



NEW HORIZON COLLEGE OF ENGINEERING

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by **NAAC** with 'A' Grade, Accredited by **NBA**

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Academic Year 2018-19-20
ISE – Information Science & Engineering
Fifth and Sixth Semester
Scheme and Syllabus

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VISION

To evolve as a centre of academic excellence and advanced research in information science and engineering discipline and to endeavour the computational competence of students for their dream career achievement and enhancing the managerial and technical skills.

MISSION

To inculcate students with profound understanding of fundamentals related to discipline, attitudes, skills and their application in solving real world problems, with an inclination towards societal issues and research.

Program Education objectives (PEOs)

PEO1	To excel in their professional career with expertise in providing solutions to Information Technology problems.
PEO2	To pursue higher studies with profound knowledge enriched with academia and industrial skill sets.
PEO3	To exhibit adaptive and agile skills in the core area of Information Science & Engineering to meet the technical and managerial challenges.
PEO4	To demonstrate interpersonal skills, professional ethics to work in a team to make a positive impact on society.

PEO to Mission Statement Mapping

Mission Statements	PEO1	PEO2	PEO3	PEO4
To prepare the students with academic and industry exposure by empowering and equipping them with necessary domain knowledge.	3	2	2	2
To prepare the students for global career in information technology with relevant technical and soft skills.	3	2	2	2
To encourage students to participate in co-curricular and extracurricular activities leading to the enhancement of their social and professional skills.	2	2	3	3

Correlation: 3- High, 2-Medium, 1-Low

Program Specific Outcomes(PSO's)

PSO1: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics and networking or efficient design of computer based systems of varying complexity.

PSO2:The ability to apply standard practices and strategies in software project development using innovative ideas and open ended programming environment with skills in teams and professional ethics to deliver a quality product for business success.

Program Outcomes (PO) with Graduate Attributes

	Graduate Attributes	Program Outcomes (POs)
1	Engineering Knowledge	PO1: The basic knowledge of Mathematics, Science and Engineering.
2	Problem analysis	PO2: An Ability to analyze, formulate and solve engineering problems.
3	Design and Development of Solutions	PO3: An Ability to design system, component or product and develop interfaces among subsystems of computing.
4	Investigation of Problem	PO4: An Ability to identify, formulate and analyze complex engineering problem and research literature through core subjects of Computer Science.
5	Modern Tool usage	PO5: An Ability to use modern engineering tools and equipments for computing practice.
6	Engineer and society	PO6: An Ability to assess societal, health, cultural, safety and legal issues in context of professional practice in Computer Science & Engineering.
7	Environment and sustainability	PO7: The broad education to understand the impact of engineering solution in a global, economic, environmental and societal context.
8	Ethics	PO8: An understanding of professional and ethical responsibility.
9	Individual & team work	PO9: An Ability to work both as individual and team player in achieving a common goal.
10	Communication	PO10: To communicate effectively both in written and oral formats with wide range of audiences.
11	Lifelong learning	PO11: Knowledge of contemporary issues, Management and Finance.
12	Project management and finance	PO12: An Ability to recognize the need and thereby to engage in independent and life-long learning for continued professional and career advancement.

Mapping of POs with PEOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PEO1	3	3	3	2	3	-	-	-	3	-	3	-
PEO2	3	3	3	2	3	-	-	-	3	-	3	-
PEO3	3	3	3	2	3	-	-	-	3	-	3	-
PEO4	3	3	3	2	3	-	-	-	3	-	3	-

Correlation: 3- High, 2-Medium, 1-Low

New Horizon College of Engineering
Department of Information Science and
Engineering

Fifth Semester B.E Program-Scheme

Sl.No	Course Code	Course	Credit Distribution				Overall Credits	Contact Hours Weekly Theory	Contact Hours Weekly Lab	Marks		
			L	P	T	S				CIE	SEE	TOTAL
1	ISE51	Software Engineering & Best Practices	3	0	0	0	3	4	0	50	50	100
2	ISE52	Database Management System	4	1	0	0	5	4	2	75	75	150
3	ISE53	Operating Systems	3	0	0	0	3	4	0	50	50	100
4	ISE54	Design and Analysis of Algorithm	3	2	0	0	5	4	4	75	75	150
5	ISE551	Formal Languages and Automata Theory	4	0	0	1	5	4	0	50	50	100
6	ISE56X	Professional Electives-1	3	0	0	1	4	3	0	50	50	100
7	ISE57	Mini Project	0	2	0	0	2	0	0	25	25	50
TOTAL							27	23	6	375	375	750

Professional Electives-1	
ISE561	Digital Experience Management using Adobe Experience Manager
ISE562	Virtualization Essentials with Vmware
ISE563	Big Data Analytics with HP Vertica
ISE564	Essentials of Cloud Computing
ISE565	Operations Research

New Horizon College of Engineering
Department of Information Science and Engineering
Sixth Semester B.E Program-Scheme

Sl. No.	Course Code	Course	Credit Distribution				Overall Credits	Contact Hours Weekly Theory	Contact Hours Weekly Lab	Marks		
			L	P	T	S				CIE	SEE	TOTAL
1	ISE61	Web Internet Programming	3	1	0	0	4	4	2	75	75	150
2	ISE62	Computer Networks	3	1	0	0	4	4	2	75	75	150
3	ISE63	Data Warehousing & Data Mining	3	0	0	1	4	4	0	50	50	100
4	ISE641	JAVA & J2EE	3	2	0	0	5	4	4	75	75	150
5	ISE65x	Professional Elective-1	3	0	0	0	3	3	0	50	50	100
6	NHOPX X	Open Elective**	3	0	0	1	4	3	0	50	50	100
7	ISE66	Mini Project	0	2	0	0	2	0	2	25	25	50
TOTAL							26	22	10	400	400	800

** Scheme and Syllabus for Open Electives is available separately.

Professional Electives-2	
ISE651	Python Programming
ISE652	Cloud Computing
ISE653	Wireless Sensor Networks
ISE654	Compiler Design
ISE655	Mobile Application Development

FIFTH SEMESTER

SYLLABUS

SOFTWARE ENGINEERING & BEST PRACTICES

Course Code : ISE51
L:P:T:S : 3:0:0:0
Exam Hours : 3

Credits: 03
CIE Marks: 50
SEE Marks: 50

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO1	Discuss about the various s/w lifecycle models available and choose the appropriate model to design software.
CO2	Understand the importance of requirements in the software process and collect, document the requirements.
CO3	Plan a project, schedule a project and develop ideas to avert risks involved in project management.
CO4	Design and develop the correct and robust software products.
CO5	Plan the testing strategies and use various metrics.
CO6	Apply Software engineering and testing principles for the product development

