, p_address, date_of_registration).

   CONSULTATION DATE (C_date, F_id, P_id).

Create tables for above relations considering suitable data types and constraints. Insert 5 appropriate tuples in the tables.

Write the SQL statements for the following queries.

1. Generate list of patients and their consultation detail.
2. Find patients consulted by specific faculty.
3. Find the details of the entire faculty whose designation is a senior doctor and have consultation date next month.
4. Find the patient whose consultation date is today along with the concerned faculty detail.

2. Consider the following relations of the manufacturing unit.

   EMPLOYEE (Essn, Ename, Dept_No, Salary, date_of_join)

   DEPENDENT (Essn, Depend_Name, Relation, Dob)

   DEPARTMENT (Dept_No, Dept_Name, Manager)

Create tables for above relations considering suitable data types and constraints. Insert 5 appropriate tuples in the tables.

Write the SQL statements for the following queries.

1. Find details of dependents for employee with a given name.
2. Find the name of the manager of the department in which employee with a given ESSN Code works.
3. Find the name of all employees whose age is less than 35 years.
4. Find the DOB of a son/daughter of an employee with a given employee code.

3. Consider the Insurance database given below. The primary keys are underlined and the datatypes are specified.

   PERSON (driver-id#: string, name: string, address: string)

   CAR (regno: string, model: String, year: int)

   ACCIDENT (report-number: int, adate: date, location: string)

   OWNS (driver-id#: string, regno: string)
PARTICIPATED (driver-id: string, regno: string, report-number: int, damageamount: int)

Create tables for above relations considering constraints. Insert five appropriate tuples in the tables.

Write the SQL statements for the following queries.

1. Demonstrate how you
   a. Update the damage amount for the car with a specific regno in
      the accident with a given report number to a specified amount.
   b. Add a new accident to the database.
2. Find the owner of car that is involved in the accident of specific date.
3. Find the total damage amount out of accidents between given dates.
4. Find the car that is frequently meeting an accident.
5. Find person and his accident details

4. Consider the following relations for an order processing database application in a company.

CUSTOMER (cust#: int, cname: string, city: string)
CUST-ORDER (corder#: int, odate: date, cust#: int, ord-amt: int)
ORDER-ITEM (corder#: int, item#: int, qty: int)
ITEM (item#: int, unit-price: int)
SHIPMENT (corder#: int, warehouse#: int, ship-date: date)
WAREHOUSE (warehouse#: int, city: string)

Create tables for above relations defining appropriate constraints. Insert five appropriate tuples in the tables.

Write the SQL statements for the following queries.

1. Display detail of orders of specific customer.
2. Display detail of orders of the items in a proper order.
3. Produce a listing: CustName, Orders, Avg_Order_Amt, where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer
4. List the orders that were shipped from all the warehouses that the company has in a specific city.

5. Referring problem definition of question 1, write the SQL statements for the following queries.

1. List the details of all patients who have got consultation dates fixed between said dates.
2. Find the first patient registered in the center along with consultation details.
3. Generate up-todate list of faculty-wise the number of consultations.
4. Generate the list of faculty-wise consultation per month for the specific year.

6. Referring problem definition of question 2, write the SQL statements for the following queries.
   1. Display the list of employees who joined in the specific year.
   2. Find the details of the departments in which the employee having experience of at least ten years.
   3. Find number of employees in each department.
   4. Fine the employee whose salary is greater than the salary of a manager.

7. Referring problem definition of question 1, write the SQL statements for the following queries.
   1. Generate list of patients who visited the center for consultation at least three times.
   2. Find the patient frequently visiting the center.
   3. Find the faculties who have maximum consultations.
   4. Find the patient who is consulted by all faculties.

8. Referring problem definition of question 3, write the SQL statements for the following queries.
   1. Find the total number of people who owned cars that were involved in accident in 2002.
   2. Find the number of accidents in which cars belonging to a specific model were involved.
   3. Find the model highly involved in the accidents.
   4. Generate the list of yearwise damage amount.

9. Referring problem definition of question 3, write the SQL statements for the following queries.
   1. Generate the list of most sensitive accident location and the number of accidents occurred there.
   2. Find the vehicle that is involved in the accident at sensitive location.
   3. Count number of accidents happening each year.
   4. Find first two highest damage amounts.

10. Referring problem definition of question 4, write the SQL statements for the following queries.
    1. Demonstrate how you delete an Item with a given number from ITEM table and make that field null in the ORDER-ITEM table.
    2. Generate the list of orders to be shipped next month.
3. Display the list of orders whose customer exists in the same city that of the warehouse.
4. To display which item is highly demanded by the customers.

11. Consider a “Library Management System” which keeps the following tables:

   **BOOK** (isbn-no, book-title, author, publisher, edition, year-of-copyright)
   **BOOKACCESSION** (accession-no, isbn-no, date-of-purchase)
   **MEMBERS** (m-id, m-name, m-address, m-phone).
   **ISSUE-RETURN** (accession-no, m-id, expected-date-of-return, actual-date-of-return)

Create tables for above relations defining appropriate data type and constraints. Insert five appropriate tuples in the tables. Please note that a member can be issued a book for a period of 15 days. The actual-date-of-return is kept blank for the books that have not been returned.

**Write the SQL statements for the following queries.**

1. Find the m-id and m-name of the members who have maximum number of unreturned books.
2. List the book details along with the number of copies for that book in the library (issued and not-issued both)
3. Find the names of all those students who have got all the books issued to him of the given author.
4. Find the books expected to be returned in this week.
5. Find those members who have not got any book issued to him/her during last six months.

12. The following tables are maintained by a book dealer.

   **AUTHOR** (author-id: int, name: string, city: string, country: string)
   **PUBLISHER** (publisher-id: int, name: string, city: string, country: string)
   **CATALOG** (book-id: int, title: string, author-id: int, publisher-id: int, category-id: int, year: int, price: real)
   **CATEGORY** (category-id: int, description: string)
   **ORDER-DETAILS** (order-no: int, book-id: int, quantity: int)

Create tables for above relations defining appropriate data type and constraints. Insert five appropriate tuples in the tables.

**Write the SQL statements for the following queries.**

1. Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.
2. Find the author of the book, which has maximum sales.
3. Demonstrate how you increase the price of books published by a specific publisher by 10%.
PCA431C: Software Engineering

4 credits (4-0-0)

CIE Marks: 50
Total Hours: 52

SEE Marks: 100
SEE Hours: 03

UNIT I


UNIT II


UNIT III

Software Design: Architectural-design-System structuring, Control models, Modular decomposition, Domain specific architectures. Verification and Validation: Verification and validation planning, Software inspections, Automated static analysis, Clean room software development. Software Testing: Defect testing, Integration testing, Object oriented testing, Testing Workbenches.

UNIT IV

Text book

Reference books
UNIT I  
13 Hours


**JSP:** Overview of JSP Technology, Need of JSP, Benefits of JSP, Advantages of JSP, Basic Syntax, Invoking java code with JSP scripting elements, creating Template Text, Invoking java code from JSP, Limiting java code in jsp, using jsp expressions, comparing servlets and jsp, writing scriptlets, scriplet example Using Scriptlets to make parts of jsp conditional, using declarations, declaration example.

