CENTRE FOR DEVELOPMENT OF IMAGING TECHNOLOGY
TECHNOLOGY EXTENSION DIVISION

SYLLABUS

POST GRADUATE DIPLOMA IN COMPUTER APPLICATIONS Sem-II (PGDCA Sem-II)	
Course Duration: 12 Months **Semester II-6 Months** **Eligibility: Any Degree**	
SCHEME OF STUDY	
PGDCA 201	**RDBMS**
PGDCA 202	**Java Programming**
PGDCA 203	**Software Engineering and Project Management**
PGDCA 204	**Introduction to .NET Technologies**
PGDCA 205	**Lab I- Java Programming**
PGDCA 206	**Lab II-RDBMS**
PGDCA 207	**Lab III-Visual Studio .NET**
PGDCA 208	**Project**

PAPER I - RDBMS

Module-I (10 Hrs)

Introduction to database system concepts —— Overview of Database System —— Data Independence —— DBMS Terminology —— Data Abstraction — Instance ——Schemes—DBMS Components — DDL — DML — Concepts of 4GL — Data Dictionary — Database Models — Relational — Network — Hierarchical

ER Model — ER Diagrams —— Aggregation — Generalization — Cardinality

Physical storage organizations —— Hashed and Indexed files

Module-II (10 Hrs)

The relational Model —— Relational Database Structure —— Databases—— Tables — Relations —— Domains —— Attributes — Tuples — Primary key — Foreign key

Relational Algebra —— Fundamental operations —— Select project — Union — Difference —— Intersection-Join —— Functional dependencies — Multi valued dependency — Decomposition of relational schemes —— Normalization 1st, 2nd and 3rd normal forms, BCNF, 4 NF and 5 NF, Typical examples, Case study.

Relational database design principle

Module-III (10 Hrs)

Integrity Constrains and Advantages of DBMS Concepts —— Domain Constraints — Referential Integrity — Database Anomalies — Data base Triggers — Transaction Concepts — Concurrency control — Lock based protocols— Deadlocks — Integrity — Recovery Rollback ——Log based recovery

Database System Architecture and new applications — Centralized Systems — Client-Server Systems — Parallel and distributed systems

Module -IV (10 Hrs)

Introduction to Oracle — Oracle architecture — Table spaces — Data files — Blocks —— Segments — Oracle server processor — Users and privileges

Basic structure of SQL-DDL — DML —— DCL —— SQL *PLUS —Creating, updating, deleting records —Rollback, dropping tables — Adding constraints —SQL functions-Simple queries

Nested sub queries with SQL — Indexing and Clustering — Creating indexes — Listing indexes — SQL statement with indexes —— Validating indexes —— Dropping indexes —Creating a clustered table — Dropping clusters

Views— Defining a View — Granting view access to others — Querying views — Creating Synonyms — Defining multiple table views with JOIN and without JOIN — Formatting results — Inserting, deleting and Updating data through views — Dropping views

Other SQL features and Versions

Module-V (10 Hrs)

. Application development with ORACLE — Overview of application tools with Oracle —— Planning and designing databases for typical applications ——Business — Inventory — Production — Marketing and distribution.

PL/SQL Programming —— Simple formatted reports — Cursors — Stored procedures — Triggers —— Forms and Reports in Developer 2000 —— Sample Program using Control Structures —Cursors — Exceptions — Triggers and Procedures.

Reference Texts:

1. Database Management Systems — Alexis Leon, Mathew Leon — Vikas Publication

2. Database System Concepts —Korth,Silberschatz, and Sudarsan — Tata McGraw Hill

3. Oracle – 7 — Complete Reference — Ivan Bayross — BPB Publications

PAPER II - JAVA PROGRAMMING

Module-I (10 Hrs)