Mapping of Course Outcomes to Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	-	1	-	-	-	-	-
CO2	2	2	1	2	1	-	3	-	-	-	1	-
CO3	2	2	3	2	2	1	2	-	2	-	-	3
CO4	2	2	3	3	3	-	2	-	1	1	-	-
CO5	1	2	1	2	3	-	-	-	-	-	-	-
CO6	2	2	2	1	1-	1	-	-	1	1		2

Mapping of Course Outcomes to Program Specific Outcomes (PSOs):

	PSO 1	PSO 2
CO1	2	2
CO2	1	3
CO3	2	3
CO4	2	2
CO5	1	2
CO6	1	1

Module No	Module Contents	Hours	COs
1	Introduction: Software Engineering; Software Process; Software Processes: Models, Process iteration, Process activities; unified process; Agile development; Agile Process; Extreme Programming; Other agile Process models	9	CO1
2	Requirements: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; Interface specification; The software requirements document. Requirements Engineering Processes: Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management.	9	CO2
3	Software Design: Architectural Design; Architectural design decisions; System organization; Modular decomposition styles; Control styles. Object-Oriented design; Objects and Object Classes; An Object-Oriented design process; Design evolution. Project Management: Management activities; Project planning; Project scheduling; Risk management. Configuration Management: Configuration Management Planning; Change management; version and release management;	9	CO3 , CO 4
4	Software Implementation: Structured coding Techniques-Coding Styles-Standards and Guidelines- Documentation Guidelines-Modern Programming Language Features: Type checking-User defined data types-Data Abstraction-Exception Handling-Concurrency Mechanism.	9	CO4
5	Testing: Software Quality; Testing: Strategic Approach to software Testing; Strategic Issues; Testing Strategies for Conventional Software, Object oriented software, Web Apps; Validating Testing; System Testing; Art of Debugging. Product Metrics: A framework for Product Metrics; Metrics for the Requirements Model; Metrics for the Design Model; Metrics for the Source Code; Metrics for the Testing.	9	CO5

TEXT BOOKS:

1. Roger S Pressman, “**Software Engineering – A Practitioner’s Approach**”, McGraw Hill, seventh edition,2010.
2. Ian Sommerville, “**Software Engineering**”, Pearson Education,8th edition,2007

REFERENCE BOOKS:

1. Pankaj Jalote, “**An Integrated Approach to Software Engineering**”, Wiley India, 2009.
2. Hans Van Vliet, “**Software Engineering: Principles and Practices**”, Wiley India, 3rd edition,2008.
3. Richard Fairley, “**Software Engineering Concepts**”, McGrawHill,2008.

CIE - Continuous Internal Evaluation (50 marks)

Bloom's Taxonomy	Tests (25 Marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Curricular/ Co-curricular (10 Marks)
Remember	5	-	5	-
Understand	5	5	-	5
Apply	5	-	-	5
Analyze	5	5	-	-
Evaluate	5	-	-	-
Create	-	-	-	-

SEE – Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests (50 Marks)
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	-

DATABASE MANAGEMENT SYSTEMS

Course Code : ISE52

Credits: 05

L: P: T: S : 4:1:0:0

CIE Marks: 50+25

Exam Hours : 3+3

SEE Marks: 50+25

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

CO1	Understand the database concepts, different database models, and database management systems and design database schema.
CO2	Develop the ER structures for real world examples using the concept of Entity Relationship models with constraints and cardinalities.
CO3	Apply the concepts of Normalization and design database which possess no anomalies.
CO4	Apply the concepts of relational database theory to manage relational database management system.
CO5	Exhibit database programming skills in SQL.
CO6	Apply Embedded and Dynamic SQL for the real datasets

Mapping of Course Outcomes with Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	-	-	1	-	-	1	-	1
CO2	2	2	3	2	-	1	-	1	-	1	-	1
CO3	2	2	2	1	-	-	-	-	-	1	-	-
CO4	3	2	3	1	-	-	2	-	-	1	-	1
CO5	3	2	3	1	2	-	1	-	1	2	-	3
CO6	3	2	3	1	2	-	1	1	-	2	-	2

Mapping of Course Outcomes with Program Specific Outcomes

CO/PSO	PSO1	PSO2
CO1	2	1
CO2	1	1
CO3	1	1
CO4	3	2
CO5	3	3
CO6	2	2

Module No.	Module Contents	Hours	COs
1	Introduction: Introduction, An example, Characteristics of Database Approach. Database Applications: Need for data management, Advantages of using DBMS approach. Data models & Database Architecture: Data models, schemas and instances, Three-schema architecture and data independence, Centralized and client-server architectures.	9	CO1
	1. Creation of tables, insertion of values with Data Definition Commands (use constraints while creating tables) and exercises on Data Manipulation Commands.	4	
2	ER Diagrams: Entity Types, Entity Sets, Attributes and Keys, Relationship types, Roles and Structural Constraints, Weak Entity Types, ER Diagrams.	9	CO2
	2. Developing Queries using clauses SELECT, FROM, WHERE, GROUP BY, HAVING.	4	
3	Relational Model: ER to Relational Mapping, Constraints, Keys Dependencies. Functional Dependencies: Normalization First, Second, Third & Fourth Normal Forms, BCNF.	9	CO3
	3. Developing Queries using clauses Aggregate functions COUNT, SUM, AVG, MAX and MIN.	4	

4	Relational Algebra: Update Operations, Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from Set Theory, Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.	9	CO4
	4. Developing Queries (along with NESTED Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSECT Constraints. Creation and Manipulation of Views.	4	
5	Introduction to SQL: Basic DDL , Data Constraints ,Triggers Database Security , Advanced SQL - Embedded & Dynamic SQL , Views Basic queries in SQL, More complex SQL Queries, Insert, Delete and Update statements in SQL.	9	CO5
	5. Creation of simple PL/SQL programs and usage of cursor and triggers.	4	

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “**Database System Concepts**”, Sixth Edition, Tata McGraw Hill,2010.
2. RamezE Imasri, Shamkant B. Navathe, “**Fundamentals of Database Systems**”, Sixth Edition, Pearson / Addison - Wesley,2010
3. Raghu Ramakrishnan, “**Database Management Systems**”, Third Edition, McGraw Hill,2003.

REFERENCES:

1. C.J. Date, A. Kannan, S. Swamynatham, “**An Introduction to Database Systems**”, 8th Edition, Pearson Education, 2006.