UNIT II  
13 Hours

**Controlling the Structure of generated servlets:** the JSP page directive, import attribute, session attribute, isElignore attribute, buffer and auto flush attributes, info attribute, erroPage and is erroPage attributes, is Thread safe Attribute, extends attribute, language attribute, Including files and applets in jsp Pages, using java beans components in JSP documents. **Java Beans & Annotations:** Understanding the benefits of beans, creating beans, installing bean classes on your server, Accessing bean properties, explicitly setting bean properties, automatically setting bean properties from request parameters, sharing beans among multiple servlets and jsp pages.

UNIT III  
13 Hours

**JDBC:** Talking to Database, Types of JDBC, Essential JDBC program, using prepared Statement JDBC in Action Result sets, Batch updates, Mapping, Basic JDBC data types, Advanced JDBC data types, immediate solutions. **Integrating Servlets and JSP:**

**The Model View Controller (MVC) Architecture:** Understanding the benefits of MVC, Using RequestDispatcher to implement the MVC, Forwarding request to jsp pages, handling relative urls, choosing among different display options, forwarding requests from jsp pages, including pages instead of forwarding to them.
UNIT IV

Exploring the struts architecture: Introducing application frameworks, MVC, and Model2, understanding how struts works, using struts control flow, exploring the strengths and weakness of struts.

Text books


Reference book

PCA433C: Web Technologies

4 credits (4-0-0)

CIE Marks: 50
Total Hours: 52
SEE Marks: 100
SEE Hours: 03

UNIT I 13 Hours
Fundamentals of Web, XHTML - 1 : Internet, WWW, Web Browsers, and Web Servers; URLs; MIME; HTTP; Security; The Web Programmers Toolbox. XHTML: Origins and evolution of HTML and XHTML; Basic syntax; Standard XHTML document structure; Basic text markup; Images; Hypertext Links; Lists; Tables; Forms; Frames; Syntactic differences between HTML and XHTML.

UNIT II 13 Hours
CSS Introduction; Levels of style sheets; Style specification formats; Selector forms; Property value forms; Font properties; List properties; Color; Alignment of text; The Box model; Background images; The <span> and <div> tags; Conflict resolution. Javascript : Overview of Javascript; Object orientation and Javascript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; Pattern matching using regular expressions; Errors in scripts; Examples.

UNIT III 13 Hours
Javascript and HTML Documents, Dynamic Documents with Javascript : The Javascript execution environment; The Document Object Model; Element access in Javascript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model; The navigator object; DOM tree traversal and modification. Introduction to dynamic documents; Positioning elements; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click; Slow movement of elements; Dragging and dropping elements. XML : Introduction; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets; XML processors; Web services.

UNIT IV 13 Hours
Introduction to PHP: Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files. Building Web applications
with PHP: Tracking users, cookies, sessions, Using Databases, Handling XML.

**Introduction to Ruby:** Origins and uses of Ruby, Scalar types and their operations, Simple input and output, Control statements, Arrays, Hashes, Methods, Classes, Code blocks and iterators, Pattern matching. Introduction to Rails: Overview of Rails, Document requests, Processing forms, Rails applications with Databases, Layouts.

**Text book**


**Reference book**

1. Write a Servlet Program to implement a dynamic HTML using Servlet (user name and Password should be accepted using HTML and displayed using a Servlet).

2. Write a Servlet Program to Auto Web Page Refresh (Consider a webpage which is displaying Date and time For all such type of pages, you would need to refresh your web page regularly; Java Servlet makes this job easy by providing refresh automatically after a given interval).

3. Write a Servlet Program to implement and demonstrate get() and Post methods(Using HTTP Servlet Class).

4. Write a Servlet Program using cookies to remember user preferences.(user name,password) at client machine

5. a. Write a JSP Program to implement verification of a particular user login and display a Welcome page.
   b. Write a JSP program to demonstrate the import attribute.

6. a. Write a JSP Program which uses jsp: include action to display aWebpage.
   b. Write a JSP Program which uses <jsp:plugin> tag to run a applet.

7. Write a JSP Program to get student information through a HTML and create a JAVA Bean.

8. Write a JAVA Program to insert data into Student DATABASE and retrieve info based on particular queries using any popular database(For example update, delete, search etc…).

9. Write a struts application to demonstrate the user login process.

10. Write a struts application to demonstrate validation using validate.xml
1. Develop and demonstrate an XHTML document that illustrates the use of external style sheet, ordered list, table, borders, padding, color and the <span> tag.

2. Develop and demonstrate an XHTML file that includes JavaScript script for the following problems:
   
   a) Input: A number $n$ obtained using input box
      
      Output: The first $n$ Fibonacci numbers
   
   b) Input: A number $n$ obtained using input box
      
      Output: A table of numbers from 1 to $n$ and their squares using alert

3. Develop and demonstrate an XHTML file that includes JavaScript Script that uses functions for the following problems:
   
   a) Parameter: A string
      
      Output: The position of the left-most vowel in the string
   
   b) Parameter: A number
      
      Output: The number with its digits in the reverse order

4. a) Develop and demonstrate, using JavaScript script, an XHTML document that collects the USN of the student. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.
   
   b) Modify the above program to get the current year of registration.

5. a) Develop and demonstrate, using JavaScript script, an XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.

   b) Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom.
6. a) Design an XML document to store information about a student in an engineering college. The information must include USN, Name, Name of the College, Branch, Year of joining, and e-mail id. Create sample data for 3 students. Create a CSS style sheet and use it to display the document.

b) Create an XSLT style sheet for one student element of the above document and use it to create a display of that element.

7. a) Write a PHP program to store current date-time in a COOKIE and display the ‘Last visited on’ date-time on the web page upon reopening of the same page.

b) Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.

8. Create an XHTML form with Student Name, USN, YOJ, Branch, Sem, Address and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on USN using PHP.

9. Write a Ruby program which demonstrates the usage of regular expressions.

10. Using Rails and MySQL, develop a program to accept book Information viz. Accession number, title, authors, edition and Publisher from a web page and store the information in a database And to search for a book with the title specified by the user and to Display the search results with proper headings.
PCA436S: Seminar-I

1 Credit (0-2-0)

CIE Marks: 50
Total Hours: 28

SEE Marks: 50
SEE Hours: 03

Each student has to submit the synopsis of the seminar topic and should get approval from the departmental head. The department will allot the guide for the student. Students are required to present seminar on said topic with proper consultation with the guide.
PCA437P: Mini Project-I

2 Credit (0-1-3)

CIE Marks: 50
Total Hours: 56

SEE Marks: 50
SEE Hours: 03

Each team of 3 students has to submit the synopsis of the mini project based on database area and should get approval from the departmental head. The department will allot the guide for the team. Teams are required to present demonstration on said project with proper consultation with the guide.

Mini Project Assessment

1. Mini project is evaluated for 100 marks (50 CIE and 50 SEE)
2. Allocation of 50 marks for CIE: 3 seminars and related reports write-up: 10+20+20 marks.
3. Allocation of 50 marks for SEE: 25% write-up, 50% Demonstration, and 25% Viva-voce.
UNIT I


UNIT II


UNIT III

Identifying attributes and methods, Class responsibility: Defining attributes by analyzing use cases and other UML diagrams, Defining attributes for ViaNet bank objects. Object responsibility: Methods and messages, Defining methods for ViaNet bank objects.

UNIT IV

Object-Oriented Design: The object-oriented design process and design axioms:
Introduction. The object-oriented design process, Object oriented design axioms.

