Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2015
'B' Grade (CGPA 2.62)

Name of the Faculty: Science and Technology

CHOICE BASED CREDIT SYSTEM

Structure and Syllabus: Computer Science & Engineering

Name of the Course: S.Y. B. Tech. Sem III and Sem IV

(Syllabus to be implemented from w.e.f. June 2021)

Programme Educational Objectives and Outcomes

A. Program Educational Objectives

1. To make students competent for professional career in Computers, IT & allied fields.
2. To build strong fundamental knowledge amongst student to pursue higher education and continueprofessional development in Computers, IT & other fields
3. To imbibe professional ethics, develop team spirit and effective communication skills to besuccessful leaders and managers with a holistic approach.
4. To nurture students to be sensitive to ethical, societal & environmental issues while conductingtheir professional work.

B. Program Outcomes Engineering Graduate will be able to –

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities withan understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

C. Program Specific Outcomes (PSOs)

1. Graduate has an ability to use technical skills necessary for design, maintenance, developmentand implementation of database systems and networking applications.
2. Graduate has an ability to provide IT solutions, develop mobile applications in multidisciplinaryareas using standard tools and techniques.
3. Graduate has an ability to utilize and apply software engineering tools for design and realizationof projects in various domains of Computer Science and Engineering.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE AND TECHNOLOGY

Structure of S.Y. B.Tech.(CSE) wef. 2021-2022

Semester – III

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS211	Applied Mathematics-I	3	1		4	70	30	25	125
CS212	Discrete Mathematical Structures	3	1		4	70	30	25	125
CS213	Data structures	3			3	70	30		100
CS214	Computer Graphics	3			3	70	30		100
CS215	Microprocessors	3			3	70	30		100
CS216	Python Programming	2			2		25		25
	Sub Total	**17**	**2**		**19**	**350**	**175**	**50**	**575**
	Environmental studies	2				50			50
	Laboratory/Workshop					**ESE** **POE**			
CS213	Data structures			2	1	50		25	75
CS214	Computer Graphics			2	1			25	25
CS215	Microprocessors			2	1			25	25
CS216	Python Programming			2	1	50		25	75
	Sub Total			**8**	**4**	**100**		**100**	**200**
	Grand Total	**19**	**2**	**8**	**23**	**450**	**175**	**150**	**775**

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

FACULTY OF SCIENCE AND TECHNOLOGY

Structure of S.Y. B.Tech.(CSE) wef. 2021-2022

Semester – IV

Course Code	Theory Course Name	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
CS221	Applied Mathematics-II	3	1		4	70	30	25	125
CS222	Theory of Computation	3	1		4	70	30	25	125
CS223	Computer Organization and Architecture	3			3	70	30		100
CS224	Computer Networks	3			3	70	30		100
CS225	OOP using Java	2			2		25		25
	Total	**14**	**2**		**16**	**280**	**145**	**50**	**475**
	Environmental studies	2				50			50
	Laboratory/Workshop					**ESE** **POE**			
CS223	Computer Organization and Architecture			2	1			25	25
CS224	Computer Networks			2	1	50		25	75
CS225	OOP using Java			4	2	50		25	75
	Total			**8**	**4**	**100**		**75**	**175**
	Grand Total	**16**	**2**	**8**	**20**	**380**	**145**	**125**	**650**

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Second Year B.Tech (Computer Science & Engineering)

Semester-III

CS211 APPLIED MATHEMATICS-I

Teaching Scheme:	**Examination Scheme**
Lectures-3 Hours/week,3 Credits	ESE-70 Marks
Tutorial- 1 Hours/ week,1 Credit	ISE - 30 Marks
	ICA-25 Marks

Introduction:

This course includes mathematical theory and concepts required by the computer engineer. The course consists of linear differential equations which can be used for mathematical model which are appearing in computer engineering, where these variables are dynamically related. This course introduces Z-transform which provide a mathematical framework for a series of mathematical conversions that are useful for digital filters. Laplace transforms is another powerful mathematical tool for engineering problems in Computer Science and Engineering. This course also introduces Fourier series, which plays an important role in designing, and analyzing communication system. This course also introduces fundamentals of probability distributions which are useful for digital communication. This course introduces Queuing systems which are prevalent throughout society. There are applications of queuing theory in several disciplines.

Course Prerequisite:

Fundamentals of trigonometry, method of finding roots of algebraic equations, differentiation, integration, partial fraction, sum of sequence and methods of solving definite integrations, basics of statistics and probability theory.

Course Objectives:

1. To introduce to student method of solving higher order linear differential equations
2. To introduce to student Laplace and inverse Laplace transforms
3. To introduce to student Fourier series of periodic functions
4. To make student understand Z transform and its properties
5. To introduce to student various probability distributions
6. To introduce to student Queuing theory and its model.

Course Outcomes:

1. Student can solve higher order linear differential equation with constant coefficient.
2. Student can apply Laplace and inverse Laplace transforms for solving linear differential equations.
3. Student can express a function in terms of sine’s and cosines components so as to model simple periodic functions.
4. Student can solve problems on Z transform and explain its properties
5. Student can find the relation between two variables for the given data using regression and explain various probability distribution functions.
6. Student can solve problems based on queuing theory.

SECTION – I

Unit1: Linear differential equations with constant coefficients: (07)

Basic definition, differential operator, complimentary functions, particular integral,Shortcut methods for standard functions like e^{ax}, $\sin(ax+b)$, $\cos(ax+b)$, x^m, $e^{ax}VandxV$, particular integral by general method (without method of variation of parameters) for other functions.

Unit2:Z-Transform: (05)

Introduction, Z-Transform of standard sequence, properties of Z-transform – linearity, change of scale, shifting property, multiplication by k, division by k, inverse Z-transform –power series method, partial fraction method

Unit 3:Laplace transform: (09)

Definition, Laplace transform of standard functions, properties-first shifting, change of scale, multiplication of power t and division by t, Laplace transform of derivative and integral, Laplace transform of periodic functions, unit step functions and unit impulse functions, properties of inverse Laplace transforms- linear property, first shifting theorem, partial fraction, inverse transform of logarithmic & inverse trigonometric functions and convolution theorem, solution of differential equations by Laplace transform.

