SARDAR PATEL UNIVERSITY

M. Sc. (Information Technology)
(Under Choice Based Credit Scheme)
Semester - II
(Syllabus with effect from June 2020)

COURSE NO: PS02EINT31 ***w.e.f. June 2020***

ADVANCED JAVA

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. **Java Servlet and Java Sever Page(JSP)**
   - Introduction to Java Servlet, Life cycle of Servlet
   - Introduction to JSP, Architecture of JSP
   - Developing simple JSP page
   - JSP directives, JSP scripting elements, JSP action elements
   - JSP implicit objects
2. **The Spring Framework**
   - Introduction to the spring framework and architecture
   - Beans (definition, scope, lifecycle)
   - Aspect-Oriented Spring
   - Spring MVC, Security
   - JDBC Framework
3. **Hibernate**
   - Understanding object relational persistence
   - Hibernate mapping
   - Managing entity identity
   - Mapping class inheritance
4. **Enterprise Java Beans (EJB)**
   - Introduction to Java EE architecture
   - EJB Overview
   - Entity Beans, Session Beans, Message Driven Beans

REFERENCE BOOKS:

1. Bayross Ivan, Shah Sharanam, Bayross Cynthia and Shah Vaishali: Java Server Programming, 2nd Edition, Shroff Publishers and Distributors Pvt. Ltd., 2008
2. Craig Walls : Spring in Action, Dreamtech Press, 4th edition
3. Bauer Chritian and King Gavin : Java Persistence with Hibernate, Dreamtech Press, 2010
4. Panda, Rahman and Lane : EJB 3 in Action, Dreamtech Press, 2010

5. Bond, Law, Longshaw, Haywood and Roxburgh : Teach yourself J2EE, 2nd Edition, Pearson Education, 2007
6. Web sources

ADDITIONAL REFERENCE BOOKS:

1. Shah Sharanam and Shah Vaishali : Struts 2 for beginners, 2nd Edition, Shroff Publishers and Distributors Pvt. Ltd., 2009
2. Koegh Jim : The Complete Reference J2EE, Tata McGraw-Hill, 2006

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DATA SCIENCE

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. **Introduction to Data Science Data Analytics**
   - Data Science Definition
   - Need and features
   - Importance of Data Science in Modern Business
   - Current Trends in Data Science
   - Analytical Techniques
2. **Introduction to Big Data**
   - Types of Digital Data: Unstructured, Semi-structured and Structured
   - Working with Unstructured Data
   - Evolution and Definition of Big Data
   - Characteristics and Need of Big Data
3. **Introduction to Big Data Analytics**
   - Meaning and Characteristics of Big Data Analytics
   - Need of Big Data Analytics
   - Classification of Analytics
   - Importance of Big Data Analytics
4. **Data Analytics using Python and R**
   - Introduction to NumPy, SciPy
   - Introduction to pandas
   - Introduction to Matplotlib
   - Introduction to R
   - Introduction to R Studio
   - Developing data science applications using Python and R

REFERENCE BOOKS:

1. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, Introducing Data Science: Big Data, Machine Learning and More, Using Python Tools
2. Seema Acharya, Subhashini Chellappan, Big Data and Analytics, Wiley
3. VigneshPrajapati, Big Data Analytics with R and Hadoop – Packrt
4. Mark Lutz, "Learning Python", 4th Edition, O'Reilly, 2009
5. Wes McKinney, "Python for Data Analysis", O'Reilly, 2013
6. Robert I. Kabacoff, "R in Action: Data Analysis and Graphics with R", Manning, 2011
7. e-Book

ADDITIONAL REFERENCE BOOKS:

1. Minelli, Chambers, Dhiray, Big Data Big Analytics, Wiley
2. Bart Baesens, Analytics in a Big Data World , Wiley

3. Thomas Erl, Wajid Khattak, and Paul Buhler, Big data Fundamentals: Concepts, Drives, and Techniques, , Pearson India Education Services Pvt. Ltd., 2016
4. Roger D. Peng and Elizabeth Matsui, The Art of Data Science: A Guide for Anyone Who Works with Data, LeanPub, 2016
5. Brian Caffo, Roger D. Peng and Jeffrey Leek, Executive Data Science A Guide to Training and Managing the Best Data Scientists, LeanPub, 2016
6. Alex Holmes Hadoop in Practice – Dreamtech
7. Documentation of relevant software packages
8. Other web references