Text book


Reference books

PCA532C: .Net Technologies

4 Credits (4-0-0)

CIE Marks: 50
Total Hours: 52
SEE Marks: 100
SEE Hours: 03

UNIT I

Getting started with .NET Framework 4.0
Need of C#, C# Pre-processor Directives, Creating a Simple C# Console Application, Identifiers and Keywords. Data Types, Variables and Constants: Value Types, Reference Types, Type Conversions, Boxing and Unboxing, Variables and Constants. Expression and Operators: Operator Precedence, Using the ?? (Null Coalescing) Operator, Using the :: (Scope Resolution) Operator and Using the is and as Operators. Control Flow statements: Selection Statements, Iteration Statements and Jump Statements.

UNIT II

Namespaces, Classes, Objects and Structures

UNIT III


Exception Handling: Exception Handling: The try/catch/finally statement, Checked and Unchecked Statements

Text books

1. .NET 4.0 Programming (6-in-1), Black Book, Kogent Learning Solutions Inc., Wiely-Dream Tech Press.

References books

2. Bart De Smet: C# 4.0 Unleashed, Pearson Education- SAMS Series.
PCA533C: Mobile Computing and Applications

4 Credits (4- 0- 0)

CIE Marks: 50
SEE Marks: 100
Total Hours: 52
SEE Hours: 03

UNIT I

13 Hours


UNIT II

13 Hours


Mobile Client: Moving beyond desktop, Mobile handset overview, Mobile phones and their features, PDA, Design Constraints in applications for handheld devices. Mobile IP: Introduction, discovery, Registration, Tunneling, Cellular IP, Mobile IP with IPv6

UNIT III

13 Hours


UNIT IV

13 Hours

Building, Mobile Internet Applications: Thin client: Architecture, the client, Middleware, messaging Servers, Processing a Wireless request, Wireless Applications Protocol (WAP) Overview, Wireless Languages: Markup Languages, HDML, WML,
HTML, cHTML, XHTML, VoiceXML. **J2ME** Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDlet model, Provisioning, MIDlet life-cycle, Creating new application, MIDlet event handling, GUI in MIDP, Low level GUI Components, Multimedia APIs; Communication in MIDP, Security Considerations in MIDP.

**Text Books**


**Reference Books**


1. Design the Library system: Identify the use cases of the system.  
   (Suggestive use cases: borrow book, return books, read newspapers,  
   reference, digital library). Develop the use case diagram, Packages and  
   documentation for the same. Preferable use of uses & Extends  
   relationships expected.

2. Design the Examination system: Identify the use cases. (Suggestive use  
   cases: Form filling, Get Hall Ticket, Write exam, get result, Verify Hall  
   Ticket) Develop the use case diagram, Packages and documentation for  
   the same. Preferable use of uses & Extends relationships expected.

3. Analyze and design the system for ATM Transaction: Identify the use  
   cases. (Suggestive use cases: Transaction, Approval process, Invalid PIN,  
   Deposit Amount, Deposit savings, Deposit checking, withdraw Amount,  
   withdraw checking, saving, withdraw saving denied, checking Transaction  
   History, saving Transaction History). Develop the use case diagram,  
   Packages and documentation for the same. Draw the essential class  
   diagrams.

4. Analyze and design the system for voting system (The actors are presiding  
   officer, 1st polling officer, 2nd polling officer, Election officer, voter,  
   candidate; Processes: Voting, counting, and announcement of results).  
   Develop the use case diagram, Packages and documentation for the same.  
   Draw the essential sequence diagrams and state chart diagrams.

5. Analyze and design the system for Results section of autonomy, mainly  
   responsible for CGPA, SGPA Calculation, Grade card generation.  
   Develop the class diagrams and packages.

6. Analyze and design the system for Employee reference. (The Process HR  
   Manager contacts Employees of his company and HR manager of other  
   company to publicise about the vacancy. The person who has referred the  
   right candidate, will be given bonus. Interview, Short listing, selection list  
   announcement, Bonus for referred employees are all parts of the process).  
   Develop the use case diagram, sequence diagrams and state chart  
   diagrams.
7. Analyze and design the system for Vehicle Purchase, registration and licensing Systems. Develop the use case diagram, sequence diagrams, activity diagrams and packages.

8. Develop State transition diagrams for
   a. telephone line (Refer page no. 104, Blaha and Rumbaugh)
   b. Nested State diagram for vehicle transmission states.

9. Analyze and design the system for autonomous education system.
   (Classes: students, Teacher, courses, subjects, core, Electives, Labs).
   Develop the class diagrams, sequence diagrams and packages.

10. Analyze and design the system for Railway reservation, which includes the details of Boarding station, classes of reservation, fare, Time table, concessions, No. of Seats, Seat No, State of reservation (confirmed, waiting, RAC). Develop the class diagrams, packages, component diagrams and deployment diagrams.

11. Analyze and design the system for Income Tax assessment. Develop the class diagrams, collaboration diagrams, state chart diagrams.

12. Analyze and design the system for Online shopping system. Develop the class diagrams, collaboration diagrams, state chart diagrams and packages.
   a. Check for the product.
   b. Place order.
   c. Track the order.
   d. Cancel the order.
   e. Feedback.
1. Write a program in C# to implement sorting of integer elements taken as command line arguments.

2. Write a program in C# to check whether a number is Palindrome or not.

3. Write a Program in C# to demonstrate boxing and unboxing

4. Write a Program in C# to implement Stack operations

5. Write a Program in C# to find the second largest element in a single dimensional array.

6. Write a Program in C# to multiply two matrices using Rectangular arrays.

7. Write a program to reverse a given string and check whether string is palindrome or not.

8. Using Try, catch and finally blocks write a program in c# to demonstrate error handling.

9. Desing a simple calculator using Switch Statement in C#

10. Demonstrate use of interface with a C# program.

11. Using C# connects to any popular database and verify user login.

12. Using C# connects to any popular database and demonstrate insert, update and select queries.

13. Write a program to illustrate the use of different variable (set, get) properties in C#.

14. Write a program to demonstrate abstract class and abstract methods in C#.

15. Write a ASP.Net page to read student information such as Name,USN,sum and validate the fields.
PCA536S: Seminar-II

1 Credit (0-2-0)

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<th>SEE Marks: 50</th>
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<tbody>
<tr>
<td>Total Hours: 28</td>
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Each student has to submit the synopsis of the seminar topic and should get approval from the departmental head. The department will allot the guide for the student. Students are required to present seminar on said topic with proper consultation with the guide.
PCA537L: Mini Project-II

2 Credits (0-1-3)

CIE Marks: 50  
Total Hours: 56  
SEE Marks: 50  
SEE Hours: 03

Each team of 2 students has to submit the synopsis of the mini project based on networks technology and should get approval from the departmental head. The department will allot the guide for the team. Teams are required to present demonstration on said project with proper consultation with the guide.

Mini Project Assessment

1. Miniproject is evaluated for 100 marks (50 CIE and 50 SEE)

2. Allocation of 50 marks for CIE: 3 seminars and related reports write-up: 10+20+20 marks.

3. Allocation of 50 marks for SEE: 25% write-up, 50% Demonstration, and 25% Viva-voce.
Individual project: Includes the following components:

1. Problem definition phase (Industrial Internship) of 1 month duration.
3. Pre-final demonstration and viva-voce.

Evaluation procedure:

CIE - 50 marks (Evaluated based on the seminars and reports submitted during various phases of software development. Typical split up:

Industrial internship and problem definition (Presentation and report) – 15 marks
Midterm seminar, report and demonstration – 20 marks
Pre-final seminar, report and demonstration – 15 marks

SEE – 200 marks (evaluated jointly by an internal and external examiner). Later scaled down to 50.

