Sixth Semester Syllabus

OBJECT ORIENTED PROGRAMMING WITH JAVA (DCS-601)
Discipline core (DC): Credit 4(3-0-2)

Objective:
Today, the most likely place you will find Java is on World Wide Web. The web acts as convenient transport mechanism for Java programs and the web's ubiquity has popularized Java as an Internet development tool. Java has shifted the programming paradigm of single machine to distributed network of machines. Any application on World Wide Web can be easily implemented. Internet can have numerous applications and various protocols.

COURSE OUTLINE:
1. Introduction to Java
A brief history, how Java works?, Java Virtual Machine (JVM), Java In Time (JIT) compiler, Java features, using Java with other tools, native code, Java application types, comparison with C and C++
2. Working with data types, control flow statements, arrays, casting, command line arguments
3. Java Classes and Memory Management
Introduction to Classes, inheritance, encapsulation and polymorphism, constructors and finalizers, garbage collection, access specifier
4. Interfaces and Packages
Using Java interface, using Java packages
5. Exception Handling and Stream Files
Over view of exception handling, method to use exception handling, method available to exceptions (The throw statement, the throws class, finally class), creating your own exception classes
6. Threads and Multi-threading
Overview, thread basics – creating and running a thread, The thread control methods, The threads life cycle and synchronization
7. Introduction to Applet, Application and JD
Java applets Vs Java applications, building application with JDK, building applets with JDK, HTML for Java applets, managing input-output stream
8.Java Data Base Connectivity (JDBC)

LIST OF PRACTICALS
1. Programming exercise on control flow statements in Java
2. Programming exercise on Arrays and String
3. Programming exercise on inheritance
4. Write Program for exception handling
5. Write programs for Multithreading
6. Programming exercise on Java applets
7. Write program for Java Data base connectivity
8. Mini project on Java

RECOMMENDED BOOKS
1. The Complete Reference Java by Herbel Schildt; McGraw Hill, New Delhi

2. Java Programming by Balagurusamy, Tata McGraw Hill Education Pvt Ltd , New Delhi

3. Computer Programming in Java, W C/D by Junaid Khateeb, Wiley-India Pvt Ltd. Daryaganj, New Delhi

UNIX WITH SHELL PROGRAMMING (DCS-602)
Discipline core (DC): Credit 4(3-0-2)

Objective: This course introduces basic understanding of UNIX OS, UNIX commands and File system and to familiarize students with the Linux environment. To make student learn fundamentals of shell scripting and shell programming. Emphases are on making student familiar with UNIX environment and issues related to it.

COURSE OUTLINE:

Unit 1
The Unix Operating System, The UNIX architecture and Command Usage, The File System ,Basic File Attributes, the vi Editor.

Unit 2
The Shell, The Process, Customizing the , More file attributes, Simple filters

Unit 3
Filters using regular expressions, An Advanced Filter perl – The Master Manipulator

Unit 4
Essential Shell Programming, An Advanced Filter, perl - The Master Manipulator

RECOMMENDED BOOKS

1. Sumitabha Das: UNIX – Concepts and Applications, 4 th Edition, Tata McGraw Hill, 2006.
2. Behrouz A. Forouzan and Richard F. Gilberg: UNIX and Shell Programming, Cengage Learning, 2005

Artificial Intelligence (DCS-603)
Open Elective (OE): 4(3-0-2)

Objective: The basic objective of AI (also called heuristic programming, machine intelligence, or the simulation of cognitive behavior) is to enable computers to perform such intellectual tasks as decision making, problem solving, perception, understanding human communication (in any language, and translate among them), and the like.

COURSE OUTLINE:

1. Approaches to AI: Turing Test and Rational Agent Approaches; State Space Representation of Problems, Heuristic Search Techniques, Game Playing, Min-Max Search, Alpha Beta Cutoff Procedures.

2. Knowledge Representation: Logic, Semantic Networks, Frames, Rules, Scripts, Conceptual Dependency and Ontologies; Expert Systems, Handling Uncertainty in Knowledge.