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WEB PROGRAMMING

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. **Introduction to Front-end Development Tools**
   - HTML Forms
   - Introduction to HTML5 and XHTML
   - CSS: Introduction, Applications, types, properties and attributes, class
   - Introduction to JavaScript: Features, Advantages, DOM, Methods to implement JavaScript, Arrays, Functions, Dialogue Boxes
   - Events, Methods and Validations in JavaScript
2. **Server Side Scripting Using PHP - I**
   - Introduction to Open Source
   - Advantages and Capabilities of Open Source
   - Introduction to PHP: Features, Adding PHP to HTML
   - Common PHP script elements – data types, Variables, Constants, operators,
   - Flow Control and looping,
   - strings, arrays, associative arrays, functions
   - Working with Forms – Form validation, Input validation, regular expression functions
3. **Server Side Scripting Using PHP – II**
   - Introduction to MySQL: Features, Merits and Demerits,
   - Data Types
   - MySQL Functions
   - Database Connectivity
   - Error handling
   - Introduction to Sessions and Cookies
4. **Server Side Scripting Using PHP - III**
   - Security – Authentication (user logins), Authorization (Permissions)
   - Object Oriented Programming with PHP: Classes, Objects, Inheritance, Polymorphism
   - File Handling – Introduction, access, uploading, handling
   - Introduction to Content Management Systems

REFERENCE BOOKS:

1. Ivan Baryons: "Web Enabled Commercial Applications Development using HTML, DHTML, Javascript, PHP"
2. Steve Suehring Tim Converse Joyce Park:PHP6 and MySQL Bible - Wiley Publication
3. Internet reference for the relevant topics

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SOFTWARE ENGINEERING

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. **Introduction**
   - General Architecture of Systems with basic components
   - Open and Close Systems
   - TPS, MIS, DSS and ES Types of Systems
   - Software – meaning and applications
   - Software Engineering – meaning, goal, challenges and approach
   - Software Process
   - Software Development Process Models – waterfall, prototyping, iterative, time boxing and spiral
   - Introduction to Agile Computing
2. **Software Requirement Analysis and Project Management**
   - Software Development Life Cycle (SDLC)
   - Software Requirements Specification (SRS) – Need, Process, Problem Analysis, Requirement Specifications, structure and components, Functional Specifications using Use Cases
   - Software Project Management : Project Planning, various issues addressed in Project Planning
   - Work Breakdown Structure (WBS)
3. **Software Design**
   - Design – meaning, types
   - Design approaches - function-oriented design (introduction), object-oriented design
   - Design Concepts for Object-oriented design - information hiding, functional independence, refinement, refactoring and design classes
   - Object Modeling using UML – Overview, Diagrams – class, sequence, collaboration, use-case, activity, state chart
4. **Coding and Testing**
   - Coding – meaning, process, programming standards and guidelines, refactoring, verification, metrics
   - Testing – meaning, importance and process
   - Testing fundamentals – error, fault, bug, failure, test oracles, test cases and test criteria
   - Introduction to Black-box (functional) testing and White-box (structural) testing
   - Comparison of Black-box and White-box testing
   - Alpha testing and Beta testing
   - Testing tools

REFERENCE BOOKS:

1. Jalote Pankaj : Integrated Approach to Software Engineering, 3rd Edition, Narosa Publishing House, 2005 (ISBN 978-81-7319-702-4).

2. Roger S. Pressman : Software Engineering, A Practice Approach, 6th Edition, Mc-Graw Hill International Edition, 2005 (ISBN 007-124083-7).
3. Rajib Mall : Fundamentals of Software Engineering, 2nd Edition, Prentice-Hall of India, 2006 (ISBN-81-203-2445-5).
4. James A Senn : Analysis and Design of Information Systems McGraw Hill Intl. Stdt. Edn, 1985

ADDITIONAL REFERENCE BOOKS:

1. Ian Sommerville : Software Engineering, 6th edition, Pearson Education, 2001, (ISBN 81 7808-497-X).
2. Waman S Jawadekar, Software Engineering Principles and Practice, 1st Edition,Tata McGraw Hill, 2004.
3. Sajja, P.S. "Essence of Systems Analysis and Design: A Workbook Approach", Springer International Publishing, Singapore, 2017