70 marks: Awarded by Internal Examiner for Dissertation report evaluation
70 marks: Awarded by External Examiner for Dissertation report evaluation
60 marks: Awarded jointly by the Internal and External examiners for Viva-voce
### Scheme and Syllabus of MCA Electives for III, IV and V semester

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<td>CN, WT</td>
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PCA301E: Management Information Systems

4 Credits (4-0-0)

Prerequisite: Principles of Management

CIE Marks: 50
Total Hours: 52
SEE Marks: 100
SEE Hours: 03

UNIT I 13 Hours

UNIT II 13 Hours
UNIT III

13 Hours


UNIT IV

13 Hours


Text books


Reference book

PCA302E: Computer Graphics

4 Credits (4-0-0)

**Prerequisite:** Data Structures

<table>
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</table>

**UNIT I**

13 Hours


**Attributes of output primitives:** Line Attributes, Color and Grayscale levels, Area-Fill Attributes, Character Attributes, Antialiasing

**UNIT II**

13 Hours

**Two-dimensional geometric transformations:** Basic Transformations, Matrix Representations and Homogeneous coordinates, Composite Transformations, Other Transformations, Transformations Between Coordinate Systems, Affine Transformations, Transformation Functions, Raster Methods for Transformations. **Two dimensional viewing:** The Viewing Pipeline, Viewing Coordinate Reference Frame, Window-to-Viewport Coordinate Transformation, Two-Dimensional Viewing Functions, Clipping Operations, Point Clipping, Line Clipping, Polygon Clipping, Text Clipping, Exterior Clipping.

**UNIT III**

13 Hours

**Graphical user interfaces and interactive input methods:** The User Dialogue, Input of Graphical Data, Input Functions, Initial Values for Input-Device Parameters, Interactive Picture Construction Techniques, Virtual-Reality Environments. **Three-dimensional concepts and object representations:** Three Dimensional Display Methods, Polygon Surfaces, Curved Lines and Surfaces, Quadric Surfaces, Busier Curves and Surfaces, B-Spline Curves and Surfaces, Octrees.

**UNIT IV**

13 Hours

**Three-dimensional geometric and modeling transformation:** Translation, Rotation, Scaling, Other Transformations, Composite Transformations, Three-Dimensional Transformation Functions, Modeling and Coordinate Transformations. **Three-dimensional viewing:** Viewing Pipeline, Viewing Coordinates, Projections, View Volumes, Clipping. **Visible - surface detection methods:** Classification of Visible

**Text book**


**Reference books**


PCA303E: Microprocessor

4 Credits (4- 0- 0)

Prerequisite: Computer Organization and Architecture

CIE Marks: 50
SEE Marks: 100
Total Hours: 52
SEE Hours: 03

UNIT I 13 Hours


UNIT II 13 Hours


UNIT III 13 Hours

Instruction Set and Assembler directives, Addressing modes, Instruction set, Assembler directives, Assembly Language Programming, Programming with an assembler, example programs, Special Architectural features – Stack, Interrupt and Macros.

UNIT IV 13 Hours

Basic Peripherals and interfacing-Memory interfacing I/O ports, 8255, Special purpose programmable, peripheral devices-8253, 8259A, 8279, 8251 and 8257.

Text book


Reference books

3. B. Ram, Microprocessors and Applications
4. Leu and Gibson, Microcomputers 8086/8088 Family, 1984
PCA304E: Advanced Operating Systems

4 Credits (4-0-0)

Prerequisite: Operating Systems

CIE Marks: 50  SEE Marks: 100
Total Hours: 52  SEE Hours: 03

UNIT I  13 Hours
Introduction, Review Operating Systems Strategies: User’ perspectives, technologies and
design of Batch Systems, Timesharing Systems, Personal computer systems,
Embedded systems, and small communicating computers; The genesis of modern
operating systems. Using the Operating Systems The programmer’s abstract machine;
Resources; Processes and threads.

UNIT II  13 Hours
Writing concurrent programs Operating Systems Organization Contemporary OS kernels.

Basic functions; General implementation considerations.

UNIT III  13 Hours
Design Strategies Design considerations; Monolithic kernels; Modular organization;
Microkernel; Layered organizations; Operating Systems for distributed system. Real
World Examples Linux, Windows NT/2000/XP. Process descriptors, Thread descriptors,
Thread scheduling. Linux, Windows NT/2000/XP: Kernel

UNIT IV  13 Hours
Distributed Systems: Networking; The Need for a Protocol Architecture; The TCP/IP
Sockets; Linux Networking; Client/Server Computing; Distributed Message Passing;
Remote Procedure Calls; Clusters;Windows Vista Cluster Server; Linux Clusters;
Distributed Process Management; Process Migration; Distributed Global States;
Distributed Mutual Exclusion; Distributed Deadlock.

Text books


Reference books


PCA305E: Embedded Systems

4 Credits (4-0-0)

Prerequisite: Computer Organization and Architecture

CIE Marks: 50
Total Hours: 52
SEE Marks: 100
SEE Hours: 03

UNIT I

13 Hours

**Introduction to Embedded Systems:** An embedded system; Processor in the 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. I/O types and examples; Serial communication devices; Parallel device ports; Sophisticated interfacing features in device ports.

UNIT II

13 Hours

**Communication Buses for Device Networks:** Wireless devices; Timer and counting devices; Watchdog timer; Real time clock; Networked embedded systems; Serial bus communication protocols; Parallel bus device protocols; Internet enabled systems; Wireless and mobile system protocols. **Device Drivers and Interrupts Service Mechanism** Device access without interrupts; ISR concept; Interrupt sources; Interrupt servicing Mechanism; Multiple interrupts; Context switching and the periods for context-switching; Classification of interrupt service mechanisms; Direct memory access; Device drivers programming.

UNIT III

13 Hours

**Program Modeling Concepts** Program models; DFG models; State machine programming models for event controlled program flow; Modeling of multiprocessor systems. **Inter-Process Communication, Synchronization** Multiple processes in an application; Multiple threads in an application; Tasks and task states; Task and data; Distinctions between functions, ISRs and tasks; Concept of semaphores; Shared data; Inter Process Communication; Signal function; Semaphore functions; Message queue functions; Mailbox functions; Pipe functions; Socket functions; RPC functions.
Real-time Operating systems: Operating System services; Process management; Timer functions; Event functions; Memory management; Device, file and I/O sub-systems management; Interrupt routines in RTOS environment; Real-Time Operating Systems; Basic design using an RTOS; RTOS task scheduling models, interrupt latency and response times of the tasks as performance metrics; OS security issues.

Embedded Software Development Introduction; Host and target machines; Linking and locating software; Getting embedded software in to the target system; Issues in hardware-software design and co-design; Testing on host machine; Simulators; Laboratory tools.