SECTION-II

Unit4:Fourier series: (07)

Introduction, Definition, Euler’s formula, Fourier series of periodic functions with period 2□and2L, Dirichlet’s theorem (only statement),even and odd functions, half range sine and cosine series.

Unit 5: Statistics and probability: (08)

Coefficient of correlation by KarlPearson’s method and lines of regression of bivariate data, random variable, discrete and continuous random variable, probability density function, Binomial, Poisson, Normal distribution

Unit 6:QueuingTheory: (06)

Introduction, Queuing system, Distributions in Queuing systems, Kendall’s notation, classification of queuing models, M/M/1: ∞/∞ models, M/M/1: N/∞ models.

Internal ContinuousAssessment(ICA):

ICA shall consist of minimum six to eight assignments based on entire curriculum

Text books:

1. A textbook of Applied Mathematics Vol. II and Vol. III, J.N. and P.N. Wartikar,Vidyarthi Grah Prakashan, Pune.
2. Higher Engineering Mathematics, Dr.B.S.Grewal, KhannaPublications, Delhi.
3. A Textbook of Applied Mathematics, N.P. Bali, Ashok Saxena and N.Ch. S.N.Iyengar,Laxmi Publications, Delhi.
4. Advanced Engineering Mathematics, Kreyzig-JohnWiley&SMS, NewYork.

Reference Books:

1. Advanced Engineering Mathematics, Peter O’Neil, Cengage Learning.
2. Engineering Mathematics, Srimanta Pal, Subodh Chandra Bhunia, Oxford University Press

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Second Year B.Tech (Computer Science & Engineering)

Semester-III

CS212-DISCRETE MATHEMATICAL STRUCTURES

Teaching Scheme	**Examination Scheme**
Lectures–3 Hours/week,3 Credits	ESE –70 Marks
Tutorial–1 Hour/week,1 Credits	ISE – 30 Marks
	ICA – 25 Marks

Introduction:

This course introduces discrete mathematics which deals with fundamentals of mathematical reasoning and set theory. The course also introduces theoretical and mathematical aspects of relations, functions, algebraic system & Boolean algebra.

Course Prerequisite: Student shall have knowledge of basic mathematics.

Course Objectives:

1. To get acquainted to basic connectives and find equivalent formulas and normal forms.
2. To draw implications from basic primitives.
3. To introduce set theory and relations with illustrations.
4. To introduce the concepts of functions and its types through scenarios.
5. To define types of algebraic systems and applications.

Course Outcomes:

Students will be able to:

1. Arrive at inference from the given premises applying mathematical logic
2. Select the associated operations and terminologies to solve logical problems for sets, functions, and relations.
3. Classify algebraic systems based on its properties and Select an appropriate for given application

SECTION-I

UNIT-1 Mathematical logic (06)

Introduction, statements and Notation, Connectives-negation, conjunction, disjunction, conditional, bi conditional, statement formulas and truth tables, well-formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives.

UNIT-2 Representation of expressions (04)

Normal & Principle normal forms, completely parenthesized infix & polish notations, Theory of inference for statement calculus.

UNIT-3 Set theory (04)

Basic concepts of set theory, types of operations on sets, ordered pairs, Cartesian product.

UNIT-4 Relations (07)

Relations, Properties of binary relations, Matrix and graph representation, Partition and covering of set, Equivalence relation, Composition, POSET and Hasse diagram.

SECTION II

UNIT-5 Functions **(04)**
Function-types, Composition of functions, Inverse functions.

UNIT-6 Algebraic systems **(07)**
Algebraic systems, semi groups and monoids, properties and example.

UNIT-7 Groups **(06)**
Polish expressions and their compilation, Groups, group codes.

UNIT-8 Lattices and Boolean algebra **(07)**
Lattice as POSETs, definition, examples and Properties, Special Lattices, Boolean algebra definition and examples, Boolean functions.

Internal Continuous Assessment (ICA):

In tutorial session, students of different batches should be assigned exercise problems and should be guided for the solution. Minimum one tutorial per unit is expected.

Text books:

1. Discrete mathematical structures with applications to computer science -- J. P. Tremblay & R. Manohar (MGH International)

ReferenceBooks:

1. Discrete Mathematics with combinatorics and graph theory- S. SNTHA (CENGAGE Learning)
2. Discrete Mathematical Structures –Bernard Kolman, Robert C. Busby (Pearson Education)
3. Discrete mathematics-Liu (MGH)
4. Theory and problems in Abstract algebra--Schaums outline series (MGH)
5. Discrete Mathematical Structures-Y N Singh (WILEY)
6. Discrete Mathematics and Its Applications, Chakraborty & Sarkar, Oxford
7. Discrete Structures, S.B.Singh, Khanna Book Publishing, Delhi
8. Discrete Mathematics, T.Veerarajan, TataMcGraw-Hill

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Second Year B.Tech (Computer Science & Engineering)

Semester-III

CS213 -DATA STRUCTURES

Teaching Scheme	**Examination Scheme**
Lectures:3 Hrs/Week,3Credits	ESE:70 Marks
Practical:2 Hrs/Week,1Credits	ISE:30 Marks
	ICA:25 Marks
	POE: 50 Marks

Introduction:

This course introduces various data structures like searching sorting, stack, queue, linked list, trees, graphs and hashing techniques. Course includes implementation of various operations of these data structures and some applications.

Course prerequisites:

This course requires prior knowledge of any basic programming language.

Course Objectives:

1. To introduce students to various data structures.
2. To develop programming skills to implement and analyze linear and nonlinear data structures.
3. To identify and apply the suitable data structure for problem solving.

Course Outcome:

Students will be able to

1. Describe linear and non-linear data structures
2. Implement abstract data structures
3. Analyze and Implement Tree and Graph data structures
4. Identify appropriate usage of data structures for a given problem

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UNIT 1 : Introduction to Data Structures & Searching-Sorting (05)

What is Data Structure, types of data structures – static, dynamic, primitive, non-primitive, linear, non-linear

Study and Implementation of Searching Algorithms- Linear search and Binary search.

Study and Implementation of Sorting Algorithms-Bubblesort, Insertion sort, Merge sort, Quick sort, Selection sort, Shell sort and Radixsort, Heap sort.