3. Planning: Components of a Planning System, Linear and Non Linear Planning; Goal Stack Planning, Hierarchical Planning, STRIPS, Partial Order Planning.

4. Natural Language Processing: Grammar and Language; Parsing Techniques, Semantic Analysis and Prgamatics.

5. Multi Agent Systems: Agents and Objects; Agents and Expert Systems; Generic Structure of Multiagent System, Semantic Web, Agent Communication, Knowledge Sharing using Ontologies, Agent Development Tools.

6. Fuzzy Sets: Notion of Fuzziness, Membership Functions, Fuzzification and Defuzzification; Operations on Fuzzy Sets, Fuzzy Functions and Linguistic Variables; Fuzzy Relations, Fuzzy Rules and Fuzzy Inference; Fuzzy Control System and Fuzzy Rule Based Systems.

7. Genetic Algorithms (GA): Encoding Strategies, Genetic Operators, Fitness Functions and GA Cycle; Problem Solving using GA.

8. Artificial Neural Networks (ANN): Supervised, Unsupervised and Reinforcement Learning; Single Perceptron, Multi Layer Perceptron, Self Organizing Maps, Hopfield Network.

LIST OF PRACTICALS

RECOMMENDED BOOKS

Python (DCS-603)
Open Elective (OE): 3(3-0-0)

Course Outcome (CO)
CO 1To read and write simple Python programs.
CO 2To develop Python programs with conditionals and loops.
CO 3Todefines Python functions and to use Python data structures–-lists, tuples, dictionaries
CO 4To do input/output with files in Python
CO 5To do searching, sortingand merging in Python

DETAILED SYLLABUS

Introduction: The Programming Cycle for Python, Python IDE, Interacting with Python Programs, Elements of Python, Type Conversion. Basics: Expressions, Assignment Statement, Arithmetic Operators, Operator Precedence, Boolean Expression.

Conditionals: Conditional statement in Python (if-else statement, its working and execution), Nested-if statement and Elif statement in Python, Expression Evaluation & Float Representation. Loops: Purpose and working of loops , While loop including its working, ForLoop, Nested Loops, Break andContinue.

Function:Parts of A Function, Execution of A Function, Keyword and Default Arguments, Scope Rules. Strings: Length of the string and perform Concatenation and Repeat operations in it. Indexing and Slicing of Strings. Python Data Structure: Tuples, Unpacking Sequences, Lists, Mutable

Sequences, List Comprehension, Sets, Dictionaries Higher Order Functions: Treat functions as first class Objects, Lambda Expressions

Sieve of Eratosthenes: generate prime numbers with the help of an algorithm given by the Greek Mathematician named Eratosthenes, whose algorithm is known as Sieve of Eratosthenes. File I/O:File input and output operations in Python Class Example, Inheritance, Inheritance and OOP.
Iterators & Recursion: Recursive Fibonacci, Tower Of Hanoi Search : Simple Search and Estimating Search Time, Binary Search and Estimating Binary Search Time Sorting & Merging : Selection Sort, Merge List, Merge Sort, Higher Order Sort
Text books:
1. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist", 2nd edition,Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python –Revised and updatedfor Python 3.2, Network Theory Ltd., 2011.
3. John V Guttag, —Introduction to Computation and Programming Using Python", Revised andexpanded Edition, MIT Press , 2013
4.Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python:An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016
5.Timothy A. Budd, —Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.,, 2015.
6.Kenneth A. Lambert, —Fundamentals of Python: First Programs‖, CENGAGE Learning, 2012.
7.CharlesDierbach, —Introduction to Computer Science using Python: A Computational ProblemSolving Focus, Wiley India Edition, 2013.
8.PaulGries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3‖, Second edition, Pragmatic Programmers, LLC

Internet of Things (DCS-603)
Open Elective (OE): 3(3-0-0)

Objective: Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain like agriculture, space, healthcare, manufacturing, construction, water, and mining.