Text book

Reference books
Prerequisite: UNIX

CIE Marks: 50
Total Hours: 52

UNIT I 13 Hours

UNIT II 13 Hours

UNIT III 13 Hours
UNIT IV

Programming in Perl 5.0: The basic Perl program, scalars, arrays, hashes, control structures, processing text, regular expressions, using files, subroutines, CGI scripting: What is CGI?, developing CGI applications, processing CGI, returning a basic HTML page, introduction to CGI.pm, CGI.pm methods, creating HTML pages dynamically, using CGI.pm- an example, adding robustness.

Text Books:

1. Evi Nemeth, Garth Snyder, Trent R. Hein, Linux administration handbook.
PCA307E: Distributed Database Systems

4 Credits (4-0-0)

Prerequisite: Database Concepts and Applications

CIE Marks: 50  SEE Marks: 100
Total Hours: 52  SEE Hours: 03

UNIT I  13 Hours

Overview: features of distributed v/s centralized system. Why distributed databases, DDBMS, levels of distribution transparency, Levels of distribution transparency: Reference architecture for distributed databases, types of data fragmentation, distribution transparency for read only applications, distribution transparency for update applications, distributed database access primitives, integrity constraints in distributed databases.

UNIT II  13 Hours

Distributed database design: A framework for distributed database design, the design of database fragmentation, the allocation of fragments.

Translation of global query to fragment queries: Equivalence transformation for queries, converting a global query into fragment query, distributed grouping and aggregate functions, parametric queries

UNIT III  13 Hours


UNIT IV  13 Hours

Concurrency control: Foundations of distributed concurrency control, distributed deadlocks, concurrency control based on timestamps, optimistic methods for distributed concurrency control.

Reliability: Basic concepts, Non-blocking commitment protocols

Distributed database administration: Catalogue management in distributed databases, authorization and protection. Heterogeneous distributed database systems.

Text books

PCA308E: User Interface Design

4 Credits (4-0-0)

Prerequisite: Software Engineering

CIE Marks: 50                  SEE Marks: 100
Total Hours: 52                 SEE Hours: 03

UNIT I                  13 Hours

UNIT II                  13 Hours

UNIT III                 13 Hours
anthropomorphic Design, Display Design, Color. Reading from Paper Versus from Displays.

UNIT IV 13 Hours


Text book

Reference books
PCA309E: System Simulation and Modeling

4 Credits (4-0-0)

**Prerequisite:** Applied Mathematics

CIE Marks: 50  SEE Marks: 100
Total Hours: 52  SEE Hours: 03

UNIT I  13 Hours

**Introduction:** When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study. Simulation examples: Simulation of queuing systems; Simulation of inventory systems; Other examples of simulation. **General Principles, Simulation Software**


UNIT II  13 Hours

**Statistical Models in Simulation:** Review of terminology and concepts; Useful statistical models; Discrete distributions; Continuous distributions; Poisson process; Empirical distributions. **Queuing Models:** Characteristics of queuing systems; Queuing notation; Long-run measures of performance of queuing systems; Steady-state behavior of M/G/1 queue; Networks of queues.

UNIT III  13 Hours

**Random-Number Generation, Random-Variant Generation:** Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers. Random-Variant Generation: Inverse transform technique; Acceptance-Rejection technique; Special properties. **Input Modeling:** Data Collection; Identifying the distribution with data; Parameter and their estimation;

UNIT IV  13 Hours

**Input Modeling:** Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data; Multivariate and Time-Series input models. **Output Analysis for a Single Model:** Types of simulations with respect to output analysis; Stochastic nature of output data; Measures of performance and their estimation; Output analysis for terminating simulations; Output analysis for steady-state simulations.
**Text book**


**Reference books**


PCA310E: Multimedia Systems

**4 Credits (4-0-0)**

**Prerequisite:** Compute Networks

**CIE Marks:** 50  
**SEE Marks:** 100

**Total Hours:** 52  
**SEE Hours:** 03

**UNIT I**  
**13 Hours**

**Introduction, Media and Data Streams, Audio Technology:** Multimedia Elements; Multimedia Applications; Multimedia Systems Architecture; Evolving Technologies for Multimedia Systems; Defining Objects for Multimedia Systems; Multimedia Data Interface Standards; The need for Data Compression; Multimedia Databases. Media: Perception Media, Representation Media, Presentation Media, Storage Media, Transmission Media, Information Exchange Media, Presentation Spaces & Values, and Presentation Dimensions; Key Properties of a Multimedia System: Discrete & Continuous Media, Independence Media, Computer Controlled Systems, Integration; Characterizing Data Streams: Asynchronous Transmission Mode, Synchronous Transmission Mode, Isochronous Transmission Mode; Characterizing Continuous Media Data Streams. **Sound:** Frequency, Amplitude, Sound Perception and Psychoacoustics; Audio Representation on Computers; Three Dimensional Sound Projection; Music and MIDI Standards; Speech Signals; Speech Output; Speech Input; Speech Transmission.

**Graphics and Images, Video Technology, Computer-Based Animation:** Capturing Graphics and Images Computer Assisted Graphics and Image Processing; Reconstructing Images; Graphics and Image Output Options. Basics; Television Systems; Digitalization of Video Signals; Digital Television; Basic Concepts; Specification of Animations; Methods of Controlling Animation; Display of Animation; Transmission of Animation; Virtual Reality Modeling Language.

**UNIT II**  
**13 Hours**

**Data Compression:** Storage Space; Coding Requirements; Source, Entropy, and Hybrid Coding; Basic Compression Techniques; JPEG: Image Preparation, Lossy Sequential DCT-based Mode, Expanded Lossy DCT-based Mode, Lossless Mode, Hierarchical Mode. H.261 (Px64) and H.263: Image Preparation, Coding Algorithms, Data Stream, H.263+ and H.263L; MPEG: Video Encoding, Audio Coding, Data Stream, MPEG-2, MPEG-4, MPEG-7; Fractal Compression.
UNIT III  13 Hours

Optical Storage Media: History of Optical Storage; Basic Technology; Video Discs and Other WORMs; Compact Disc Digital Audio; Compact Disc Read Only Memory; CD-ROM Extended Architecture; Further CD-ROM-Based Developments; Compact Disc Recordable; Compact Disc Magneto-Optical; Compact Disc Read/Write; Digital Versatile Disc. Content Analysis: Simple Vs. Complex Features; Analysis of Individual Images; Analysis of Image Sequences; Audio Analysis; Applications.

UNIT IV  13 Hours

Data and File Format Standards: Rich-Text Format; TIFF File Format; Resource Interchange File Format (RIFF); MIDI File Format; JPEG DIB File Format for Still and Motion Images; AVI Indeo File Format; MPEG Standards; TWAIN Multimedia Application Design: Multimedia Application Classes; Types of Multimedia Systems; Virtual Reality Design; Components of Multimedia Systems; Organizing Multimedia Databases; Application Workflow Design Issues; Distributed Application Design Issues.

Text books


Reference books

PCA311E: Compiler Design

4 Credits (4- 0- 0)

Prerequisite: System Software

CIE Marks: 50
SEE Marks: 100
Total Hours: 52
SEE Hours: 03

UNIT I

13 Hours

Introduction, Lexical analysis  Language processors; The structure of a Compilers; The evolution of programming languages; The science of building a compiler; Applications of Compiler technology; Programming language basics; Lexical analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens.

UNIT II

13 Hours

Syntax Analysis Part 1: Introduction; Context-free Grammars; Writing a Grammar; Top-down Parsing.