UNIT 2 : Hashing (05)

Different Hash Functions, choosing a hash function Collision Resolution by Open Addressing : Linear probing, quadratic probing, double hashing, Collision Resolution by Chaining

UNIT 3 : Stack and Queue (05)

Stack: Definition, representation, Operations, Implementation and applications like conversion of polish notations, evaluation of postfix expressions.

Queue: Definition, representation, Operations, Implementation of Linear Queue, Circular Queue, Priority Queue.

UNIT 4 : Lists (06)

Definition, representation, Operations, Types of Lists: Singly Linked list, Doubly Linked list, Circular Linked list, Stack using linked list, Queueusing Linked list, Application of Linked list : Addition and Subtraction of two polynomials

SECTION –II

UNIT 5 : Trees (06)

Definition, Traversal, Linked implementation, Operations on: Binary trees and Binary Search Trees, Introduction to Threaded Binary trees

UNIT 6 : Multiway Trees (06)

Multiway search Trees, Balanced Multiway Trees, Traversing a Multiway Tree, Insertion in Multiway Tree : BTrees, B+ Trees

UNIT 7 : Height Balance Trees (06)

AVL Trees : Definition, Height of an AVL Tree, Insertion, Deletion of node in AVL Trees, Single and Double rotation of AVL Trees.

UNIT 8 : Graphs (06)

Definition, Undirected and Directed Graphs, Graph Terminologies, Computer Representation of Graphs, Graph Traversal methods : Depth First and Breadth First Search, Application : Shortest Path using Dijkstra’s algorithm.

Internal Continuous Assessment(ICA):

ICA shall consist of minimum 15 practical assignment problems based on all above topics in line with course outcome. Practical problem statements should cover all topics mentioned in syllabus.

Text Books:

1. Data Structure and Program Design in C by Robert Kruse/C.L.Tonda/Bruce Leung second edition, Pearson Education, Prentice Hall.
2. Data Structures: A Pseudo Approach with C. by Richard.F.Gilberg & Behrouz A. Forouzan, second edition, Cengage Learning
3. Data Structure using C and C++ by Rajesh.K.Shukla,Wiley Publication

Reference Books:

1. Data Structures using C and C++, second edition by Yedidyah Langram, Moshe J, Augensteen, Aason. M. Tanenbaum.
2. Data Structures and Algorithms by Prof. Maria S. Rukadikar, Shroff Publications.
3. Data Structures Through C in Depth by S.K. Shrivastava, Depali Shrivastava, BPB Publications
4. Fundamentals of Data Structures, Sartaj Sahni, University Press
5. Data Structures, R S Salaria, Khanna Publishing House
6. Data Structures through C,Yashwant Kanetkar, BPB Publications
7. Expert Data Structures with C++, R B Patel, Khanna Publications

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Second Year B.Tech (Computer Science & Engineering)

Semester-III

CS214-COMPUTER GRAPHICS

Teaching Scheme	**Examination Scheme**
Lectures:3 Hrs/week,3 credits	ESE:70 Marks
Practical:2 Hrs/Week,1 credit	ISE: 30 Marks
	ICA: 25 Marks

Introduction:

This course introduces the basic of computer graphics and different basic graphics functions. It also develops ability for implementation of different algorithms. With this course student can acquire computer graphics techniques, its uses and implementation details.

Course Prerequisite: Knowledge of C Programming & Mathematics.

Course Objectives :

1. To introduce basics elements of computer graphics and graphic devices.
2. To demonstrate the line, circle and polygon filling algorithms.
3. To demonstrate 2D and 3D transformations.
4. To use clipping algorithms.
5. To introduce hidden and visible surfaces, different types of curves.

Course Outcome:

Student will able to

1. Draw graphical elements using built-in graphic functions in'C'.
2. Differentiate different graphical devices.
3. Drawlines, Circles and fill polygons.
4. Apply simple 2D and 3D transformations to given object and create simple 2D animations
5. Demonstrate different clipping algorithms, surfaces and different types of curves.

SECTION I

UNIT-1Basic Concepts & Devices (06)

Introduction to computer graphics, Application of Computer Graphics, pixel,frame buffer, resolution, aspect ratio, Video display devices: Refresh CRT,Raster scan display, Random scan display, color CRT monitors, Interactivedevices:joysticks, touchpanels, lightpens.

UNIT-2 Rasterscan Graphics (08)

Line drawing algorithms : DDA, Bresenham's algorithm, Bresenhams Circle generation algorithm, Run Length Encoding, Polygon filling : Scan converting polygon, Edge fill, Edge flag, Seed fill.

UNIT-3 Geometric Transformations (09)

2DTransformation: Translation, Rotation, Reflection, Scaling, Shearing, Combined transformation, Rotation about an arbitrary point, Reflection through an arbitrary line.

3DTransformation: Scaling, Shearing, Rotation, Reflection, Translation, Multiple Transformation, Rotation about axis parallel to coordinate axis.

SECTION II

UNIT-4 Clipping&Display FileCompilation (07)

Sutherl and-Cohenline clipping algorithm, Midpoint subdivision algorithm, Viewing transformation, Window transformation, segmented display file, Display file compilation.

UNIT-5 Visible Lines &Visible Surfaces (08)

Hidden surfaces : introduction, back-face removal algorithm : Painter‘s algorithm, Warnock algorithm, Z–buffer. Antialiasing and antialiasing techniques, Halftoning.

UNIT-6 Plane curves & Space curves (07)

Introduction to curve generation, Curvere presentation, interpolation, Nonparametric & parametric curves, Beziercurves, B-splinecurves, Introduction to fractals, Fractal lines and surfaces.

Internal continuous assessment(ICA):

Student should perform 8 to10 experiments based on following guidelines.

1. To Study Basic graphics functions.
2. Implementation of DDA line drawing algorithm.
3. Implementation of Bresenham’s line drawing algorithm.
4. Implementation of Bresenham’s Circle generation algorithm.
5. Implement Polygon filling algorithms.
6. Implement 2D transformation.
7. Implementation of 3D transformation.
8. Implement Sutherl and–Cohen line clipping algorithm.
9. Implementation of Warnock algorithm.
10. Case study of OpenGL
11. Implement a small animation package.

