JAVA PROGRAMMING

Lecture : 4 Hrs/week **Practical : 3 Hrs/week**
One paper: 100 marks / 3 Hrs duration **Practical exam: 50 marks**
Term work: 25 marks

1. **Java Fundamentals**
   - Features of Java
   - OOPs concepts
   - Java virtual machine
   - Reflection byte codes
   - Byte code interpretation
   - Data types, variable, arrays, expressions, operators, and control structures
   - Objects and classes

2. **Java Classes**
   - Abstract classes
   - Static classes
   - Inner classes
   - Packages
   - Wrapper classes
   - Interfaces
   - This
   - Super
   - Access control

3. **Exception handling**
   - Exception as objects
   - Exception hierarchy
   - Try catch finally
   - Throw, throws

4. **IO package**
   - Input streams
   - Output streams
   - Object serialization
   - Deserialization
   - Sample programs on IO files
   - Filter and pipe streams

5. **Multi threading**
   - Thread Life cycle
   - Multi threading advantages and issues
   - Simple thread program
   - Thread synchronization

6. **GUI**
   - Introduction to AWT programming
   - Layout and component managers
   - Event handling
   - Applet class
   - Applet life-cycle
   - Passing parameters embedding in HTML
   - Swing components – JApplet, JButton, JFrame, etc.
   - Sample swing programs

7. **Database Connectivity**
   - JDBC architecture
   - Establishing connectivity and working with connection interface
   - Working with statements

Creating and executing SQL statements
Working with ResultSet

Term work/Practical : Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal paper. Test will be graded for 10 marks and assignments will be graded for 15 marks.

References:

1. Programming with Java A Primer, E.Balaguruswamy Tata McGraw Hill Companies
2. Java Programming John P. Flynt Thomson 2nd
3. Java Programming Language Ken Arnold Pearson
4. The complete reference JAVA2, Herbert schildt. TMH
5. Big Java, Cay Horstmann 2nd edition, Wiley India Edition
6. Core Java, Dietel and Dietel
7. Java – Balaguruswamy
8. Java server programming, Ivan Bayross SPD

JAVA PROGRAMMING LAB

1. Programs using constructor and destructor
2. Creation of classes and use of different types of functions
3. Count the number of objects created for a class using static member function
4. Write programs on interfaces
5. Write programs on packages
6. Write programs using function overloading
7. Programs using inheritance
8. Programs using IO streams
9. Programs using files
10. Write a program using exception handling mechanism
11. Programs using AWT
12. Programs on swing
13. Programs using JDBC

OBJECT ORIENTED MODELING AND DESIGN USING UML

Lecture : 4 Hrs/week **Practical : 3 Hrs/week**
One paper: 100 marks / 3 Hrs duration **Practical exam: 50 marks**
Term work: 25 marks

INTRODUCTION

- An overview – Object basics – Object state and properties, behavior, methods, messages
- Object oriented system development life cycle
- Benefits of OO Methodology

1. Overview of prominent OO Methodologies

a. The Rumbaugh OMT
b. The booch methodology
c. Jacobson's OOSE methodologies
d. Unified process
e. Introduction to UML
f. Important views and diagram to be modeled for system by UML

2. Functional view(models)

- **Use case diagram**
  - Requirement capture with use case,
  - Building blocks of use case diagram – actors, use case guidelines for use case models,
  - Relationships between use cases – extend, include, generalize
- **Activity diagram**
  - Elements of activity diagram – action state, activity state, object node, control and overflow, transition (fork, merge, join)
  - Guidelines for creating activity diagrams
  - Activity diagram – action decomposition (rake)
  - Partition – swim lane

3. Static structural view (Models)

a. Classes, values and attributes, operations and methods, responsibilities for classes, abstract classes, access specification (visibility of attributes and operations)
b. Relational among classes: Associations, Dependencies, Inheritance – Generalizations, aggregation
c. Adornments on association: association names, association classes, qualified association, n-ary associations, ternary and reflexive association
d. Dependency relationships among classes, notations
e. Notes in class diagram, extension mechanisms, metadata, refinements, derived, data, constraint, stereotypes, package & interface notation.
f. Object diagram notations and modeling, relations among objects (links)