COURSE OUTLINE:

1. Introduction to Internet Of Things (IoT)

Introduction to IoT, Defining IoT, Things in IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, IoT Protocols, IoT communication Models, IoT communication API's, IoT enabling Technologies.

2. IoT Devices

How electronic devices fit with the Internet of Things, and why they are important: Breadboard and its internal connections, ,LED and its connections ,Tri-color LED ,Resistor

Introduction to the many 'end devices', sensors and actuators, differentiate between different sensor types.

3. IoT Networks

Introduction to the components of basic IoT networks, the types of network connections and how data travels through them, and the role of Internet Protocols. understanding of microcontrollers/Arduino and communication protocols

4. IoT and M2M

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT- Software defined networking, network function virtualization, IoT and WoT

RECOMMENDED BOOKS

1. The Internet of Things: Connecting Objects to the Web,Wiley PublisherHakimaChaouchi
2. Internet of Things: A Hands On Approach, University Press,VijayMadisetti, Arshdeep-Bahga.
3. 21 Internet Of Things (IOT) Experiments,BPB Publications YashavantKanetkar
4. Arduino Projects For Engineers ,BPB Publications ,Neerparaj Rai
5. Internet of Things – A Hands on Approach, By ArshdeepBahga and Vijay Madisetti Universities Press, ISBN: 9788173719547
6. The Internet of Things , Pearson, By Michael Miller ISBN: 9789332552456
7. e-books/e-tools/relevant software to be used as recommended by AICTE/UP-BTE/NITTTR, Chandigarh.

ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT (DCS-604)
Discipline Electives (DE): Credit 3(3-0-0)

Objective: In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management

COURSE OUTLINE:

SECTION – A ENTREPRENEURSHIP

1. Introduction

1.1 Concept /Meaning and its need

1.2 Qualities and functions of entrepreneur and barriers in entrepreneurship

1.3 Sole proprietorship and partnership forms of business organisations

1.4 Schemes of assistance by entrepreneurial support agencies at National, State, District level: NSIC, NRDC, DC:MSME, SIDBI, NABARD, Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP)

2. Market Survey and Opportunity Identification

2.1 Scanning of business environment

2.2 Salient features of National and State industrial policies and resultant business opportunities

2.3 Types and conduct of market survey

2.4 Assessment of demand and supply in potential areas of growth

2.5 Identifying business opportunity

2.6 Considerations in product selection

3. Project report Preparation

3.1 Preliminary project report

3.2 Detailed project report including technical, economic and market feasibility

3.3 Common errors in project report preparations

3.4 Exercises on preparation of project report

SECTION –B MANAGEMENT

4. Introduction to Management

4.1 Definitions and importance of management

4.2 Functions of management: Importance and Process of planning, organising, staffing, directing and controlling

4.3 Principles of management (Henri Fayol, F.W. Taylor)

4.4 Concept and structure of an organisation

4.5 Types of industrial organisations

a) Line organisation b) Line and staff organisation c) Functional Organisation

5. Leadership and Motivation

a) Leadership

5.1 Definition and Need

5.2 Qualities and functions of a leader

5.3 Manager Vs leader

5.4 Theories of motivation (Maslow, Herzberg, McGregor)

6. Management Scope in Different Areas

a) Human Resource Management i) Introduction and objective ii) Introduction to Man power planning, recruitment and selection iii) Introduction to performance appraisal methods

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)

2. Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi

MAJOR PROJECT WORK (DCS-605)
Discipline core (DC): Credit 4(0-0-8)

Objective: Major Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective department may have a brainstorming to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment.