Text Books:

1. Computer Graphics**(Chapter 1)**-Donald Hearn, Baker (second edition)PHI publications.
2. Procedural elements for Computer Graphics **(Chapter 2,4,5)** - David F. Rogers (second edition) Tata McGraw Hill publications.
3. Mathematical elements for Computer Graphics **(Chapter 3,6)** - Rogers, Adams (second edition)McGraw Hill Publishing Company.

Reference Books:

1. Computer Graphics with virtual reality systems -Rajesh K. Maurya.
2. Principals of Interactive Computer Graphics - William Newman, Sproull (second edition) McGraw-Hill Publication.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Second Year B.Tech (Computer Science & Engineering)

Semester-III

CS215 – MICROPROCESSORS

Teaching Scheme	**Examination Scheme**
Lectures:3 Hrs/week,3Credits	ESE:70 Marks
Practical:2 Hrs/week,1Credit	ISE:30 Marks
	ICA:25 Marks

Introduction:

This course introduces to develop an in-depth understanding of the operation of microprocessor, machine language programming and interfacing techniques.

Course Prerequisite: Knowledge of Digital Techniques and Basic Electrical Engineering

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Course Objectives

1. To introduce 8085 and 8086 microprocessor architectures and their functionalities.
2. To develop microprocessor based programs for various applications.
3. To build the interfacing between microprocessor and various peripherals.
4. To introduce basics of 80286, 80386 and 80486 microprocessors.

Course Outcomes :

Students will be able to

1. Describe the basic building blocks, operations & the addressing modes of microprocessors.
2. Write an assembly language program for 8086 micropocessor.
3. Implement interfacing programs for different peripheral devices with microprocessor

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SECTION-I

UNIT-1 Introduction to Microprocessor (04)

Introduction to microprocessor, Features and pin diagram of 8085, 8085 MPU architecture

UNIT-2 8086 Microprocessor (06)

8086 Architecture, Internal Operation, Machine Language Instructions : Addressing Modes, Instruction Execution Timing

UNIT-3 Assembly Language Programming (06)

Assembler Instruction Format, 8086 instruction set,Directives

UNIT-4 System Bus Architecture (04)

Introduction, Basic 8086 Configurations : Minimum Mode, Maximum Mode, System Bus Timing

SECTION-II

UNIT-5 Interrupts (06)

Introduction,Types of 8086 Interrupts, Interrupt and Interrupt service Routine, Maskable and Non-maskable Interrupt, Programmable Interrupt Controller (8259), Programmable, Features and Block Diagram of DMA Controller 8257, Operating modes of 8257.

UNIT-6 Programmable peripheral Interface (04)

Programmable peripheral Interface 8255,Modes of Operation

UNIT-7 Programmable Communication Interface and 8087 NDP (04)

8087 numeric data processor. NDP data types, process or architecture

UNIT-8 The 80286, 80386 and 80486 Microprocessor (05)

Introduction to 80286 Microprocessor, Architecture, Real Address Mode Operation, Protected Mode operation, 80386 Architecture, 80486 Architecture

Internal Continuous Assessment(ICA):

Student should perform 8 to 10 experiments using MASM/TASM / 8086 Emulator based on following guidelines.

1. Addition and subtraction of two 16 bit numbers
2. Addition and subtraction of two 32 bit numbers
3. 16 bit multiplication of unsigned numbers.
4. 8 bit division of unsigned numbers
5. Find factorial of number
6. Generate a Fibonacci series.
7. Program for block transfer
8. Program to arrange numbers in ascending and descending order
9. Program to find Largest No. in a block of data.
10. Program to display the string.
11. Program to implement keyboard sensing using 8255
12. Implementation of 7-segment display using 8255

Text Books:

1. Microprocessor Architecture, Programming, and Applications with the 8085 - Ramesh Gaonkar, Fifthedition. (UNIT -1)
2. Lice& Gibson,―MicrocomputerSystem8086 /8088‖PHI,2nd Edition. (Unit2, 3,4, 7)
3. D.V.Hall,―Microprocessor and Interfacing Programming &Hardware‖TMH–2 Edition-(Unit8)
4. AK Ray & K M Bhurchandi―Advanced Microprocessorsand Peripherals. 2nd Edition (Unit 5,6)

ReferenceBooks:

1. Barry B.Brey- The Intel Microprocessors : Architecture, Programming & Interfacing PHI, 6th Edition.
2. Uffenback- The 8086 Family Design, PHI, 2nd Edition.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Second Year B.Tech (Computer Science & Engineering)

Semester-III

CS216 PYTHON PROGRAMMING

Teaching Scheme	**Examination Scheme**
Lectures: 2 Hours/week, 2 Credits	ISE - 25 Marks
Practical: 2 Hour/week, 1 Credit	POE - 50 Marks
	ICA - 25 Marks

Introduction: Python is a popular, general-purpose, multi-paradigm, open-source, scripting language. It is designed to emphasize code readability – has a clean syntax with high level data types. It is suited for interactive work and quick prototyping, while being powerful enough to write large applications. This course introduces the python language which has simple syntax, powerful set of libraries and robust debugger and profiler.

Course Prerequisite:

Student should have knowledge of basic programming.

Course Objectives:

1. To introduce the core components of Python programming language.
2. To study library packages to write applications using python
3. To study GUI, exception handling and debugging python program.

Course Outcomes :

At the end of this course, students will be able to

1. Write Python scripts using procedure oriented approach of writing a computer program.
2. Write Python scripts using Object oriented approach of writing a computer program
3. Exhibit ability to use Python's standard library packages to provide solution to a given problem.

SECTION - I

Unit 1 - Introduction to Python (02)

Introducing the Python Interpreter, Program Execution, Execution Model Variations, The Interactive Prompt, System Command Lines and Files

Unit 2 - Introduction to Python Programming Constructs (08)

Data types and variables, Collection data types, Control structures, loops and functions, Lambdas, Generators, Exception Handling, String handling, Scope of variables, Modules, Packages, Command line arguments. Built-in: Functions, Constants, Types, Exceptions.