CIE - Continuous Internal Evaluation (50+25 Marks)

Bloom’s Taxonomy	Tests (25 Marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Curricular/Co-curricular (10 Marks)	Lab (25 Marks)
Remember	5	-	5	-	-
Understand	10	5		5	-
Apply	10	5	5	5	-
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	25
Create	-	-	-	-	-

SEE – Semester End Examination (50+25 marks)

Bloom's Taxonomy	Tests (25)	La b
Remember	10	-
Understand	20	-
Apply	20	-
Analyze	-	
Evaluate	-	25
Create	-	

OPERATING SYSTEMS

Course Code : ISE53

Credits: 03

L:P:T:S : 3:0:0:0

CIE Marks: 50

Exam Hours : 3

SEE Marks: 50

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Understand the concept of services provided by and the structure of an operating system.
CO2	Compare, implement and know when to apply various process scheduling algorithms
CO3	Ability to Learn and implement various operations on deadlock
CO4	Evaluate the efficiency aspect of using system resources
CO5	Handle operations like disk scheduling and file operations.
CO6	Analyze the I/O systems

Mapping of Course Outcomes to Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	-	1	1	-	1	2	-	1
CO2	3	2	3	3	-	-	1	-	1	2	-	1
CO3	3	2	3	3	-	1	1	-	1	2	1	1
CO4	2	3	3	3	-	1	1	1	1	2	1	1
CO5	2	2	2	3	-	1	1	1	1	2	1	1
CO6	2	2	2	3	-	1	1	1	1	2	1	1

Mapping of Course Outcomes to Program Specific Outcomes(PSOs):

	PSO1	PSO2
CO1	3	2
CO2	3	3
CO3	3	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No	Module Contents	Hours	COs
1	OPERATING SYSTEMS OVERVIEW: What is an operating system; history of operating system; operating system concepts, system calls ; operating system structure; operating system operations; process management; memory management; storage management; protection and security; system boot.	9	CO1
2	PROCESS MANAGEMENT: Processes-Process Concept, Process Scheduling, Scheduling algorithms, Preemptive strategies Non preemptive strategies, Operations on Processes, Inter process Communication; Threads Overview, Multithreading Models, process synchronization, critical section problem, semaphores.	9	CO2
3	DEADLOCKS: Deadlocks: system model; deadlock characterization; methods for handling deadlocks; deadlock prevention; deadlock avoidance; deadlock detection and recovery.	9	CO3
4	STORAGE MANAGEMENT: Memory management strategies ;swapping; contiguous memory allocation; paging; Page replacement, Allocation of frames; segmentation.	9	CO4
5	I/O SYSTEMS: File system storage-File concept, file system structure,, Access methods, Directory structure, File-system mounting ;disk structure ;disk scheduling, sharing and protection.	9	CO5

TEXT BOOKS:

1. Andrew S Tanenbaum, Albert S Woodhull, “**Operating systems design and implementation**”, 2nd edition.
2. Abraham Silberchatz, Peter B. Galv, Greg Gagne, “**Operating System Concepts**”, 8th edition, John Wileyin
3. Matthew portnoy, “**Virtualization Essentials**”, 2nd edition ,Wiley Indiaptvt.ltd

CIE - Continuous Internal Evaluation (50 Marks)

Bloom’s Taxonomy	Tests (25 Marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Curricula r/ Co-Curricular (10 Marks)
Remember	5	-	2.5	-
Understand	10	5	2.5	5
Apply	10	5		5
Analyze	-	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

SEE – Semester End Examination (50 marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	20
Apply	20
Analyze	-
Evaluate	-
Create	-

Design and Analysis of Algorithm

Course Code : ISE54

Credits: 05

L:P:T:S : 3:2:0:0

CIE Marks: 50+25

Exam Hours : 3+3

SEE Marks: 50+25

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Learning characteristics of algorithms, time and space complexity.
CO2	Implement string matching and parallel algorithms.
CO3	Analyze and understand greedy algorithms.
CO4	Design network flow problems.
CO5	Analyze P and NP classes of problems
CO6	Understanding Back tracking.

Mapping of Course Outcomes to Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	-	1	1	-	-	2	-	1
CO2	3	2	2	2	-	1	1	-	-	2	-	1
CO3	3	2	2	2	-	1	1	-	-	2	-	1
CO4	3	2	2	2	-	1	1	-	-	2	-	1
CO5	3	2	2	2	-	1	1	-	-	2	-	1
CO6	3	2	2	2	-	1	1	-	-	2	-	1

Mapping of Course Outcomes to Program Specific Outcomes (PSOs):

	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No	Module Contents	Hours	COs
1	<p>Definition and Characteristics of Algorithms: Role of Algorithms in Computing. Deterministic and Heuristic Algorithms.</p> <p>Performance Analysis: Space Complexity, Time Complexity, Asymptotic Notations, Recursive functions.</p> <p>Divide and Conquer: Quick sort, Merge sort.</p>	9	CO1
	<p>List of programs:</p> <ol style="list-style-type: none"> 1. Implement and analyze quick sort Algorithm. 2. Implement and analyze Merge sort Algorithm. 	8	
2	<p>String Matching, Parallel Algorithms & Optimization Algorithms Simple string matching, KMP String matching algorithm, Boyer Moore String matching algorithm.</p> <p>Parallel algorithms: PRAM models, Prefix computation, List ranking, Finding the maximum, Odd-Even merge sort, Sorting on a mesh.</p> <p>Optimization Algorithms</p>	9	CO2
	<p>List of programs:</p> <ol style="list-style-type: none"> 1. Implement and compare simple string matching and KMP algorithms. 2. Implement prefix computation algorithm by using multiple threads or processes. 	8	
3	<p>Greedy & Dynamic Programming Greedy Approach: General Method, Knapsack problem, Minimum cost spanning trees, and Single source shortest path problem.</p>	9	CO3 CO5

	Dynamic Programming: Principle of optimality, All pairs shortest path problem, Longest common subsequence, Traveling salesperson problem.		
	List of programs: 1. Implement and analyze Minimum spanning tree problem 2. Implement and analyze Traveling salesperson problem.	8	
4	Graph Algorithms Representation of Graphs, Breadth-First Search, Depth-First Search, Topological Sort, Minimal Spanning Trees (Prim’s Algorithm, Kruskal’s Algorithm), Travelling Salesman Problem, Single-Source Shortest Paths, All-Pairs Shortest Paths, Maximum Flow, Topological Sort, Network Flow problems.	9	CO4
	List of programs: 1. Write a program to find the shortest path using Dijkstra’s algorithm. 2. Write a program to sort the vertices of the graph using Topological sorting.	8	
5	Back Tracking The General Method, 8 Queens Problem, Sum of Subsets, Graph Coloring Hamiltonian Cycle, Knapsack Problem, Branch and Bound Method – Travelling Salesman problem, P and NP Completeness.	9	CO5
	List of programs: 1. Implement N-Queens problem. 2. Implement Sum of Subset program.	8	CO6

TEXT BOOKS:

1. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, “**Fundamentals of Computer Algorithms**”, Second Edition, Universities Press, Hyderabad, 2008.
2. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, “**Introduction to Algorithms**”, Second Edition, Prentice Hall of India, New Delhi, 2007
3. Michael T.Goodrich and Roberto Tamassia, “**Algorithm Design: Foundations, Analysis and Internet Examples**”, Second Edition, Wiley-India, 2006.