4. Class modeling and Design Approaches

a. Three approaches for identifying classes – using noun phrases, abstraction, use case diagram
b. Comparison of approaches
c. Using combination of approaches
d. Flexibility guidelines for class diagram: Cohesion, coupling, forms of coupling (identity, representational, subclass, inheritance), class Generalization, class specialization versus aggregation

5. **Behavioral (Dynamic structural view):**
   - **State diagram**
     a. State diagram notations, events (signal events, change events, time events)
     b. State diagram states (composite states, parallel states, history states) transition and condition, state diagram behavior(activity effect, do-activity, entry and exit activity), completion transition, sending signals
   - **Interaction diagrams**
     a. Sequence diagram – Sequence diagram notations and examples, iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links, activations in sequence diagram.
     b. Collaboration diagram – Collaboration diagram notations and examples, iterations, conditional messaging, branching, object creation and destruction, time constraints, origin of links, activations in collaboration diagram.

6. **Approaches for developing dynamic systems:**
   a. Top – down approach for dynamic systems
   b. Bottom – up approach for dynamic systems
   c. Flexibility guidelines for behavioral design – guidelines for allocating and designing behaviors that lead to more flexible design

7. **Architectural view**
   a. Logical architecture: dependency, class visibility, sub systems
   b. Hardware architecture: deployment diagram notations, nodes, object migration between node
   c. Process architecture: what are process and threads and their notations in UML, object synchronization, invocation schemes for threads (UML notations for different types of invocations).
   d. Implementation architecture: component diagram notations and examples.

8. **Reuse : Libraries, Frame works components and patterns**
   a. Reuse of classes
   b. Reuse of components
   c. Reuse of frameworks, black box framework, white box frame
   d. Reuse of patterns: architectural pattern and design pattern

Term work/Assignment : Each candidate will submit an approximately 10-page written report on a case study or mini project. Students have to do OO analysis & design for the project problem, and develop use case model, analysis model and design model for it, using UML.

Relevant Books:

1. Designing flexible object oriented systems with UML – Charles Ritcher
2. Object oriented analysis and design, Satzinger, Jackson, Burd, Thomson
3. Object oriented modeling and design with UML – James Rumbaugh, Michael Blaha (2nd edition)
4. The unified modeling language user guide – Grady Booch, James Rumbaugh, Ivar Jacobson
5. Object oriented modeling and design – James Rumbaugh
6. Teach yourself UML in 24 hours – Joseph Rumbaugh
7. Object oriented analysis and design: using UML Mike O'Docherty Wiley publication

Practical assignment: Nine assignments, one on each of the diagrams learnt in UML

DATA COMMUNICATIONS AND NETWORKING

Lecture : 4 Hrs/week **Tutorial : 1Hr/week**

One paper: 100 marks / 3 Hrs duration **Term work: 25 marks**

1. **Introduction**

   Attacks, services and mechanisms, security attacks, security services, integrity check, digital signature, authentication, hash algorithms

2. **Secret key cryptography**

   Block encryption, DES rounds, S-Boxes

   IDEA: overview, comparison with DES, Key expansion, IDEA rounds,

   Uses of secret key cryptography; ECB,CBC,OFB,CFB, Multiple encryptions DES

3. **Hash functions and Message Digests:**

   Length of hash, uses, algorithms (MD2, MD4, MD5, SHS)

   MD2: Algorithm(padding, checksum, passes). MD4 and 5: algorithm(padding, stages, digest computation) SHS: overview, padding, stages

4. **Public key Cryptography**

   Algorithms, examples, Modular arithmetic (addition, multiplication, inverse, and exponentiation) RSA: generating keys, encryption and decryption. Other Algorithms: PKCS, Diffie-Hellman, El-Gamal signatures, DSS, zero-knowledge signatures

5. **Authentication**

   Password based, address based, cryptographic authentication

   Passwords: in distributed systems, on-line vs off-line guessing, storing.

   Cryptographic authentication: passwords as keys, protocols, KDC's,

   Certification Revocation, inter-domain, groups, delegation. Authentication of People:

   Verification techniques, passwords, length of passwords, password distribution, smart cards, biometrics

6. **Security policies & Security Handshake Pitfalls:**

   What is security policy, high and low level policy, user issues?

   Protocol problems, assumptions, shared secret protocols, public key protocols, mutual authentication, reflection attacks, use of timestamps, nonce and sequence numbers, session keys, one-and two-way public key based authentication.