Unit 3 - Introduction to Object Oriented Programming in Python (05)

Classes, Instance Objects, Method Objects, Class and Instance Variables, Attributes and methods, Inheritance and polymorphism

SECTION - II

Unit 4 - Python Standard Library Modules and Packages (08)

Regular expression operations, Basic date and time types, General calendar-related functions, Container datatypes, NumPy, Shallow and deep copy operations, Mathematical functions, Generate pseudo-random numbers, File and Directory Access

Data Persistence: CSV File Reading and Writing, Configuration file parser, Logging facility for Python.

Unit 5 – Multithreading and Introduction to GUI programming (04)

Concurrent Execution: Thread-based parallelism, Process-based parallelism, Context Variables, Asynchronous I/O.

Introduction to GUI programming in python.

Unit 6 – Testing and Debugging **(03)**

Testing output, Unit tests in Python, Handling Multiple exceptions, Creating custom exceptions, Debugging programs, Unit testing, Measure execution time of small code snippets.

ISE Evaluation for the course will consists of three programming (hands on) tests.

Internal Continuous Assessment (ICA):

Minimum 12 assignments based on above topics.

- The assignments should test and develop student's practical proficiency and ability to use Python standard library modules and packages efficiently in writing effective code for varied applications scenarios & requirements, use cases.
- Use of IDEs like PyCharm, Eclipse with PyDev, Jupyter Notebook for Interactive development and debugging of Python applications is highly recommend to enhance hands on skills in Python Programming of Students.
- Every assignment shall be performed under Python 2.x or 3.x runtime environment configured using any of the following tools 1) pyenv 2) virtualenv3)Anaconda

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Text Book:

Programming in Python 3, Mark Summerfield, Second Edition

Reference Books:

1. Python Cookbook, David Beazley and Brian K. Jones, Third Edition, Shroff Publishers & Distributors Pvt. Ltd., ISBN :978-93-5110-140-6
2. Learning Python, MarkLutz, 5th edition
3. Programming Python (English), MarkLutz, 4th Edition
4. Testing Python, David Sale, Wiley India (P) Ltd., ISBN :978-81-265-5277-1

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e-resources :

1. Python 2.7.16 documentation - https://docs.python.org/2/
2. Python 3.7.3 documentation - https://docs.python.org/3/

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Second Year B.Tech (Computer Science and Engineering)
Semester-IV
CS221 : APPLIED MATHEMATICS-II

Teaching Scheme	Examination Scheme
Lectures–3 Hours/week,3 Credits	ESE–70 Marks
Tutorial–1 Hour/week,1 Credit	ISE – 30 Marks
	ICA- 25 Marks

Introduction:

This course introduces numerical methods (Unlike analytical methods) to solve algebraic and transcendental equations, simultaneous systems of linear equations and numerical integrations. This course also introduces the fuzzy set theory in brief which deals with characterizing the concept of uncertainty and its relationship to the increasingly important concept of information and complexity. This course also introduces simplex method to solve LPP and assignment problems.

Course Prerequisite:

Student shall have knowledge of basic notions of classical set theory and probability theory. Studentshall have to be familiar with some analytical method for solving equations, simultaneous equations &analyticalmethods to solvedefiniteintegrations.

Course Objectives:

1) To make students familiar with the uncertainty.
2) To give students comprehensive coverage ofoperations on fuzzysets.
3) To make student use of numerical methods for the problems that cannot be solved analytically.
4) To enable students to solve Linear Programming Problems and Assignment Problems.

Course Outcomes:

1) Student can solve nonlinear algebraic and transcendental equations.
2) Student can solve simultaneous linear and nonlinear equations.
3) Students can apply numerical methods to evaluate definite integrals.
4) Student can apply knowledge of basics of fuzzy set theory to solve the problems.
5) Student can solve the fuzzy equations
6) Students can solve a particular kind of problems arises in day to day life using simplex method and Assignment Problems.

SECTION-I

Unit1: Solution of algebraic and transcendental equation (07)

Basic properties of equations, False position method, Newton-Raphson method, Multipleroots, Newton's iterative formula for obtaining square root, system of non-linear equations by Newton Raphson method.

Unit 2: Solution of linear simultaneous equations (07)

Direct methods–Gauss Elimination method, Gauss Jordan methods, Method of factorization Iterative methods–Jacobi's method, Gauss-seidal method, power method to find eigen value and eigen vector.

Unit 3:Numerical Integration (07)

Integration using Newton's cote's formulae–Trapezoidal rule, simpson's $1/3^{rd}$ rule, Simpson's 3/8th rule, Weddel's rule, Romberg integrations, Double integrations.

SECTION-II

Unit 4:Classical (Crisp) sets of fuzzy sets: (06)

Crisp sets, Basic types of fuzzy sets, Basic concepts of fuzzy sets, fuzzy sets vs Crisp sets:Additional properties of $\alpha-$cuts,representationoffuzzysetsandextensionprincipleoffuzzysets.

Unit 5:Fuzzy arithmetic. (08)

Fuzzy number, arithmetic operations on intervals, arithmetic operations on fuzzy numbers, fuzzy equations, lattice of fuzzy numbers.

Unit6:LPP and Assignment Problems (07)

Introduction of LPP, Simplex method for LPP, Assignment problem : introduction mathematical formulation of Assignment Problem, Hungerian method to solve Assignment Problem.

Internal Continuous Assessment (ICA):

ICA shall consist of minimum six to eight assignments based on entire curriculum

Text Books:

1) B.S. Grewal, Numerical methods, Khanna publication, New Delhi.
2) George J Klir and BoYuan, Fuzzy sets and Fuzzy logic– PHI India.
3) Fundamental of statistics, S.C.Gupta, Himalaya house publication.

ReferenceBooks:

1) George J. Klir and Tina A. Folger, Fuzzysets, uncertainity and information, PHI India.
2) Robert J. Schiling, SandraL.Harris, Applied Numerical methods for Engineers.
3) M.K.Jain, S.R.K.Iyengar, R.K.Jain, Numerical methods for scientific and engineering computations– New Age International ltd.
4) Pundir & Pundir, Fuzzysets and their applications – Pragati Publications.