REFERENCES:

1. Kenneth A. Berman and Jerome L. Paul, “**Algorithms**”, Cengage learning India Edition, New Delhi, 2002.
2. Sara Baase and Allen Van Gelder, “**Computer Algorithms – Introduction to Design &Analysis**”, Third Edition, Pearson Education, New Delhi, 2000.

CIE - Continuous Internal Evaluation (50+25 Marks)

Bloom's Taxonomy	Tests (25 Marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Curricular/Co-Curricular (10 Marks)	Lab
Remember	5	-	2.5	-	-
Understand	10	-	-	-	-
Apply	10	5	2.5	5	-
Analyze	-	5	-	5	-
Evaluate	-	-	-	-	25
Create	-	-	-	-	-

SEE – Semester End Examination (50+25marks)

Bloom's Taxonomy	Tests	Lab
Remember	10	-
Understand	20	-
Apply	20	-
Analyze	-	-
Evaluate	-	25
Create	-	-

Formal Languages and Automata Theory**Course Code:ISE551****Credits:05****L:P:T:S:4:0:0:1****CIE Marks:50****Exam Hours: 3****SEE Marks:50****Course Outcomes: At the end of the Course, the student will be able to:**

CO1	Acquire a fundamental understanding of the core concepts in automata theory, construct Deterministic Finite Automata (DFA) and Non-deterministic Finite Automata (NFA) and ability to transform between equivalent finite automata.
CO2	Construct Epsilon-NFA and transform between equivalent finite automata also understand the power and the limitations of regular expressions and design regular expressions.
CO3	Compute transformation between finite automata and regular expressions and to minimize the DFA with equivalence technique.
CO4	Describe and construct Context Free Grammar and Pushdown Automata, transformation between them.
CO5	Construct and analyze the use and properties of Turing machines performing simple tasks, with recent trends and applications in the area of finite state machines.
CO6	Comprehend and manipulate the different concepts in automata theory and formal languages.

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	-	-	-	1	-	-
CO2	3	2	2	3	1	-	-	-	-	1	-	-
CO3	3	2	2	3	1	-	-	-	-	1	-	-
CO4	3	2	2	3	1	-	-	-	-	1	-	-
CO5	3	2	2	3	1	-	-	-	-	1	-	-
CO6	3	2	2	3	1	-	-	-	-	1	-	-

Mapping of CO v/s PSO:

	PSO 1	PSO 2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1
CO6	2	1

Module No.	Module Contents	Hours	COs
1	Introduction to Finite Automata: Prerequisites- Set Theory concepts; Introduction to Finite Automata; The central concepts of Automata theory- Alphabets, Strings, Languages; Deterministic finite automata (DFA)- Definition & problems; Non-deterministic finite automata (NFA) - Definition & problems; Conversion from NFA to DFA- Subset Construction Method & Lazy Evaluation Method; An Application of finite automata.	9	CO1, CO6
2	Finite Automata and Regular Expressions (1):Finite automata with Epsilon-transitions (Epsilon –NFA) – Definition, Epsilon Closure, Conversion from Epsilon-NFA to DFA; Differences between DFA, NFA, Epsilon-NFA; Moore and Mealy machines, Simulators for Finite Automata. Regular expressions- Definition, Operators of Regular Expressions, Building Regular Expressions, Properties of Regular Expressions, Applications of Regular Expressions.	9	CO2 , CO6
3	Finite Automata and Regular Expressions (2):Converting Regular Expressions to Automata– Theorem & problems; Converting DFA to Regular Expressions– Kleene’s Theorem & problems, State Elimination method; Equivalence and minimization of automata, Pumping Lemma and related problems.	9	CO3 , CO6

4	Context Free Grammar (CFG) and Pushdown Automata (PDA): Definition of Grammar, Chomsky Hierarchy and problems; Derivations- Leftmost and Rightmost, Parse trees, Ambiguity in grammars; Definition of Pushdown automata; Construction of PDA; Equivalence of PDA's and CFG's – From CFG to PDA, From PDA to CFG.	9	CO4 , CO6
5	Turing Machines: The Turing machine model, Definition, Types, Techniques for Turing Machine construction. Recent Trends and Applications: Matrix Grammar, Programmed Grammar, Random Context Grammar, Linder Mayer Systems, A glance on DNA computing and Membrane Computing	9	CO5, CO6

TEXT BOOKS:

1. Elaine Rich: Automata, Computability and Complexity, 1st Edition, Perason Education, 2012/2013.
2. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson Education, 2007.

REFERENCES:

1. Kavi Mahesh: Theory of Computation-A Problem Solving Approach, WileyIndia Pvt. Ltd.
2. Michael Sipser: Introduction to the Theory of Computation, 3rd Edition, Tata McGraw Hill Publishing Company Limited, 2013.
3. K.L.P. Mishra: Theory of Computer Science, Automata, Languages, and Computation, 3rd Edition, PHI, 2007.
4. John C Martin: Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw-Hill, 2007.

CIE - Continuous Internal Evaluation (50Marks)

Bloom's Taxonomy	Tests	Assignments	Quizzes	Self -Study
Marks (Out of 50)	25	10	5	10
Remember				
Understand	5			
Apply	10	5		
Analyze	10		5	5
Evaluate				
Create		5		5

SEE – Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	
Understand	10
Apply	20
Analyze	20
Evaluate	
Create	

Digital Experience Management Using Adobe Experience Manager

Course Code :ISE561

Credits: 04

L:P:T:S :3:0:0:1

CIE Marks: 50

Exam Hours : 3

SEE Marks: 50

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Gain a fresh perspective on online marketing in a global scenario. Understand the concepts of object oriented programming in JAVA.
CO2	Understand the programming concepts in Web scripting languages and will be able develop web pages using scripting languages.
CO3	Understand the architecture, technologies and frameworks in Adobe Experience Manager.
CO4	Create online webpages, Digital asset management and campaigning using AEM
CO5	Integrate new digital marketing techniques into the strategic marketing plan using AEM. Drive change and foster innovation in Digital Marketing with AEM.
CO6	Apply AEM dash board activities to build the web applications