Introduction to Java —— Features— Java Applications — Java Applets —— Platform independent, Security — Bytecodes and JVM — Java versus C++ — Java Application —Java Applets-Java Languages — Data types in Java — Integral types—Byte,short,int,long — Floating points—float,double character —— Boolean type-Variables — Declaration of variable — Dynamic initialization — Scope of variables — Final variables — Type promotion—rules — Type casting-Literals — Integer,Floating point,Boolean,character and string literals
Operators — Arithmetic Operators — Relational Operators — Increment and decrement Operators — Conditional Operators-Control Statements — IF, if…….else, switch…..case —— Iteration-while, do while, for, break, continue-A Simple java program — Structure — The main( ) method — Command line arguments — Editing, Compiling and executing a java program
Arrays — Declaring and creating arrays——The new operator —— One-dimensional arrays — Multi dimensional arrays — Simple programs using arrays,read,print,sort,etc

Module - II (10 Hrs)

Objects in Java — Class-syntax-class and method naming conversions — Class members, private, public and protected access — Creating objects — Object references — Defining Constructors — This keyword and its use — Program example using simple classes —— Final member and methods —— Static members and methods —— Overloading methods — Passing simple types and objects as method arguments
Packages — Overview of packages in the java library — Java.lang— Java.io —Java.Util — Java.NET — Java.awt —— Java.sql — Defining a package — Classpath— Importing a package—import statement — Interfaces — Defining interface — Implementation interface — Interface variables — Extending interfaces
Exception Handling —— Exception class hierarchy — Exception handling—try, catch, throw — Throws , finally ——Exception Handling

Module- III (10 Hrs)

Inheritance —— Defining inheritance — Sub class, super class — Defining sub class- extends keyword —— Creating multi level class hierarchy — Order of constructor execution — Super keyword — Method overriding —— Using final to prevent overriding-Polymorphism —— Abstract Classes-Multithreading —— Definition of thread —— Java:lang, —Thread class methods ——Creating a thread —— By extending thread class —— By implementing Runnable interface —Creating multiple threads —— Synchronizing threads — Synchronized methods —— Synchronized statement

Module – IV (10 Hrs)

Java Library —— String Handling –string class —— String Constructors —— String literals — Character extraction, methods, substring() —— Index methods, length() method —— String comparison method —— Conversion using value Of methods-String Buffer Class — StringBuffer construcors —— Append(),insert(),and replace() methods — String Tokenizer-Type Wrapper classes — Uses of type wrapper classes —— Integer, Double, Float, Boolean, Character classes —— Utility Classes-Input / Output in Java —— Concepts of Streams — Java.in package-io class hierarchy ——Input stream, Output stream, Data input Stream, Data Output Stream —— Reader and Writer classes — Using console input —— The file class — File input stream — File output stream —— File handling using File Input Stream and File Output Stream-

Networking in Java — The Inet Address class — TCP/IP classes — Socket class —ServerSocket class —— Writing a client server program using TCP/IP classes(Simple message passing only)

Module -V (10 Hrs)

GUI programming — Java awt package — Components and containers —— AWT class hierarchy-Layout manager—Flow layout, Grid layout, Border layout, Card layout —Event handling — Event model, Listeners —— Listener objects — Listener interfaces for most types of events-Introduction to J2EE— Overview — Web applications — Enterprise applications —Sun J2EE Blueprints — Platform roles — Platform Contracts — Scalability and fault tolerance —— Future directions-Enterprise Java Beans——Overview of EJB — The Components — Session Beans —Entity Beans — EJB Container — Limitations when writing EJBs —— Stateful and Stateless Operation.

JMS —JMS Capabilities —Servlets / JSP

The Java Transaction API and the Java Transaction Service — Transactions and Enterprise Java Beans—JDBC —JNDI —JavaMail—XML and XSL-Introduction to The Case Study — Requirement for the Webstore Application —Interface Requirements —Feature Requirements —— Design Requirements —— Limitations.