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

Second Year B.Tech (Computer Science and Engineering)

Semester-IV

CS 222 – THEORY OF COMPUTATION

Teaching Scheme	**Examination Scheme**
Lectures–4Hours/week,4credits	ESE–70Marks
Tutorial–1Hour/week,1credit	ISE – 30 Marks
	ICA-25Marks

Introduction:

Theory of computation lays a strong foundation for a lot of abstract areas of computer science. TOC teaches you about the elementary ways in which a computer can be made to think. Any algorithm can be expressed in the form of a finite state machine and can serve as a really helpful visual representation of the same. Sometimes, the finite state machines are easier to understand thus helping the cause furthermore.

Prerequisite: Students should have prior knowledge of Discrete Mathematical Structure

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Course Objectives:

1. To introduce the computational principles to build regular expressions for given regular language.
2. To introduce different types of automata.
3. To explain regular and non-regular languages.
4. To introduce context free grammar.
5. To introduce different types of Pushdown automata and Turing machine.

Course Outcome:

Students will be able to

1. Build regular expression for a given language.
2. Design different types of automata.
3. Classify languages as regular and non regular language.
4. Detect ambiguity in a grammar and convert into unambiguous grammar and normal forms.
5. Design pushdown automata and Turing machine for a given language.

SECTION-I

UNIT-1 Regular Expressions (08)

Regular expressions & corresponding regular languages, examples and applications, unions, intersection & complements of regular languages

UNIT-2 Finite Automata (08)

Finite automata definition and representation, Non-deterministic F.A.,NFA with^ transitions, Equivalence of DFA & NFA

UNIT-3 Kleen’s Theorem (08)

Statements & proofs, minimizing number of states in an FA, Basics of Moore and Mealy Machines

UNIT– 4 Grammars & Languages (08)

Definition and types of grammars and languages, derivation trees and ambiguity, CNF notations, Union, Concatenation and*'s of CFLs, Eliminating ^ production and unit productions from a CFG, Eliminating useless variables from a Context Free Grammar.

SECTION-II

UNIT– 5 Pushdown Automata **(07)**
Definition, deterministic PDA & types of acceptance, equivalence of CFGs & PDAs.

UNIT– 6 CFL's & Non CFL's **(06)**
Pumping Lemma & examples, inter section and complements.

UNIT– 7 Turing machines **(10)**
Models of computation, definition of TM as language Acceptors, Combining Turing machines, computing function with a TM

UNIT-8 Variations in TM **(05)**
TMs with doubly infinite tapes, Multitape, Non-deterministic TM and universal TM.

Internal Continuous Assessment (ICA):

Students should solve assignments based on the topics below:

1. Regular Expression & Corresponding Languages
2. Union, Intersection & Complements of Regular languages
3. Design & Simulation of Simple Finite Automata
4. Nondeterministic Finite Automata & NFA with ^transitions ,Conversion of NFA to DFA
5. Draw NFA using Kleens theorm
6. DFA minimization
7. Grammer, Removing ambiguity from a grammar, Conversion to BNF & CNF form
8. Push Down Automata
9. Pumping Lemma & Examples for regular sets & regular languages
10. Turing Machine

Text Books:

1. Introduction to languages & theory of computation--John C.Martin(MGH)
2. Formal Languages & Automata Theory-- Basavraj S. Anami, Karibasappa K.G., Wiley Precise Textbook-Wiley India

References:

1. Theory of Computation—Rajesh K Shukla (CENGAGE Learning)
2. Introduction to Automata theory, languages and computations – John E. Hopcraft, Rajeev Motwani, Jeffrey D. Ullman (Pearson Edition).
3. Discrete mathematical structures with applications to Computer science - J.P.Tremblay & R.Manohar (MGH)
4. Theory of Computer Science:Automata, Languages and Computation, Mishra, Phi
5. Theory of Computation, R B Patel & Prem Nath, Khanna Publications

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Faculty of Science and Technology
Second Year B. Tech (Computer Science & Engineering)
Semester – IV

CS223 - COMPUTER ORGANIZATION AND ARCHITECTURE

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs/Week, 3 Credits	ESE: 70 Marks
Practicals 2 Hrs/Week, 1 Credit	ISE: 30 Marks
	ICA : 25 Marks

Introduction: Computer Organization and Architecture (COA) course provide students with an understanding of the design of fundamental blocks used for building a computer system and interfacing techniques of these blocks to achieve different configurations of an "entire computer system". It introduces detailed understanding of various processor micro architectural designs, which include pipeline design, and multi-core processor design.

Course Prerequisite: Student shall have undergone a course on Digital Logic Design and Operating system.

Course Objective:

1. To impart basic concept of computer organization and architecture.
2. To help student to understand various memory module.
3. To facilitate student in understanding in learning IO communication.
4. To develop deeper understanding of instruction and multiprocessor level parallelism.

Course Outcomes: At the end of the course students will be able to

1. Describe the functional architecture of computing systems.
2. Analyse various parallel programming model.
3. Use ARC Processor based instructions to write assembly language program.
4. Demonstrate the design aspects of memory, instruction level parallelism and multiprocessors.

SECTION-I

Unit 1 - Introduction (05)

A Brief History of Computing, The Von Neumann Model, Generations of Computers, The System Bus Model, Levels of Machines: Upward Compatibility, The Levels of computer, A Typical Computer System.

Unit 2 - The Instruction Set Architecture and Memory (06)

Hardware Components of the Instruction Set Architecture, ARC - A RISC Computer , Pseudo Operations, Synthetic Instructions, Examples of Assembly Language Programs, Accessing Data in Memory-Addressing Modes, The Memory Hierarchy, Cache Memory.

Unit 3: Parallel Models, Languages and Compilers (07)

Parallel Programming Models: Shared variable model, Message passing model, Data Parallel Model, Object Oriented Model, Functional and Logic Models. Parallel Languages and Compilers: Language Features for parallelism, Parallel Language Constructs, Optimizing Compilers for Parallelism

SECTION-II

Unit 4 - Input/ Output Organization (05)

External devices, I/O module, Programmed I/O, Interrupt driven I/ O, Direct memory access, I/O channels and processors, External interface.

Unit 5 - Fundamentals of Pipeline: (05)
Introduction to Pipelining, The Major Hurdle of Pipelining: Pipeline Hazards, linear pipeline and Nonlinear pipeline, MESI protocol.