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	1	-	2	1	-	2	-	-
CO2	2	2	1	2	1	-	-	-	-	2	-	-
CO3	2	3	3	2	1	-	-	-	-	1	-	-
CO4	1	3	2	3	3	1	-	-	-	1	-	1
CO5	1	1	2	3	3	2	-	-	-	-	-	2
CO6	1	1	2	3	3	2	-	-	-	1	1	2

Mapping of Course Outcomes to Program Specific Outcomes(PSOs):

	PSO 1	PSO 2
CO1	3	2
CO2	3	2
CO3	2	2
CO4	1	2
CO5	1	2
CO6	1	2

SYLLABUS			
Module	Contents of the Module	Hours	
1	<p>Introduction to DM & AEM Getting started with DM: What is online marketing? Characteristics of good domain name? What is digital marketing? Different methods of digital Marketing, Main methods of DM, Search engine optimization, pay per click & display advertising, email marketing, content marketing, social mediemarketing.</p> <p>Introduction Object Oriented Programming with JAVA Fundamentals: Class Objects, Methods, Constructor, this reference, inheritance, and polymorphism, Introduction to JSP</p>	8	
	<p>Hands on:</p> <p>1. Write a program to calculate and area of four differentgeometric shapes: triangles, squares, rectangles, and circles.Use Method overriding.</p> <p>2. Employee program to create ‘n’ object to find grosssalary. Data: empid,empname,gender,basic,hra = 25% of basic, DA = 125% of basic,CCA=Rs 300, IT=10% if gross >1L.</p> <ul style="list-style-type: none"> • Display allinformation. • Use constructors • Implement requiredmethods. <p>3. Student program to create ‘n’ objects to find Grade. Data:usn,studname,sem,sub name[],sub marks[],percentage,Grade. 90 -100 = S 80 – 89 = A 70-79 =B 60 – 69 = C 50 – 59 =D 40 – 49 =E < 40 = F</p>	4	
2	<p>Introduction to Scripting Languages: Web and XHTML:Internet, WWW, Web Browsers and Web Servers, URLs, HTTP, XHTML: Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links, Lists, Tables, Forms, FramesCSS:Introduction,Levels of style sheets,formats,selectorforms,The box model,conflictresolutionJavascript: Overview , Object orientation and Javascript, Syntactic characteristics, Primitives, operations,and expressions, Screen output and keyboard input, Control statements, Arrays, Functions, Pattern matching using regular expressions, Errors in scripts.Introduction to Sightly</p>	9	

	<p>Hands on:</p> <ol style="list-style-type: none"> 1. Create a web page using HTML forms for emailregistration. 2. Create a web page using HTMLframes. 3. Develop a XHTML file that includes Javascript script for that accepts a number n using prompt and outputs the first n Fibonaccinnumbers 4. Develop a XHTML file that includes Javascript script for that accepts a number n using prompt and outputsa table of numbers from 1 to n and their squares usingalert 5. Develop a web page usingHTML and apply the various CSSstyles. 6. Develop a web page usingHTML and apply selectorforms. 	4	
3	<p>Getting started with AEM: Introduction to Web content management, History of AEM ,The adobe marketing cloud, Install & deploy AEM, Author Instance, Publish Instance,AEM Consoles: Authoring in AEM, work with user interfaces: Classic UI, Touch optimized UI, AEM web console: OSGi management console, CRX Explorer, CRXDELite</p> <p>AEM Architecture</p> <p>OSGi framework: Introduction ,AEM functional building blocks, Architecture stack, OSGi framework.</p> <p>Content Repository: JCR, Jackrabbit Oak, Adobe CRXWeb</p> <p>Framework: REST, Apache Sling.</p>	9	
	<p>Hands on:</p> <ol style="list-style-type: none"> 1. AEM installation & deployment. 2. Working in AEM Environment 3. Familiarize yourself with a Repositorystructure. 4. Create a Node and addproperties. 	4	
4	<p>Managing Content</p> <p>AEM Authoring Framework —Templates, Create Templates, Components and Design ,components ,Create a Page-Rendering Component ,Modularize the Page Component ,Inheriting Foundation Components , Design , Adding a design to a page ,Creating Components and Include them in Scripts, Create a Top Navigation Component, Dialog Boxes ,Create Dialog Boxes for Components, Dialog Box -Classic-UI ,touch-optimized UI ,Use Design Dialog Boxes for Global Content ,Create a logo component.</p>	9	
	<p>Hands On</p> <ol style="list-style-type: none"> 1. Create the Structure of YourWebsite 2. Create a Template for YourWebsite 3. Create a Page-RenderingComponent 4. Create a WebsiteStructure 5. Modularize the PageComponent 6. Inherit the Sightly Foundation ComponentPage 	4	

	<ul style="list-style-type: none"> 7. Add a Design to thePage 8. Create a Top Navigation Component and Include it in aScript 9. Create a Training TitleComponent 10. Create a LogoComponent 		
5	<p>Digital Asset Management, Mobile pages, Managing Campaign : Introduction to DAM, Basic DAM functions, DAM Metadata, DAM Components, Finding Assets, Asset Management, Adding New content, Authoring Responsive& Mobile Pages,Managing Campaigns& Content Targeting.</p>	9	
	<p>Hands on:</p> <ul style="list-style-type: none"> 1. Create and customize asset sharepage 2. Add a predicate to the asset sharepage 3. Add an asset editorpage 4. Versioning forassets 5. Createfolders 6. Add CUG properties tofolders 7. Use tags to organizeassets 8. Editimages 9. Uploadthumbnail 10. View references toassets 11. Edit metadata of anasset 12. Create aPage 13. Insert a NewParagraph 14. Edit the nextParagraph 15. Add an image from the contentfinder 16. Insert an image from your filesystem 17. Add moreComponents 18. Annotate acomponent 19. Move or delete acomponent 20. Working with responsive pageLayout 21. Create a Mobilepage 22. Add content to MobilePage 23. Creatingbrand 24. Creatingcampaign 25. Defining a newsegment 26. Createexperiences 27. Turn a component into targetedcomponent 28. Test thecampaign 	4	

Text Books:

1. Ryan D Lunka, “**Adobe Experience Manager: Classroom in a Book**“, 2014, Adobe Press.
2. Shane closser , “**Adobe Experience Manager: Quick Reference Guide**“, 2014, Adobe Press.
3. Shivanikarwal, “**Digital Marketing Handbook** “ , 2015 , CreateSpace Independent Publishing Platform.
4. Robert W. Sebesta , “**Programming the World Wide Web**”, 4th Edition, Pearson Education , 2008
5. M. Deitel, P. J. Deitel, A. B. Goldberg, “**Internet and World Wide Web How to Program**”, 4th Edition, Pearson Education , 2004
6. Shivanikarwal, “**Digital Marketing Handbook: A Guide to Search Engine Optimization, Pay Per Click Marketing, Email Marketing, Social Media Marketing and Content Marketing**”, 2015 , CreateSpace Independent Publishing Platform
7. Herbert Schildt, “**Java: The Complete Reference**”, 9th Edition, Oracle Press, Tata McGraw Hill.