Syntax Analysis Part 2: Bottom-up Parsing; Introduction to LR Parsing: Simple LR. More powerful LR parsers; Using ambiguous grammars; Parser Generators.

UNIT III

13 Hours

Syntax-Directed Translation Syntax-Directed definitions; Evaluation order for SDDs; Applications of Syntax-directed translation; Syntax-directed translation schemes

Intermediate Code Generation Variants of syntax trees; Three-address code; Types and declarations; Translation of expressions; Type checking; Control flow; Back patching; Switch statements; Intermediate code for procedures.

UNIT IV

13 Hours

Code Generation Issues in the design of Code Generator; The Target language; Addresses in the target code; Basic blocks and Flow graphs; Optimization of basic blocks; A Simple Code Generator.

Run-Time Environments Storage Organization; Stack allocation of space; Access to non-local data on the stack; Heap management; Introduction to garbage collection.

Text book

Reference books


PCA312E: Information retrieval and search engines

4 Credits (4- 0- 0)

Prerequisite: Web Technologies, Applied Mathematics

CIE Marks: 50
SEE Marks: 100
Total Hours: 52
SEE Hours: 03

UNIT I 13 Hours


UNIT II 13 Hours


UNIT III 13 Hours

Ranking with Indexes: Abstract Model of Ranking, Inverted indexes, Compression, Entropy and Ambiguity, Delta Encoding, Bit-aligned codes, Query Processing. Queries and Interfaces: Information Needs and Queries, Query Transformation and Refinement, Showing the Results Cross-Language Search.

UNIT IV 13 Hours


Text book

1. Trevor Strohman, Bruce Croft, Donald Metzler, Search Engines: Information Retrieval in Practice, Kindle Edition
PCA313E: Storage Area Network

4 Credits (4-0-0)

Prerequisite: Computer Networks

CIE Marks: 50
Total Hours: 52

UNIT I


UNIT II

UNIT III
Process, Backup and restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

UNIT IV  13 Hours


Text Book

Reference Books
PCA314E: UNIX System Programming

4 Credits (4-0-0)

Prerequisite: Introduction to UNIX

CIE Marks: 50
SEE Marks: 100
Total Hours: 52
SEE Hours: 03

UNIT I 13 Hours


UNIT II 13 Hours


UNIT III 13 Hours

Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Single-instance daemons; Daemon conventions; Client-Server Model.

UNIT IV  
13 Hours

Interprocess Communication: Introduction; Pipes, popen, pclose Functions; oprocesses; FIFOs; XSI IPC; Message Queues; Semaphores, Network IPC: Sockets:Introduction; Socket Descriptors; Addressing; Connection establishment; Data transfer; Socket options; Out-of-band data; Nonblocking and asynchronous I/O.

Text Books

**PCA315E: Analysis and Design of Algorithms**

**4 Credits (4-0-0)**

**Prerequisite:** Data Structures

**CIE Marks: 50**
**SEE Marks: 100**

**Total Hours: 52**
**SEE Hours: 03**

**UNIT I**
13 Hours

**Introduction:** Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Fundamental Data Structures. **Fundamentals Of The Analysis Of Algorithm Efficiency:** Analysis Framework, Asymptotic Notations and Basic efficiency classes, Mathematical analysis of Recursive and Non-Recursive algorithms, Examples. **Brute Force:** Selection Sort and Bubble Sort, Sequential Search and String Matching, Exhaustive Search.

**UNIT II**
13 Hours

**Divide-And Conquer:** Merge sort, Quick sort, Binary Search, Binary Tree Traversals and related properties, Multiplication of large integers, Strassen’s Matrix, Multiplication. **Decrease-And-Conquer:** Insertion Sort, Depth First and Breadth First Search, Topological Sorting, Algorithms for Generating Combinatorial Objects.

**UNIT III**
13 Hours

**Transform And Conquer:** Presorting, Balanced Search Trees, Heaps and Heap sort, Problem Reduction. **Dynamic Programming:** Computing a binomial coefficient, Warshall’s and Floyd’s Algorithms, The Knapsack Problem and Memory Functions.

**UNIT IV**
13 Hours

**Greedy Technique:** Prim’s Algorithm, Kruskal’s Algorithm, Dijkstra’s Algorithm, Huffman Trees. **Backtracking:** n-Queen’s Problem – Hamiltonian Circuit problem – Subset-Sum problem – Branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem.
Text books


Reference books


PCA316E: Client Server Computing

4 Credits (4- 0- 0)

Prerequisite: Computer Networks

CIE Marks: 50  SEE Marks: 100
Total Hours: 52  SEE Hours: 03

UNIT I  13 Hours
Introduction to client/Server computing, advantages of client/Server computing. Architecture - Data access architecture, Execution architecture, Vertical slice-two-tiered client/server, stored procedure, Three tiered architecture.

UNIT II  13 Hours
Role of the client, client services, Remote procedure call, print services, Remote services, Utility services, Message services, Network services, Application services, Database services, Dynamic Data Exchange (DDE), Object linking and embedding, Common object request broker architecture, client tools - Non GUI, GUI, Object oriented user interface clients (OOUI). Server functionality, Request processing, File services, Database services, Communication services, Security services, Network operating system, platforms, Server operating system.

UNIT III  13 Hours
Connectivity - Open systems interconnect, communications interface technology, interprocess communication, wide area network technologies, Network Management. Application development management issues- platform and productivity, environment definition, productivity measures, performance, support, organization and management, task allocation server and client side.

UNIT IV  13 Hours
Distributed objects and components - CORBA, compound documents, Opendoc component model, OLE/DCOM.

Text books

**Reference Books**


PCA317E: Artificial Intelligence

4 Credits (4-0-0)

Prerequisite: Discrete Mathematics, Computer Organization and Architecture

CIE Marks: 50
SEE Marks: 100
Total Hours: 52
SEE Hours: 03

UNIT I 13 Hours

Overview of Artificial Intelligence: Definition & Importance of AI General Concepts
of Knowledge: Introduction, Definition and Importance of Knowledge, Knowledge-Based Systems, Representation of Knowledge, Knowledge Organization, Knowledge Manipulation, Acquisition of Knowledge.

UNIT II 13 Hours


UNIT III 13 Hours


UNIT IV 13 Hours

Knowledge Organization and Management: Introduction, Indexing and Retrieval Techniques, Integrating Knowledge in Memory, Memory Organization Systems.


Text Book

1. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI,
New Delhi, 2006.

**Reference Books**


PCA318E: Cryptography and Network Security

4 Credits (4-0-0)

Prerequisite: Computer Networks

CIE Marks: 50
Total Hours: 52

SEE Marks: 100
SEE Hours: 03

UNIT I


UNIT II


UNIT III


UNIT IV

Text book


Reference books


PCA319E: Software Project Management

4 Credits (4- 0- 0)

**Prerequisite:** Software Engineering

**CIE Marks:** 50  
**SEE Marks:** 100  
**Total Hours:** 52  
**SEE Hours:** 03

**UNIT I**  
13 Hours

**Introduction to Software Project Management:** Project Definition, Contract Management, Activities Covered By Software Project Management, Overview of Project Planning – Stepwise Project Planning.  
**Project Evaluation:** Strategic Assessment: Technical Assessment, Cost Benefit Analysis

**UNIT II**  
13 Hours


**UNIT III**  
13 Hours

Types of Risk: Managing Risk, Hazard Identification, Hazard Analysis, Risk Planning And Control.  
**Monitoring and Control:** Creating Framework, Collecting The Data, Visualizing Progress, Cost Monitoring, Earned Value, Prioritizing Monitoring, Getting Project Back To Target, Change Control, Managing Contracts.