Unit 6 - Instructions –Level Parallelism (07)
ILP: Concepts and challenges, Basic Compiler Techniques for exposing ILP, Reducing Branch costs with prediction, Overcoming Data hazards with Dynamic scheduling, Hardware based Speculation, Exploiting ILP using multiple issues and static scheduling,

Unit 7 - Multiprocessors and Thread –Level Parallelism: (05)
Introduction, Symmetric Shared-Memory architectures, Performance of symmetric shared–memory multiprocessors, Distributed shared memory and Directory-based coherence.

Internal Continuous Assessment (ICA):
Student should perform 8 to 9 Experiments. Refer the following virtual lab link

1) http://vlabs.iitkgp.ernet.in/coa/exp7/index.html
2) http://cse11-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Computer%20Science

Text Books:

1. Computer Architecture and Organization AN INTEGRAGATED APPROACH, Miles Murdocca and Vincent Heuring (WILEY).
2. Computer Architecture, A Quantitative Approach, John L. Hennessey and David A. Patterson: 4thEdition, Elsevier, 2007.
3. Computer Organization & Architecture, Rajaraman, PHI Learning 4. Advanced Computer Architecture - Parallelism, Scalability, Programmability-Kai Hwang-Tata McGraw Hill

Reference books:

1. Computer Organisation, HamacherZaky (MGH)
2. Computer Architecture and Organization, John P. Hayes
3. Computer Organization and Architecture, William Stallings
4. Digital Logic and Computer Design, M. Morris Mano. Pearson Education - Prentice Hall

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR
Second Year B.Tech (Computer Science and Engineering)
Semester-IV
CS224–COMPUTER NETWORKS

Teaching Scheme	**Examination Scheme**
Lectures–3 Hours/week,3Credits	ESE–70 Marks
Practical–2 Hour/week,1Credits	ISE–30 Marks
	ICA–25 Marks

Introduction:
This course introduces OSI reference model and TCP/IP protocol in detail and ital so covers the IPv4 Addressing, Socket Programming, Transport layer and Application layer protocols.

Course Prerequisite: Student should have the knowledge of Basics of Computer Networks and networking devices.

Course Objectives:

1. To Introduce OSI reference model, TCP/IP protocol and different classes of IPv4 addressing.
2. To analyze client-server paradigm for socket interfaces and Transport layer protocols like TCP, UDP and SCTP.
3. To explore different application layer protocols like DNS,FTP and TELNET.

Course Outcomes:
Student will be able to

1. Understand the basic principles of OSI reference model and TCP/IP protocol suite for Network-communication.
2. Identify the different classes of IP address for network set-up.
3. Implement client-server paradigm using transport layer protocols.
4. Select and use appropriate Application Layer Protocols for a given problem.

SECTION-I

UNIT-1 Basics of Computer Networks (08)

OSI Reference model, TCP/IP protocol, Internet Protocol : Introduction, IP Datagram, fragmentation, Addressing : Physical, Logical, Port & Application Specific Addresses. Introduction To IPv4 Addresses: Classful addressing, Classless addressing, Special addresses,NAT

UNIT-2 Transport Layer (07)

UDP: Introduction, User Datagram, UDP Services, UDP Applications.
TCP: TCP Services, TCP Features, Segment, A TCP Connection, Flow Control, Error Control, Congestion Control,TCP Timers.
SCTP:Introduction, SCTP Services, SCTP Features, Packet Format

UNIT-3 Client Server Model and Socket Interface (08)

Client Server Paradigm: Server, Client, Concurrency, Concurrency in Clients, Concurrency in Servers, Socket, Byte Ordering Functions. Socket System Calls, Connectionless Iterative Server, UDP Client Server Programs, and Connection-oriented Concurrent Server.

SECTION-II

UNIT-4 Host Configuration & Domain Name System (07)

Host Configuration : BOOTP Operation, Packet format, DHCP : Introduction, DHCP Operation and Configuration.

Domain Name System: Need for DNS, Name Space, DNS in the Internet, Resolution, DNS Messages, Types of Records.

UNIT-5Remote Login and TELNET (07)

TELNET Concept, Time-Sharing Environment, Network Virtual Terminal, Embedding, Options, Symmetry, Suboption Negotiation, Controlling the Server, Out-of-Band Signaling, Escape Character, Mode of Operation, User Interface.

SSH:Components, Port Forwarding, Format of SSH Packets.

UNIT-6 File Transfer and Electronic Mail (08)

FTP: Introduction**,** control & data connections, Communication over data and control connection, Command Processing

TFTP: Messages, Connection, Data Transfer, UDP Ports, TFTP Applications.

Electronic Mail: Architecture, UserAgent, Message Transfer Agent, SMTP, Message Access Agent: POP and IMAP

Internal Continuous Assessment(ICA):

Students should perform minimum 8 experiments based on the following guidelines and preferably conducted on Unix/Linux platform using C language.

1. Configuration of Network-Assigning IP Address, Subnet-Mask, Default Gateway, DNS Server Addresses & Testing Basic Connectivity.
2. Connectionless Iterative Server : C Implementation of Client-Server Programs Using Iterative UDP Server.
3. Connection-oriented Iterative Server : C Implementation of Client-Server Programs Using Iterative TCP Server.
4. Connection-oriented Concurrent Server : C Implementation of Client-Server Programs Using Concurrent TCP Server.
5. Implementation of Simple Network Chatting Application.
6. Remote Login : TELNET
    a. Logon to a remote computer from client using TELNET.
    b. After logging on executes few commands at remote server from client. For example userwants a server to display a file (hello.txt) on a remote server then he/she types: *cathello.txt*.
    c. Logon to a remote computer from client using TELNET and Putty terminal emulator. After logging on execute few commands. Here Client and Server are on heterogeneous systems, for example client is on windows and server is on Linux.
7. Remote Login : SSH
    a. Log on to a remote computer from client using SSH.
    b. After logging on executes few commands at remote server from client. For exampleuser wants a server to display a file (hello.txt) on a remote server then he/she types:*cathello.txt.*
    c. Log on to a remote computer from client using SSH and Putty terminal emulator.After logging on execute few commands. Here Client and Server are on heterogeneous systems for example client is on windows and server is on Linux.
8. Installation and configuration of DHCP
9. Installation and configuration of FTP.