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Lab (25 Marks)	Mini Project (25 Marks)
Remember	-	-
Understand	-	-
Apply	-	-
Analyze	-	-
Evaluate	25	-
Create	-	25

SEE – Semester End Examination (50marks)

Bloom's Taxonomy	Lab (50 Marks)
Remember	
Understand	
Apply	
Analyze	25
Evaluate	25
Create	

Virtualization Essentials with VMware

Course Code : ISE562

Credits: 04

L:P:T:S : 3:0:0:1

CIE Marks: 50

Exam Hours : 3

SEE Marks: 50

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Learn the common terms and definitions of Operating System, Cloud Computing and Virtualization.
CO2	Learning the business benefits and considerations of VMware virtualization.
CO3	Knowing various approaches to server virtualization, its relevance to the modern data center, available platforms and important features.
CO4	Analyzing the implications of virtualization on Data Center Challenges.
CO5	Enable to configure the VMware vSphere storage and network virtualization.
CO6	Apply Virtualization concepts to manage the resources

Mapping of Course Outcomes to Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	-	1	1	1	1	2	-	1
CO2	2	2	2	1	2	1	-	-	1	1	-	1
CO3	2	2	2	1	2	1	-	-	1	2	-	1
CO4	2	3	2	2	2	2	-	-	2	2	1	1
CO5	2	2	2	3	2	2	-	-	1	2	1	1
CO6	2	2	2	3	2	2	-	-	1	2	1	1

Mapping of Course Outcomes to Program Specific Outcomes(PSOs):

CO/PSO	PSO1	PSO2
CO1	3	1
CO2	3	1
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No	Module Contents	Hours	COs
1	Understanding Virtualization: Operating Systems Essentials: Process Management, Memory Management, Storage Management. Cloud Computing Essentials: Introduction to Cloud Computing, Cloud Deployment Models, Challenges. Virtualization Essentials: Importance of Virtualization, Examining today's trends, Virtualization Software Operations: Virtualizing Servers, Virtualizing Desktop, Virtualizing Applications.	8	CO1

	<p>List of programs:</p> <ol style="list-style-type: none"> Using vSphere WebClient. Creating a VirtualMachine. 		
2	<p>VMware vSphere Virtualization Overview: Introduction to Data Center Virtualization: Traditional Architecture, Virtual Architecture, Types of Virtualization. Understanding Hypervisors: Describing hypervisor, Type-1 Hypervisor, Type-2 Hypervisor. vSphere Products & Features: vSphere vMotion, vSphere HA, vSphere DRS, vSphere FT, vSphere replication, vSphere data protection.</p>	9	CO2
	<p>List of programs:</p> <ol style="list-style-type: none"> Deploying Virtual Machines Using Cloning, Templates, and a Content Library Modifying Virtual MachineSettings 		
3	<p>Creating & Managing Virtual Machines: Creating, Managing, Monitoring & Configuring VM: vSphere Client and vSphere Web Client, vSphere Web Client UI, Creating VM: VM Components, Installing Guest OS, Managing VM: Startup and Shutdown of VM's, Creating and Managing Snapshots, RDM, Configuring VM: Memory/CPU Hot Plug, SwapFiles.Creating Clones, Templates & Content Libraries Cloning VM, Creating Templates, OVF Templates, Types of Content Library.</p>	9	CO3
	<p>List of programs:</p> <ol style="list-style-type: none"> Managing Virtual Machines and Using Snapshots Monitoring Virtual Machine Performance 		
4	<p>vSphere Solutions to Data Center Challenges: Data Center Challenges: Availability, Scalability, Optimization, Management, Application Upgrade & Cloud Challenges. vSphere for Scalability and Business Continuity: vSphere vMotion, vSphere HA, vSphere DRS, vSphere FT, vSphere replication, vSphere data protection.</p>	9	CO4
	<p>List of programs:</p> <ol style="list-style-type: none"> Managing Tasks, Events, and Alarms Using vSphere vApps, Managing Multitiered Applications 		
5	<p>Understanding VMware vSphere Storage & Network Virtualization Storage Virtualization: Storage Concepts, iSCSI Concepts, NFS Data stores, VMFS Data stores, Virtual SAN Data stores, Virtual Volume Network Virtualization: Introduction to vSphere Standard Switch, Configuring Standard Switch Policies, Introduction to vSphere Distributed Switch.</p>	9	CO5
	<p>List of programs:</p> <ol style="list-style-type: none"> Using vSphere vMotion and Storage vMotion to Migrate Virtual Machines Implementing a vSphere DRSCluster 		

TEXT BOOKS:

1. Nick Marshall, Scott Lowe (Foreword by) with Grant Orchard, Josh Atwell, “**Mastering VMware vSphere 6**”, Publisher: Sybex; 1 edition (24 March 2015).
2. Matthew Portnoy, “**Virtualization Essentials**”, 2nd Edition, Wiley India Pvt. Ltd.

REFERENCES:

1. Thomas Kraus, Kamau Wanguhu, Jason Karnes, “**VMware Network Virtualization: Connectivity for the Software-Designed Data Center**”, VMware Press Technology 1st Edition.
2. Bill Ferguson, “**vSphere 6 Foundations Exam Official Cert Guide (Exam #2V0-620): VMware Certified Professional 6 VMware Press**”, 1st Edition.