7. **Example System**

   Kerberos: purpose, authentication, server and ticket granting server, keys and tickets, use of ASS and TGS, replicated servers

   Kerberos V4: names, inter-realm authentication, key version numbers

   Kerberos V5: names. Realms, delegation, forwarding and proxies, ticket lifetimes, revoking tickets, multiple realms

8. **Network security**

   Electronic mail security, IP security, network management security

9. **Security for electronic commerce: SSL, SET**

10. **System Security**

    Intruders and Viruses, Firewalls, Intrusion detection

Tutorials:

1. Numerical problems on DES, IDEA, MD2, MD5, Diffie-Helman and El=Gamal Signatures
2. Comparative study of network security tools
3. Vulnerability tools: Nessus, Retina, Wireshark, Nmap
4. Packet Sniffers: Tcpdump, Ettercap, DSniff

Term work/Assignment : Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test graded for 10 marks and Practicals graded for 15 marks.

Reference Books:

1. Atul Kahate, Cryptography and Network Security, McGraw Hill
2. Kaufman, C.Perlman, R and Speciner, M. , Network Security, Private Communication in a public world, 2nd edition, prentice hall PTR, 2002
3. Stallings, W. Cryptography and Network Security: Principles and Practice, 3rd edition, Prentice hall PTR, 2003
4. Stallings, W.Network security Essentials: Applications and Standards, Prentice Hall, 2000
5. Cryptography and Network Security: McGraw Hill, Behrouz Forouzan
6. Information Security Intelligence Cryptographic Principles & App. Calabrese Thomson
7. Securing A Wireless Network Chris Hurley SPD

ADVANCED DATABASE TECHNIQUES

Lecture : 4 Hrs/week **Practical : 1 Hr/week**
One paper: 100 marks / 3 Hrs duration **Practical exam: 50 marks**
Term work: 25 marks

1. **Parallel and Distributes databases**
   - Architecture for parallel databases
   - Parallelizing individual operations
   - Parallelizing query operations
     - Introduction to DBMS
     - Architecture of DDBs
     - Storing data in DDBs
     - Distributed catalog management
     - Distributed query processing
     - Distributed concurrency control and recovery
     - Transaction processing

2. **Datawarehousing**
   - Data Marts
   - Getting data into the data into the warehouse
   - Extraction
   - Transformation
   - Cleansing
   - Loading
   - Summarization
   - Metadata
   - Datawarehousing &ERP
   - Datawarehousing & KM
   - Datawarehousing & CRM

3. **Planning & Project management**
   - How is it different?
   - Life-cycle approach
   - The development phases
   - Dimensional analysis
   - Dimensional modeling
     - Star schema
     - Snowflake scheme

4. **OLAP**
   - OLAP architecture
   - Relational OLAP
   - Relational vs multidimensional OLAP
   - Web based OLAP
   - Major functions and features
     - Drill-down and Roll-up
     - Slice and dice or rotation
     - Implementation techniques for OLAP
     - Bitmap Indexes
     - Join indexes

5. Data mining

- Introduction
- Data mining algorithms: clustering, classification, association rules
- Knowledge discovery: KDD process
- Decision trees
- Neural networks
- Search engines
    - Characteristics
    - Functionality
    - Architecture
    - Ranking of web pages
    - The search engine industry
    - The enterprise search
- Case study
    - The analysis of a large scale hypertextual search engine

6. Object databases systems

- Introduction
- User defined ADTs
- Structured types
- Object, object identity and references
- Inheritance
- Database design for ORDBMS
- New challenges in implementing ORDBMS
- Storage & access methods
- Query processing & optimization
- OODBMS
    - Comparison between OODBMS and ORDBMS

7. Database security

Term work/Assignment : Each candidate will submit a journal in which at least 10 assignments based on the above syllabus and the internal test paper. Test graded for 10 marks and assignments graded for 15 marks.