The project assignments may consist of:

- Installation of computer systems, peripherals and software

- Programming customer based applications

- Web page designing including database connectivity

- Database applications

- Networking (Cabling, Hubs, Switch etc)

- Software Development

- Fabrication of components/equipment (computer related components)

- Fault-diagnosis and rectification of computer systems and peripherals

- Bringing improvements in the existing systems/equipment

- Projects related to Multimedia

- Projects related to Computer Graphics

- Web Hosting

- Configuration of Network Operating System(Windows, Linux)

- Configuration of servers (Proxy, DNS etc)

Employable Skills (DCS-606)
Discipline core (DC): Credit 2(0-0-4)

Objective:
Diploma holders are required to not only possess subject related knowledge but also soft skills to get good jobs and to rise steadily at their workplace. This subject is included to develop employability skills amongst the students

DETAILED CONTENTS

1.Industrial Scenario Engineering Education and expectations of competences from an engineer by employer
2.Personality types, characteristic and features for a successful engineer
3.Professional Engineer desirable values and ethics and their development. Relation between engineering profession, society and environment
4.Managing project
•Leadership•Motivation
•Time management
•Resource management
•Computer Software
•Interpersonal relationship
•Engineer economics and fundamentals
5.Effective Communication
•Listening
Speaking
•Writing
•Presentation Technique/Seminar
•Group discussion

6.Preparing for Employment
•Searching for job/job hunting
•Resume Writing
•Interview technique in personal interview telephonic interview, panel interview, group interview, video conference
7.Managing Self
•Managers body, mind, emotion and spirit
•Stress Management
•Conflict resolution
8.Continuing professional development
•Organising learning and knowledge
•Use of computer for organising knowledge resource
9.Creativity, Innovation and Intellectual property right
•Concept and need in present time for an engineer
10.Basic rules, laws and norms to be adhered by engineers during their working

8: Eligibility Criteria

For Indian:

- 10^{th} with Science and Mathematics (Not the elementary mathematics) or equivalent as prescribed by the Board of Technical Education, Uttar Pradesh. For admission to polytechnic first year the applicants must have cleared qualifying examination scoring minimum 35% from a recognized education board.
- **Lateral Entry:**
    - The applicants with 12^{th} standard qualified with Physics, Chemistry & mathematics (PCM) can also apply for lateral entry.
    - Pass in ITI with one year (who have passed 10th examination before admission in ITI) or 10+2 with vocational course.

For International:

9: Career path student can choose after the course

Nowadays almost all organizations and companies are reliant on computers. So, all companies require computer engineers for development, maintenance and repair of computer systems. So, Diploma computer engineers can work as:

1. Software Engineer
2. Hardware Engineer
3. Networking Engineer
4. Software Tester

5. Web Designer
6. App Developer
7. Project Engineer

Job in IT Companies

Computer manufacturing units recruit Computer engineers at junior level for designing and manufacturing censors, VLSI Chips, Micro Processors, Micro Controllers, Circuit Boards and other various parts.

Job opportunities in telecommunication sector

Junior Computer engineers are also regularly recruited by well-known recruiters in telecom sectors. With more and more modernization, the job opportunity for Diploma engineers in Computer Science is ever increasing.

Job opportunities in software development firms

Nowadays the field of Android App development has been flourishing at great pace. Diploma engineers can find suitable jobs in this field also.

Career opportunity in armed forces

Indian armed forces are becoming more and more technology driven. Every year, hundreds of junior engineers are recruited by three wings of armed forces. Generally, Diploma engineers work in various fields like Signals Department, maintenance of Radar, on-board computers and in various other related fields. It is felt that compared to the Army, more job opportunities are available in Indian Air Force and Indian Navy for Diploma holders in Computer Science. So far as Indian Navy is concerned, Diploma engineers also get opportunity to work on-board of the naval ship.

Career opportunity in PSUs

Various technology based public sector undertakings regularly appoint junior level Computer engineers every year. In this connection, we must mention Hindustan Aeronautical Limited (HAL), Bharat Electronics Limited (BHEL), Indian Telephone Industries (ITI) and various other public sector undertakings, which regularly recruit Diploma engineers in CSE. Similarly State Government PSUs also appoint many Diploma engineers in Computer Science.

Self-employment opportunity

Many Diploma Computer engineers get good opportunity to start their own work/enterprise. Diploma computer engineers can become independent software engineers or can start their own hardware sales/support services.