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	CIE (25 Marks)	LAB (25 Marks)
Remember	-	-
Understand	10	-
Apply	10	10
Analyze	5	-
Evaluate	-	-
Create	-	15

SEE – Semester End Examination (50marks)

Bloom's Taxonomy	LAB (50 Marks)
Marks	50
Remember	-
Understand	5
Apply	15
Analyze	-
Evaluate	-
Create	20

Big Data Analytics with HP Vertica

Course Code : ISE563

L:P:T:S : 3:0:0:1

Exam Hours : 3

Credits: 04

CIE Marks: 50

SEE Marks: 50

Course Outcomes:At the end of the Course, the Student will be able to:

CO1	Understand Big data with SQL, architecture of HP Vertica
CO2	Apply projections and database designer for query performance
CO3	Apply copy,merge,delete,truncateetc to manage data effectively
CO4	Analyze HDFS, Map Reduce and its uses to manage big data
CO5	Apply hadoop related various tools and techniques to solve big data problems
CO6	Apply Sqoop tool for data management with heterogeneous platform

Mapping of Course Outcomes to Program Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	2	1	-	1	-	2	1	2
CO2	3	2	3	1	2	-	-	-	2	1	1	2
CO3	3	3	3	2	2	-	-	-	2	1	1	2
CO4	3	2	2	2	2	-	-	-	1	2	-	3
CO5	3	2	2	2	2	-	-	-	2	1	-	3
CO6	3	2	2	2	2	-	-	-	2	1	-	3

Mapping of Course Outcomes to Program Specific Outcomes(PSOs):

CO/PSO	PSO1	PSO2
CO1	3	1
CO2	3	3
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No	Module Contents	Hours	COs
1	<p>Introduction to SQL and HP Vertica: Types of SQL, Data Types, Constrains, JOINS, Types of JOINS, Clause, Group by, Having, Order by, Where Clause with examples,SQL Alias, Views, Union, Union all, aggregate functions, Operators, SQL exists, Introduction to HP-Vertica Database, Vertica Analytics Platform, Columnar Orientation, Advanced Compression, High Availability, Automatic Database design, Massively Parallel Processing, Application Integration.</p> <p>Hands on sessions</p> <ul style="list-style-type: none"> a) Creation of tables with constrains and insertion of values into tables b) Hands-on DML commands to apply different aggregate function, Group by-Having-Order by clause,Operators. c) Creation of views and working withjoins. 	9	CO1
2	<p>HP Vertica- 1 Projections, Query Execution ,Vertica Transactions, Hybrid data store – WOS & ROS, Projection Design: Projection fundamentals, Projection types, Projection properties, Replication and Segmentation, Database Designer, Comprehensive mode, Incremental mode, Sample data, Sample queries, DBD Advantages</p> <p>Hands on sessions</p> <ul style="list-style-type: none"> a) Creation of schema, tables and execution of SQL statements on VerticaDatabase, b) Running Databasedesigner c) Hands-onprojections 	9	CO2
3	<p>HP Vertica -2 Loading data via INSERT-COPY-MERGE, Deleting data in Vertica-delete vector, design for delete, process of deleting,Truncate, Purge, Update, Partitioning, Tuple Mover- MoveOut Parameter, MergeOut</p>	9	CO3
	<p>Parameter, Working with Vertica Management Console.</p> <p>Hands on sessions</p> <ul style="list-style-type: none"> a) Loading data files from different sources to Verticadatabase. b) Verifying the log files after loading the data into Verticadatabase. c) Hands-onpartitions. 		

4	<p>Big Data Analytics with Hadoop Big data overview, Introduction to Hadoop, Overview of Hadoop Distribution File Systems[HDFS] and Map reduce Operations, Clustering types in Hadoop- Standalone mode, Pseudo distributed mode, Fully distributed mode.</p> <p>Hands on Sessions : Verifying Hadoop installation (Pseudo distributed mode)</p> <ul style="list-style-type: none"> • Javapath • Hadooplocation • Hadoop configurationfiles • Name Nodesetup • JobTracker • Metadatafiles • Accessing Hadoop onbrowser 	9	CO4
5	<p>Hadoop Ecosystem Introduction to SQOOP, Overview of PIG -Standalone mode, cluster mode, when to use PIG latin, Introduction to HIVE- data types, Manage table, External table, Creation of database through HIVE, Introduction to HBASE- comparison of Hadoop hdfs and HBASE .</p> <p>Hands on Sessions : a) Moving data from local file system to Hadoop filesystem b) Performing MAP Reduction operation inHadoop c) Verification of operation results through terminal andbrowser</p>	9	CO5

REFERENCES

1. Boris lublinsky, Kevin t. Smith, AlexeyYakubovich, “**Professional Hadoop Solutions**”, Wiley, ISBN: 9788126551071,2016.
2. Chris Eaton,Dirkderooset al. , “**Understanding Big data** ”, McGraw Hill,2016.
3. Tom White, “**HADOOP: The definitive Guide**”, O Reilly2015.
4. VigneshPrajapati, “**Big Data Analytics with R and Haoop**”, Packet Publishing2013.
5. James Taylor, “**Decision Management Systems-A Practical guide to using Business rulesand Predictive Analytics**”, IBM Press,2015.
6. EfraimTurban , Jay E. Aronson , Ting-Peng Liang, “**Decision Support Systems & Intelligent Systems**”, 9th edition, Prentice Hall,2014.
7. Alberto Cordoba, “**Understanding the Predictive Analytics Lifecycle**”, Wiley,2014.
8. EricSiegel,ThomasH.Davenport,“**PredictiveAnalytics:ThePowertoPredictWhoWillClick, Buy, Lie, or Die**”, Wiley,2013.

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	CIE Test (25 Marks)	Assignments (10 Marks)	Hands on Laboratory experiments (15 Marks)
Remember	5	-	-
Understand	5	5	5
Apply	10	5	10
Analyze	5	-	-
Evaluate	-	-	-
Create	-	-	-

SEE – Semester End Examination (50 Marks)

Bloom's Taxonomy	Hands on Laboratory experiments (50 Marks)
Remember	-
Understand	10
Apply	30
Analyze	5
Evaluate	-
Create	5

Essentials of Cloud Computing**Course Code:ISE564****Credits :04****L:P:T:S : 3:0:0:1****CIE Marks :50****Exam Hours :3****SEE Marks : 50****Course Outcomes: At the end of the Course, the Student will be able to:**

CO1	Understand the cloud computing model, Types and Characteristics.
CO2	Understand the cloud services, Applications and Virtualization
CO3	Explore the Cloud Services provided by the Cloud providers
CO4	Apply the Technology of the cloud computing
CO5	Describe the different services, company offerings, Migration to the cloud
CO6	Analyze the various cloud platforms

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		-	-	-	-	-			-	-	-
CO2	3	-	3	-		2	-	-	3	-	3	-
CO3	3	2	3	3	3	3	3	3	3	2	3	2
CO4	3	3	3	3	3	3	2	3	2	2	2	-
CO5	3		1	2	2	3	2	1	3		1	
CO6	3	2	1	2	2	1	-	-	-	1	2	2

Mapping of Course Outcomes to Program Specific Outcomes(PSOs):