**UNIT IV**  
13 Hours

**Managing People and Organizing Teams:** Introduction, Understanding Behavior, Organizational Behavior: A Background, Selecting The Right Person For The Job, Instruction In The Best Methods, Motivation, The Oldman, Hackman Job Characteristics Model, Working In Groups, Becoming A Team, Decision Making, Leadership, organizational Structures, Stress, Health And Safety, Case Studies.
Text Book


Reference Books


PCA320E: Data mining

4 Credits (4-0-0)

Prerequisite: Database Concepts and Applications, Applied Mathematics

CIE Marks: 50
SEE Marks: 100
Total Hours: 52
SEE Hours: 03

UNIT I

Introduction to data mining: Definition of Data Mining, Motivating Challenges of DM, Data Mining Tasks. Data: Data Attributes, Types of Data, Quality of Data and Data Preprocessing, Measures of Similarity and Dissimilarity.

UNIT II

Association Analysis: Definition of Association Analysis, Frequent Item Set Generation, Rule Generation, Compact Representation of Frequent Item Sets. Alternate Method of Generating Item Sets, FP Growth Algorithms, Evaluation of Association Patterns

UNIT III

Classification: Preliminaries, General Approach To Solving Classification Problem, Decision Tree Based Classifier, Rule Based Classifier, Nearest Neighbor Classifier. Cluster Analysis: Overview, Kmeans, DBSCAN

UNIT IV


Text Books:

1. PangNing Tan, Michael Steinbach, Vipin Kumar, “Introduction to Data Mining”, Pearson Education.

2. G K Gupta, “Introduction to Data Mining with Case studies”, PHI.
PCA321E: Software Testing and Analysis

4 Credits (4-0-0)

Prerequisite: Software Engineering

CIE Marks: 50  SEE Marks: 100
Total Hours: 52  SEE Hours: 03

UNIT I  13 Hours

**Basics of Software Testing:** Humans, Errors and Testing, Software Quality; requirements, Behavior and Correctness, Correctness Vs Reliability; Testing and Debugging; Test Metrics; Software and Hardware Testing; Testing and Verification; Defect Management; Execution History; Test Generation Strategies; Static Testing; Test Generation from Predicates. **Basic Principles:** Sensitivity, Redundancy, Restriction, Partition, Visibility and Feedback. **Test Analysis Activities within a Software Process:** The Quality Process, Planning and Monitoring Quality goals, Dependability Properties

UNIT II  13 Hours

Analysis; Testing Improving the Process, Organizational Factors. **Finite Models, Dependence and Dataflow Models:** Overview, Finite abstraction of Behavior; Control Flow Graphs; Finite State Machines, Definition-Use Pairs; Data Flow Analysis; Cluster Analysis; Live and Avail; From Execution to Conservative Flow Analysis; Data flow analysis with Arrays and Pointers; Inter-Procedural Analysis. **Functional Testing:** Overview, Random versus Partition Testing Strategies, A Systematic Approach, Choosing a Suitable Approach

UNIT III  13 Hours


UNIT IV  13 Hours

Test Case Prioritization and Selective Execution. **Automating Analysis and Test:** Overview, Automation and Planning, Process Management, Static Metrics, Test Case

**Text Books**

**Reference Books**
PCA322E: Digital Image Processing
4 Credits (4-0-0)

Prerequisite: Computer Graphics

CIE Marks: 50  SEE Marks: 100
Total Hours: 52  SEE Hours: 03

UNIT I  13 Hours


UNIT II  13 Hours


UNIT III  13 Hours

Color Image processing: Introduction, color model and transformation. Image Compression: Definition, A brief discussion on – Run length encoding, contour coding, Huffman code, compression due to change in domain, compression due to quantization, compression at the time of image transmission, compression at the time of image transmission, brief discussion on Image Compression standards

UNIT IV  13 Hours

Image segmentation: Definition, Characteristics of segmentation, Detection of Discontinuities, Threasolding, Pixel based segmentation method, Region based segmentation methods – segmentation by pixel aggregation, segmentation by sub region aggregation, histogram based segmentation, split and merge technique. Use of motion in segmentation (spatial domain technique only).
**Morphology**: Dilation, Erosion, Opening, Closing, Hit-and-Mass Transform, Boundary extraction, Region filling, connected components, thinning, Thickening, skeletons, Pruning Extensions to Gray – Scale Images. Application of Morphology in IP.

**Text Book**


**Reference Books**

PCA323E: Web 2.0 and Rich Internet Applications

4 Credits (4- 0- 0)

Prerequisite: Web Technologies

CIE Marks: 50  SEE Marks: 100
Total Hours: 52  SEE Hours: 03

UNIT I

Introduction to Ajax: Web 2.0 and Rich Internet Applications, Overview of Ajax, Examples of usage of Ajax: Updating web page text, Chatting in real time, Dragging and dropping, Downloading images. Creating Ajax Applications: An example, Analysis of example ajax.html, Creating the JavaScript, Creating and opening the XMLHttpRequest object, Data download, Displaying the fetched data, Connecting to the server, Adding Server-side programming, Sending data to the server using GET and POST, Using Ajax together with XML. Handling multiple XMLHttpRequest objects in the same page, Using two XMLHttpRequest objects, Using an array of XMLHttpRequest objects, Using inner functions, Downloading JavaScript, connecting to Google Suggest, Creating google.php, Downloading from other domains with Ajax, HTML header request and Ajax, Defeating caching, Examples.Building XML and working with XML in JavaScript, Getting the document element, Accessing any XML element, Handling whitespace in Firefox, Handling cross-browser whitespace, Accessing XML data directly, Validating XML, Further examples of Rich Internet Applications with Ajax.

UNIT II

Drawing user’s attention to downloaded text, Styling text, colors and background using CSS, Setting element location in the web pages, Setting the stacking order of web page elements, Further examples of using Ajax. Displaying all the data in an HTML form, Working with PHP server variables, Getting the data in to array format, Wrapping applications in to a single PHP page, Validating input from the user, Validating integers and text, DOM, Appending new elements to a web page using the DOM and Ajax, Replacing elements using the DOM, Handling timeouts in Ajax, Downloading images with Ajax, Example programs.Introduction: Understanding Flex Application Technologies, Using Flex Elements, Working with Data Services (Loading Data at Runtime), The Differences between Traditional and Flex Web Applications, Understanding How Flex Applications Work, Understanding Flex and Flash Authoring. Building Applications with the Flex Framework: Using Flex Tool Sets, Creating Projects, Building Applications, Deploying Applications Framework Fundamentals: Understanding
How Flex Applications Are Structured, Loading and Initializing Flex Applications, Understanding the Component Life Cycles, Loading One Flex Application into Another Flex Application, Differentiating Between Flash Player and the Flex Framework, Caching the Framework, Understanding Application Domains, Localization, Managing Layout: Flex Layout Overview, Making Fluid Interfaces, Putting it all together.