COURSE NO: PS02CINT33 ***w.e.f. June 2020***

ARTIFICIAL INTELLIGENCE

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. **Artificial Intelligence (AI) and Knowledge Based Systems (KBS)**
   - Natural and Artificial Intelligence
   - Testing Intelligence with Turing Test, and Chinese Room Experiment, Application Areas of Artificial Intelligence, Data pyramid
   - Production systems and AI Based Searches like Hill Climbing and Heuristic Search
   - KBS Structure, Components of KBS, Categories of KBS, Knowledge-Based Shell, Advantages, Limitations and Applications of KBS
   - Knowledge Acquisition, Knowledge Update
   - Factual and Procedural Knowledge Representations
   - Knowledge Based Systems Development Model
2. **Fuzzy Logic**
   - Fuzzy Logic and Fuzzy Sets, Membership Functions,
   - Fuzzification and Defuzzification
   - Operations on Fuzzy Sets
   - Fuzzy Functions and Linguistic Variables
   - Fuzzy Relations, Propositions and Connectives
   - Fuzzy Inference
   - Fuzzy Rules, Fuzzy Control System and Fuzzy Rule Based Systems
3. **Connectionist Models**
   - Introduction to ANN, Biological Neuron and Artificial Neuron
   - Hopfield model of ANN, Parallel relaxation
   - Linearly Separable Problems, Single perceptron
   - Non Linearly Separable problems, Fixed increment perceptron learning
   - Multi Layer Perceptron, Applications of ANN and Cases
4. **Genetic Algorithms**
   - Introduction to Genetic Algorithm (GA),
   - Fundamental Concepts of GA :Gene, Population, Fitness Functions, Generations
   - Encoding Strategies, Genetic Operators, Fitness Functions
   - Typical Genetic Algorithm Cycle
   - Function Optimization, Designing Special Operators and Edge Recombination, Travelling Salesman Problem
   - Schema, Genetic programming

REFERENCE BOOKS:

1. Rich and Knight, Artificial Intelligence, Tata McGraw Hill Publishing Co. Ltd., 21st Indian Reprint, 2001
2. Akerkar RA and Sajja P S, Knowledge-Based Systems, Jones & Bartlett Publishers, Sudbury, MA, USA, 2009
3. Vijyalaxmi Pai and Rajasekaran, Neural Network, Fuzzy Logic and Genetic Algorithms, Prentice Hall of India, 2003
4. Web Resources

ADDITIONAL REFERENCE BOOKS:

1. J S R Jang, C T Sun and E Mizutani, Neuro-Fuzzy Soft Computing, Prentice Hall of India Ltd., 1997
2. Peter Jackson, Introduction to Applied Expert systems, Pearson Education Ltd., Second Indian Reprint, 2001
3. David W Rolston: Principles of AI & ES Development, McGraw Hill, 1988.
4. David E.Goldberg, Genetic Algorithms in Search, Optimization & Machine Learning, Pearson Education, 2002

COURSE NO: PS02CINT34 ***w.e.f. June 2020***

VISUAL PROGRAMMING

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

COURSE CONTENT:

1. The .NET Technology

- Introduction to .NET Framework
- Architecture of .NET framework – BCL (Base Class Library), CLR (Common Language Runtime), etc.
- .NET Languages – introduction, Types of applications supported by .NET Technology
- Managed code, compilation to intermediate language, Just-In-Time compilation, garbage collection, assemblies and the GAC

2. Language basics

- C#.NET – Introduction and features
- General structure of C#.NET program
- C#.NET – basic data types, variable, constant, type conversion - Boxing and Unboxing
- C#.NET – statements (conditional and looping)
- Console Applications, Windows Applications - Windows Forms and Life Cycle
- User interface controls - Basic Controls, Dialog controls, Menu control

3. Advance features

- OOPS concepts, Class and Object
- Class types and interface
- Working with Strings, Arrays, Lists and Collections
- Exception handling

4. Database Programming and Reports

- Database programming – concepts
- The ADO.NET architecture (connected and disconnected mode)
- ADO.NET Data providers, Dataset, DataAdapter, DataReader
- Data Controls
- Generating reports

REFERENCE BOOKS:

1. Black Book: .NET 4.5 Programming (6-in-1) covers .NET 4.5 Framework, Visual Studio 2012, C# 2012, ASP.NET 4.5, VB 2012, and F# 3.0, Dreamtech Press, 2013.
2. Bill Evjen, Scott Hanselman, Devin Rader: Professional ASP.NET 4 in C# and VB, Wiley India Pvt. Ltd., 2010
3. Matthew MacDonald: Beginning ASP.NET 4.5 in C#, Apress, 2013

ADDITIONAL REFERENCE BOOKS:

1. Black Book: C# 2010 Programming covers .NET 4.0, Dreamtech Press, 2010
2. Joseph Albabari, Ben Albabari: C# 4.0 in a Nutshell, O'Reilly.
3. Web Resources

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Practicals