Webstore Design –Basic Archtectural Design —— Layers

Designing the JSPs — The Welcome Page — The Product Browsing Page — The Toolbar / Cart Page —— The Checkout Page — Pages for functions-Designing the EJBs — CartBean — ProductBean— CustomerBean

Designing the Tag Extension Libraries — User Tag Extension Library — Cart Tag Extension Library

Implementing Webstore — Implementing the EJBs — CartBean— ProductBean— CustomerBean — Deployment Descriptors.-Implementing the Tag Extension Libraries-Implementing the JSPs— The Product Browsing Page — The Toolbar / Cart Page — The Layout Page-Implementing the XSL

Packaging the Web Application — Packaging the Enterprise Application

Reference Texts :

1. Professional JSP —— Wrox Press Ltd —— Shroff Publishers and Distributors Pvt.Ltd,——— Karl Avedal, Danny Ayers,Timothy Briggs, etc
2. Mastering Java2 — BPB
3. Java2 Black book by Steven Holzener — Wiley Dream Tech Publishers
4. Java2 Complete Reference —— TMI

PAPER III - SOFTWARE ENGINEERING AND PROJECT MANAGEMENT

Module-I (10 Hrs)

Introduction to Software Engineering

Introduction —Software Engineering—Life Cycle Models (Waterfall,Incremental,Spiral, WINWINSpiral,Evolutionary,Prototyping,ObjectOriented)— Software Development Team Structure — Chief Programmer Team Structure — Hierarchical Team Structure — Types of Software Projects.

Software Project Management

Project Definition —— Contract Management —— Activities Covered by Software Project Management —— Overview of Project Planning —— Stepwise Project Planning —— Project Schedule ——Sequencing and Scheduling Activities.

Module – II (10 Hrs)

Software Requirement Specification

Introduction to SRS——System Models——System Evolution —— Functional Requirement ——Non Functional Requirement ——Glossary of Documentation.

Software Requirement Metrics —Parameters — Speed —Robustness ——Reliability—Portability.

Object Oriented Analysis — Advantages of OOA —Introduction to Classes, Objects—Defining the attributes and operation —Aggregation ——Whole-part Structure and General-Specification Structure —Active State Diagram — Event Trace Diagram.

Module – III (10 Hrs)

Software Design — Design Concepts — Modularity, Coupling and Cohesion —Data Dictionary —Input, Output Design —Data Flow Diagram

Object Orientation Models — Relationships

Object Oriented Modeling using UML

Introduction to UML — UML features and Advantages —Object Oriented Analysis ——Principles —UML diagrams —Use Case Models —Use Case Diagrams —— Developing Use Case Diagrams for Typical Applications.

Class Diagrams — Perspectives —Associations —— Generalization ——Constrain Rules —Stereotypes — Object Diagrams.

Interaction Diagrams — Sequence and Collaboration Diagrams — Comparing Sequence and Collaboration Diagrams —— Packages and Collaborations .

Introduction to packages collaborations — CRC cards — State Diagrams — Concurrent State Diagrams — Activity Diagrams — Decomposing an Activity —— Dynamic Concurrency —Physical Diagrams — Development and Component Diagrams — Combining Component and Development Diagrams — Complete UML diagrams for typical System.

Module – IV (10 Hrs)

GUI design — Advantages — Types of User-Interfaces

X-windows / motify Systems and Programming —— Stepwise refinement —— computer aided software engineering tools ——Case study in Software Engineering

Software Testing

Taxonomy of Software Testing — Levels — Test activities — Kinds of software Testing ——Concepts from White-Box and Black-Box Testing —— Testing Boundary conditions

Time / Structure – Based Software Reliability Estimation — Definitions and Terminology ——Basic Assumptions — Testing Methods and Saturation Effect —Testing Effort — Limits of Testing Methods — Empirical Basis of the Saturation Effect—— Reliability Overestimation due to Saturation — Incorporating Coverage in Reliability Estimation —— Filtering Failure Data Using Coverage Information — Selecting the Comprehension Ratio — Handling Rare Events.

Test Coverage Criteria based on data flow mechanisms — Regression testing — testing in the large software testing strategies —— strategic approach and issues — unit testing — integration testing — validation testing —— system testing and debugging.

Software Metrics for Reliability Assessment

Static Program Complexity —— Software metrics — A Domain Model of Software Attributes — Principal Component Analysis — The usage of Metrics — Relative Program Complexity ——Software Evolution.

Dynamic Program Complexity— Execution Profile — Functional Complexity — Execution Profile —— Functional Complexity —— Dynamic Aspects of Functional Complexity — Operational Complexity.

Software Complexity and Software Quality —— Introduction —The application its Metrics —— Multivariate Analysis in Software Quality Control —— Fault Prediction Models — Enhancing Predictive Models with Increased Domain Coverage.