Reference :

1. Raghu Ramakrishnan, Johannes Gerhke, “Database Management Systems” McGraw Hill
2. Decision supporter & database systems – Efrem G. Mallach
3. Datawarehousing fundamental – Paulraj Ponniah, Wiley
4. Introduction to Data mining with case studies – G.K. Gupta
5. Elmasri and Navathe, “Fundamentals of Database Systems”, Pearson Education
6. Korth, Silberchatz, Sudarshan, “Databse system Concepts”, McGraw Hill
7. Peter Rob and Coronel, “Database Systems, Design, Implementation and Management”, Thomson Learning
8. Data Warehousing(OLAP) S. Nagabhushana New Age

SOFTWARE PROJECT MANAGEMENT

Lecture : 4 Hrs/week **Tutorial : 1 Hr/week**
One paper: 100 marks / 3 Hrs duration **Term work: 25 marks**

1. **Introduction**
    a. What is project?
    b. What is project management?
    c. The role of project manager
    d. The project management profession
    e. Project life cycle

2. **Technology Context**
    a. A systems view of project management
    b. Understanding organizations
    c. Stakeholder management
    d. Project phases and the project life cycle
    e. The context of information technology projects

3. **Introduction**
    a. Developing the project schedule
    b. Project management software tools
    c. Developing the project budget
    d. Finalizing the project schedule and budget
    e. Monitoring and controlling the project
    f. The project communications plan
    g. Project metrics
    h. Reporting performance and progress
    i. Information distribution

4. **The importance of project risk management**
    a. Risk management planning
    b. Common sources of risk on information technology projects
    c. Risk identification
    d. Qualitative risk analysis
    e. Quantitative risk analysis
    f. Risk response planning
    g. Risk monitoring and control
    h. Using software to assist in project risk management

5. **The importance of project procurement management**
    a. Planning purchases and acquisitions
    b. Planning contracting
    c. Requesting seller responses
    d. Selecting sellers
    e. Administering the contract
    f. Closing the contract
    g. Using software to assist in project procurement management
    h. Outsourcing

6. **Change management**
    a. The nature of change
    b. The change management plan
    c. Dealing with resistance and conflict

7. **Leadership & Ethics in Projects**
    a. Project leadership
    b. Ethics in projects
    c. Multicultural projects

8. **Introduction**
    a. Project implementation
    b. Administrative closure
    c. Project evaluation

References :

1. Information Technology Project Management : Kathy Schwalbe Thomson Publication
2. Information Technology Project Management providing measurable organizational value Jack Marchewka Wiley INDIA
3. Applied software project management Stellman & Greene SPD
4. Software Engineering Project Management by Richard Thayer, Edward Yourdon WILEY INDIA

ELECTIVE
CUSTOMER RESOURCE MANAGEMENT

Lecture : 4 Hrs/week **Tutorial : 1 Hr/week**
One paper: 100 marks / 3 Hrs duration **Term work: 25 marks**

1. **Introduction to CRM and eCRM**
   What is customer? How do we define CRM? CRM technology components, customer life style, customer interaction. Difference between CRM and eCRM, features of eCRM

2. **Sales Force Automation(SFA)**
   Definition and need of SFA, barriers to successful SFA, SFA functionality, technological aspect of SFA, data synchronization, flexibility and performance, reporting tools.

3. **Enterprise Marketing Automation(EMA)**
   Components of EMA, marketing campaign, campaign planning and management, business analytic tools, EMA components (promotions, events loyalty and retention programs), response management

4. **Call center**
   Meaning, customer interaction, the functionality, technological implementation, what is ACD (Automatic Call Distribution), IVR (Interactive Voice Response), CTI (Computer Telephony Integration), web enabling the call center, automated intelligent call routing, logging & monitoring

5. **Implementing CRM**
   Pre implementation, kick off meeting, requirements gathering, prototyping and detailed proposal generation, development of customization, Power user beta test and data import, training, roll out and system hand off, ongoing support, system optimization, follow up.

6. **Introduction to Application Service Provider (ASP)**
   Who are ASPs? Their role and function, advantages and disadvantages of implementing ASP

7. **Impact of CRM on Marketing Channels**
   Meaning, how does the traditional distribution channel structure support customer relationship, emerging channel trends that impact CRM

8. **Case studies**

References :

1. CRM at the speed of light by Paul Greenberg, YMH 2nd edition
2. Customer Relationship Management by V Kumar, Werner J Reinartz, WILRY India edition
3. Customer Relationship Management by Kristin Anderson and Carol Kerr, TM

Assignments

Students have to submit 7 assignments

Case study:

Present a report of 10-15 pages on any topic from syllabus