UNIT III
13 Hours

UNIT IV
13 Hours

Text Books

Reference Books
PCA324E: Network Management

4 Credits (4- 0- 0)

Prerequisite: Computer Networks, Introduction to Java

CIE Marks: 50  SEE Marks: 100
Total Hours: 52  SEE Hours: 03

UNIT I

13 Hours


UNIT II

13 Hours


UNIT III

13 Hours


UNIT IV

13 Hours

Instrumentation, Java management Extensions, Management of a Storage Area Network: Future Directions.

**Text books**
1. Network Management- Know it all by Adrian Farrel, Elsevier publications.
2. Network Management- Principles and Practice, Mani Subramaniam, Pearson Education.

**Reference books**
1. Network Management, Morris, Pearson Education.
2. Practical Guide to SNMPv3 and Network Management, David Zeltserman, PHI.
PCA325E: NOSQL
4 Credits (4- 0- 0)

**Prerequisite:** Database Concepts and Applications

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**UNIT I** 13 Hours
Definition of NoSQL, History of NoSQL and Different NoSQL products, Exploring MondoDB Java/Ruby/Python, Interfacing and Interacting with NoSQL NoSQL Storage Architecture, CRUD operations with MongoDB.

**UNIT II** 13 Hours
Querying, Modifying and Managing NoSQL Datastores, Indexing and ordering datasets (MongoDB/CouchDB/Cassandra), NoSQL in CLOUD, Parallel Processing with MapReduce, BigData with Hive.

**UNIT III** 13 Hours
Surveying Database Internals, Migrating from RDBMS to NoSQL, WebFrameworks and NoSQL, using MySQL as a NoSQL, Php and MongoDB, Python and MongoDB.

**UNIT IV** 13 Hours
Creating Blog Application with PHP, NoSQL Database Administration.

**Text books**
PCA326E: Software Architectures

4 Credits (4-0-0)

Prerequisite: Software Engineering

CIE Marks: 50        SEE Marks: 100
Total Hours: 52       SEE Hours: 03

UNIT I  13 Hours
Introduction: What software architecture is and what it is not; Architectural Structures and views; Architectural patterns; What makes a “good” architecture? Why is software important? Context of Software Architecture: Technical Context; Project life-cycle context; Business context; Professional context; Stake holders; How is Architecture influenced? What Do Architecture influence?

UNIT II  13 Hours
Understanding Quality Attributes: Architecture & Requirements; Functionality; quality attribute considerations; Specifying and achieving Quality attribute requirements; Guiding quality design decisions; Availability; Interoperability; Modifiability; Performance; Security; Testability; Usability

UNIT III  13 Hours
Quality Attribute modeling and Analysis: Modeling Architecture to enable quality attribute analysis; Quality attribute check lists; Through experiments and Back-of-the envelope analysis; Experiments; Simulations and prototypes; Analysis at different stages of the life cycle Architecture and requirements: Gathering ASRs from requirements documents; ASRs by interviewing stake holders; ASRs by understanding the business; capturing ASRs in a utility tree; Typing the methods together

UNIT IV  13 Hours
Documenting Software Architecture: Uses and Audiences for architecture documentation; Notations, View and Behavior; Documentation and quality attributes Architecture, Implementation & Testing: Architecture and implementation; Architecture and testing Architectural Patterns: Introduction to patterns; From Mud to structure; Layers; Pipes and filters; Blackboard; Distributed systems; Broker; Interactive systems; Model-view-control; Presentation abstraction-control; Adaptable systems; Microkernel.
Text books

Reference books
PCA327E: Enterprise Resource Planning

4 Credits (4-0-0)

Prerequisite: Computer Networks, Web Technologies

CIE Marks: 50
SEE Marks: 100
Total Hours: 52
SEE Hours: 03

UNIT I
13 Hours


UNIT II
13 Hours


UNIT III
13 Hours


UNIT IV
13 Hours

Solutions Company, Oracle Corporation, QAD, System Software Associates. ERP – Present and Future: Turbo Charge the ERP System, EIA, ERP and E-Commerce, ERP and Internet, Future Directions in ERP.

Text books


Reference books

PCA328E: Pattern Recognition

4 Credits (4-0-0)

Prerequisite: Digital Image Processing

CIE Marks: 50
Total Hours: 52
SEE Marks: 100
SEE Hours: 03

UNIT I 13 Hours
Introduction: Applications of pattern recognition, statistical decision theory, image processing and analysis. Probability: Introduction, probability of events, random variables, Joint distributions and densities, moments of random variables, estimation of parameters from samples, minimum risk estimators.

UNIT II 13 Hours

UNIT III 13 Hours

UNIT IV 13 Hours

Text Book
Reference books
1. Duda and Hart, Pattern recognition (Pattern recognition a scene analysis).
PCA329E: Service Oriented Architecture
4 Credits (4- 0- 0)

Prerequisite: Introduction to JAVA, Object Oriented Programming with C++

CIE Marks: 50
Total Hours: 52

SEE Marks: 100
SEE Hours: 03

UNIT I

13 Hours

Introduction to SOA, Evolution of SOA: Fundamentals of SOA, Common characteristics of contemporary SOA, Common tangible benefits of SOA, A SOA timeline (from XML to Web Services to SOA), The continuing evolution of SOA (standards organizations and Contributing vendors), The roots of SOA (comparing SOA to Past Architectures) Web Services and Primitives of SOA: The Web Services framework, Services (as Web Services), Service Description (with WSDL), Messaging (with SOAP).

UNIT II

13 Hours

Web Services and Contemporary SOA: Message Exchange patterns, Service Activity; Coordination, Atomic Transactions, Business Activities, Orchestration, Choreography, Addressing, Reliable Messaging, Correlation, Policies, Meta data Exchange, Security, Notification and eventing.

UNIT III

13 Hours


UNIT IV

13 Hours

Text books
1. Thomas Erl: Service Oriented Architecture- Concepts, Technology and Design,
2. Shankar Khambhapaty, Service Oriented Architecture for Enterprise and

Reference books
2. Eric Newcomer, Greg Lomow, Understanding SOA with Web Services,
PCA330E: Cloud Computing

4 Credits (4-0-0)

Prerequisite: Computer Networks, Web Technologies

CIE Marks: 50
SEE Marks: 100
Total Hours: 52
SEE Hours: 03

UNIT I

13 Hours


UNIT II

13 Hours

**Computer Clusters for scalable parallel computing**

**Clustering for massive parallelism:** Cluster Development Trends, Design Objective of Computer Clusters, Fundamental Cluster Design issues. Virtual machines and Virtualization of clusters and Data centers, levels of virtualization Implementation, VMM Design requirements and providers. **Cloud computing and Service Models:** Public, Private, and Hybrid Clouds, Cloud Ecosystem and Enabling Technologies, Infrastructure as a Service (IaaS), Platform and Software-as-a-Service (PaaS, SaaS). **Architectural Design of Compute and Storage Clouds:** A Generic Cloud architecture Design, Layered Cloud Architectural development.

UNIT III

13 Hours

**Public Cloud Platforms:** GAE, AWS, and Azure: Smart Cloud, Public Clouds and Service Offerings, Google App Engine (GAE), Amazon Web Service (AWS), Microsoft Windows Azure. **Cloud Security and Trust management:** Cloud Security Defense Strategies, Distributed Intrusion/Anomaly Detection, Data and Software Protection Techniques. **Features of Cloud and Grid Platforms:** Cloud Capabilities and Platform Features, Traditional Features Common to Grids and Clouds.

Text book


Reference books