Software Reliability Modeling —— Reliability with Software Complexity Metrics — The Incremental Build Problem.

Module – V (10 Hrs)

Software Quality —-Quality Assurance — Quality Control — Statistical Quality Control —— Software Defects, Reviews — SQA plan Review/inspection procedure document —checklists —Recording Defects and actions Recommended Process Frameworks : Five Levels of CMM, Introduction to CMMI —Introduction to Six Sigma , DMAIC model.

Software Cost Estimation — Function Point Models — COCOMO Model — Delphi Method —— Defining a Task Network —Scheduling —— Earned Value Analysis — Error Tracking — Software Changes — program evolution dynamics —software maintenance — Architectural Evolution — Taxonomy of CASE tools — Communications Management ——Cost Management —— Integrated Change Management.

Risk Management—Nature of Risk — Types of Risk — Managing Risk — Hazard Identification —hazard Analysis —— Risk Planning and Control.

Reverse Engineering and Re-Engineering — Need for Reverse Engineering — Steps in Reverse Engineering — Lehman's Law —— Maintenance process Model

Reference Texts :-

1. Software Engineering — Ian Sommerville —— Addison Wesley
2. Software Engineering , a Practices Approach — Pressman — Mc GrawHill

PAPER IV - INTRODUCTION TO .NET TECHNOLOGIES

Module-I (10 Hrs)

Introduction to .net technologies

Overview of visual studio.net —— .NET Languages —— Comparison of .net languages —— Common language Runtime —— .NET framework —— .NET framework security —— Advantages of .net framework-Class Library —— Assemblies —— Namespace-Execution of application in the .net framework —— Application domains —— Common type system

Module – II VB.NET

Comparison with previous version of Visual Basic —— Variable declaration changes ——Array declaration changes —— Data type changes —— Logical operator changes —— Changes in control statements —— String declaration changes-Creating new window Applications Using VB.NET —— Creating Forms — Adding controls to forms —— Writing event driven codes to the form controls —— Arranging controls in form —— Adding controls at runtime —— Aligning, anchoring, docking and layering of controls —— Creating dialog boxes —— Displaying message boxes —— Implementing MDI forms —— Programming with clipboard —— Using String methods and string handling techniques —— Using control statements for powerful codes (IF-then-next, for-each, do-loop) —— Writing Procedures and Function —— Declaring and passing arguments —— Overloading procedure —— Using Optional arguments in Procedure-Implementation VB.NET Classes —— Error handling in VB.NET-Database Programming —— Using ADO.NET —— ADO.NET Components —— Data sets —— Data adapters-Creating data entry screen for accepting and displaying data —— Setting data adapters for storing and retrieving data —— Data form wizard

Module – III VC.NET

Introduction to VC.NET —— Types of VC.NET applications —— Programs with Managed and without managed extensions —— Project Templates in Visual C++.NET —— ATL Project —— MFC Projects —— Managed Projects —— Other Projects templates —— Creating forms and adding menus —— Creating Dialog boxes —— Painting the screen —— Developing MFC applications —— Database programming in Visual C++.NET —— Managed extension for C++ —— Exception Handling

Module – IV C#.NET

Introduction to C# —— Variable types —— Type conversions —— Visual C# operators —— Introduction to C# statements —— Declaration of arrays —— Single and Multidimensional arrays —— Introduction to Jagged Arrays —— Creating classes in Visual C# —— Creating Windows Applications —— Creating Windows Services —— Installation and Administration of Services

Module -V ASP.NET

Introduction ASP.NET —— ASP.NET and .NET framework SDK —— Creating Web forms —— Adding controls —— Web page processing —— Introducing to HS —— Installation – Creating virtual Directory —— Using HTML and XML in ASP.NET —— Server side programming using ASP.NET—— Using Validation controls in ASP.NET pages —— Using ADO.NET with ASP.NET —— Running a site using HS and ASP.NET

Reference Texts:

1. Visual Studio.NET Programming-Nitin Pandey-Wiley dreamtech
2. Mastering Visual Basic.net Evangelos Petroutsos-BPB Publishers.