Text Books:

1. TCP/IP Protocol Suite:Behrouz A.Forouzan (Fourth Edition) (Unit 1,2,3,5,6)
2. TCP/IP Protocol Suite:BehrouzA.Forouzan (Third Edition) (Unit 4)
3. TCP/IP Protocol Suite:BehrouzA.Forouzan (Second Edition) (Unit 3)
4. ComputerNetworking:ATop-Down Approach Featuring the Internet, International Edition: James F.Kurose and Keith W.Ross

Reference Books:

1. Internet working with TCP/IPVol. III.Client-Server Programming & Applications : Douglas E. Comer
2. Data and Computer Communications :William Stallings
3. Data Communication and Networking : Behrouz A.Forouzan
4. Computer Networks, M.Dave,Cengage
5. An Engineering Approach to Computer Networking, Keshav,Pearson
6. An Integrated Approach to Computer Networks, Bhavneet Sidhu, Khanna Publications
7. Telecommunication Switching System and Networks,Viswanathan,PHI

PUNYASHLOK AHILYADEVI HOLKAR SOLAPUR UNIVERSITY, SOLAPUR

Faculty of Science and Technology

Second Year B.Tech. (Computer Science & Engineering)

Semester – IV

CS225 - Object Oriented Programming Using JAVA

Teaching Scheme	**Examination Scheme**
Lectures: 2 Hrs/Week, 2 Credits	ISE: 25 Marks
Practical: 4 Hrs/Week, 2 Credits	ICA: 25 Marks
	POE: 50 Marks

Introduction :

The course introduces Java language's syntax and object-oriented programming paradigms from the perspective of Java language. Further, the course thoroughly touches upon the vital aspects of the usage of Java runtime library packages' classes and methods.

Course Outcomes :

At the end of this course students will be able to

1. Implement Object Oriented Programming paradigm using Java language.
2. Exhibit the ability to use Java runtime library APIs to provide a solution to a given problem.
3. Test and debug a Java program for a given problem.

Unit 1 - Basics of Java and Strings in Java (02)

Basics: Java Runtime Environment (Oracle JDK, OpenJDK), Naming Conventions and Java profilers. Variables, Operators, Expressions, Statements, Blocks, Control flow Statements, Input and Output, Data Types, Arrays, Type Casting.

Fundamentals: String Class and Methods, Immutability of Strings, String Buffer Class and Methods, String Builder class and Methods.

Unit 2 - Classes, Objects and Methods (04)

Class, Object, Object reference, Constructor, Constructor Overloading, Method Overloading, Recursion, Passing and Returning object form Method, new operator, this and static keyword, finalize() method, Access control, modifiers, Nested class, Inner class, Anonymous inner class, Abstract class, Wrapper classes, Object Life time & Garbage Collection.

Unit 3 - Inheritance and Interfaces (06)

Use of Inheritance, Inheriting Data members and Methods, constructor in inheritance, Multilevel Inheritance – method overriding, hnadling multilevel constructors – super keyword, Final keywords, Creation and Implementation of an interface, Interface reference, instance of operator, Interface inheritance, Dynamic method dispatch ,Understanding of Java Object Class, Comparison between Abstract Class and interface

Unit 4 - Exceptions, Error Handling and Basic IO (06)

Exceptions and Error Handling: Exceptions and Errors, Catching and Handling Exceptions, The try Block, The catch Blocks, The finally Block, Throwing Exceptions, Chained Exceptions, Custom Exceptions. JUnit Testing Framework.

Basic I/O: I/O Streams, Byte Streams, Character Streams, Buffered Streams, Scanning and Formatting, Data Streams, Object Streams , File I/O Classes: Reading, Writing, and Creating Files and Directories.

Unit 5 - Java Collections Framework and Package (06)

Introduction, The Arrays Class, Searching and sorting arrays of primitive data types, Sorting Arrays of Objects, The Comparable and Comparator Interfaces, Sorting using Comparable & Comparator, Collections: Lists, Sets, Maps, Trees, Iterators and Collections, The Collection Class.

Package: Use of Package, CLASSPATH, Import statement, Static import, Access control

Unit 6 - Multithreading and Networking **(06)**
Multithreading: Creating Threads, Thread scheduling and priority, Thread interruptions and synchronization.
Network Programming: InetAddress, URLs, Socket (TCP & UDP) communication in Java, Servlet Programming

Unit 7 - GUI Programming using Swing: Swing package, Layouts, Events, Listeners and Event handling, and Swing Components. **(03)**

ISE Evaluation: ISE Evaluation for the course will consist of three programming (hands on) tests.

Internal Continuous Assessment (ICA):
ICA shall consist of minimum 15 practical assignment problems.
The assignments should test and develop student's practical proficiency and ability to use Java API Classes correctly for writing code for varied applications scenarios & use case requirements.
Use of IDEs like BlueJ, Eclipse, Netbeans or any other FOSS alternative for Interactive development and debugging of Java applications is highly recommend to enhance hands on skills in Java Programming of Students.

Text Books:

1. Head First Java, Kathy Sierra, Bert Bates, O'Reilly Publication
2. The JavaTM Programming Language, Ken Arnold, James Gosling, David Holmes, Pearson Publication
3. Core Java for Beginners, Rashmi Kanta Das, Vikas Publishing House Pvt Ltd.
4. Programming with Java, Balaguruswamy, TMH
5. Internet and Java Programming, TanweerAlam, Khanna Publishing House

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Reference Books:

1. The Java Language Specification, Java SE 8 Edition Book by James Gosling, Oracle Inc.
1. Java: The Complete Reference 8 Edition - Herbert Schildt , Tata McGraw - Hill Education
2. Head First Servlets and JSP – Bryan Bosham, Kathy Sierra, Bert Bates, O'Reilly Publication
5. The JavaTM Tutorials. Oracle Inc.
4. Java Server Programming for Professionals - Ivan Bayross, Sharanam Shah, Cynthia Bayross and Vaishali Shah, Shroff Publishers and Distributors Pvt. Ltd, 2nd Edition

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e-resources :

1. http://docs.oracle.com/javase/specs/
2. http://docs.oracle.com/javase/tutorial/