CO/PSO	PSO1	PSO2
CO1	3	1
CO2	3	3
CO3	2	2
CO4	3	2
CO5	2	2
CO6	3	2

Module No.	Module Contents	Hours	COs
1	Introduction: Defining Cloud Computing, Cloud Types, Cloud NIST, cloud cube models, Deployment models, service models, Examining the Characteristics of Cloud Computing, Benefits, disadvantages of cloud computing, Assessing the Role of Open Standard.	9	CO1
2	Understanding Services and Applications by Type: Defining Infrastructure as a Service, Defining Platform as a Service (PaaS), Defining Software as a Service (SaaS), SaaS characteristics, Open SaaS and SOA ,Salesforce.com and CRM SaaS ,Defining Identity as a Service (IDaaS), Defining Compliance as a Service (CaaS). Understanding Abstraction and Virtualization: Using Virtualization Technologies, Load Balancing and Virtualization, Understanding Hypervisors, Understanding Machine Imaging, Porting Applications	9	CO1 CO2
3	Cloud Services: Using Amazon Web Services: Understanding Amazon Web Service, Amazon Web Service Components and Service, working with the Elastic Compute Cloud (EC2), Working with Amazon Storage System, Understanding Amazon Database Service Using Microsoft Cloud Services: Exploring Microsoft Cloud Service, Defining the Windows Azure Platform, Using Windows Live. Using Google Web Services: Exploring Google Applications, Surveying the Google Application Portfolio, Exploring the Google Toolkit, Working with the Google App Engine.	9	CO3 CO4

4	Technology, Cloud Storage, Standards: Cloud Computing Technology: Clients, Security, Network, Services. Overview of Cloud storage, Some providers of Cloud storage. Standards: Applications, Clients, Infrastructure, Service.	9	CO4
5	Issues: Overview of SaaS (Software as a Service), Driving forces, Company offerings: Google, Microsoft, IBM. Software plus Service: Overview, Mobile device integration Local Clouds, Thin Clients, Migrating to the Cloud: Virtualization, Server solutions, Thin clients, Cloud services for individuals, mid-markets, and enterprises, Migration.	9	CO5 CO2

TEXT BOOKS:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley Publishing, Inc,2011
2. Cloud Computing - A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter,Tata McGraw Hill.

References:

1. RajkumarBuyya , James Broberg, Andrzej Goscinski: Cloud Computing Principles andParadigms, Willey2014.
2. Soyata, Tolga, “Enabling Real-Time Mobile Cloud Computing through EmergingTechnologies”, IGI Global, 2015, ISBN:978-1-4666-8662-5
3. Cloud computing from Beginning to End by Mr.Ray JRafaels.
4. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl, Ricardo Puttini,Zaigham Mahmood
5. www.AWS.com

CIE- Continuous Internal Evaluation (50 Marks)

Bloom’s Category	Tests (25Marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Self Study (10 Marks)
Remember	5	-	-	-
Understand	5	5	5	-
Apply	5	-	-	5
Analyze	10	5	-	5
Evaluate		-	-	-
Create	-	-	-	-

SEE- Semester End Examination (50 Marks)

Blooms Category	Tests
Remember	10
Understand	10
Apply	10
Analyze	20
Evaluate	-
Create	-

OPERATIONS RESEARCH

Course Code : ISE565
L:P:T:S :3:0:0:1
Exam Hours : 3

Credits :04
CIE Marks :50
SEE Marks : 50

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Realize the importance of Operations Research and explain the basic concepts.
CO2	Construct and Solve Linear Programming Problems for its optimal solutions by graphical method
CO3	Apply the concept of Simplex method and its extensions to Solve Linear Programming Problems for its optimal solutions
CO4	Solve specialized linear programming problems like assignment problems using various OR methods
CO5	Solve the problem of transporting the products from origins to destinations with least transportation cost.
CO6	Analyze network technique namely PERT/CPM and optimal project duration and cost

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	3	3	3	3	3	3	3
CO2	3	3	3	3	-	3	3	3	3	3	3	3
CO3	3	3	3	3	-	3	3	3	3	3	3	3
CO4	3	3	3	3	-	3	3	3	3	3	3	3
CO5	3	3	3	3	-	3	3	3	3	3	3	3
CO6	3	3	3	3	-	3	3	3	3	3	3	3

Module No	Module Contents	Hours	COs
1	INTRODUCTION & LINEAR MODEL-I	9	CO 1, CO 2
	Definition and Historical development of OR, Nature and Meaning of OR, Characteristics of OR, Phases of OR, Scope of OR. Introduction to Linear Model, Formulation of LPP problem, Graphical Solution, Slack and Surplus variables, standard form of LPP		
2	LINEAR MODEL-II	9	CO3
	Computational procedure of simplex method, Degeneracy problem, method to resolve degeneracy. Special cases: Alternative optimum solution, unbounded solution, Big-M method, Concept of duality		
3	ASSIGNMENT MODEL	9	CO4
	Introduction, Mathematical formulation of assignment problem, Hungarian method to solve assignment problems, unbalanced assignment problems, maximal assignment problem, restriction on assignments, travelling salesman problem, crew scheduling problem.		
4	TRANSPORTATION MODEL	9	CO5
	Introduction, Mathematical formulation of transportation problem, definitions, initial basic feasible solution, moving towards optimality, unbalanced transportation problem, degeneracy in transportation problem.		
5	NETWORK ANALYSIS	9	CO6
	Introduction to Project Management, basic steps in PERT / CPM techniques, network diagram representations and rules, Time estimates and Critical Path in Network Analysis, Optimum duration and Minimum duration cost, Project Evaluation and Review Technique (PERT), Applications		

TEXT Books:

1. "OPERATIONS RESEARCH – Theory, Methods & Applications", S. D. Sharma, Seventeenth Review Edition 2014, Reprint 2015, Kedarnath Ram Nath Publisher

REFERENCE Books:

1. "Introduction to OPERATIONS RESEARCH ", 9e – Frederick S Hillier, Gerald J Lieberman, Bodhibrata Nag and Preetam Basu, Ninth Edition, Tenth Reprint , 2015, TATA McGrawHill
2. Hamdy Taha, (2009), Operations Research: An Introduction, Pearson Education Inc.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25Marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Self Study (10 Marks)
Remember	5	-	-	-
Understand	5	5	5	-
Apply	5	-	-	5
Analyze	5	5	-	5
Evaluate	5	-	-	-
Create	-	-	-	-

SEE- Semester End Examination (50 Marks)

Blooms Category	Tests
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	-

Mini Project**Course Code : ISE57****L:P:T:S : 0:2:0:0****Exam Hours : 3****Credits: 02****CIE Marks: 25****SEE Marks: 25**

The student shall be capable of identifying a problem related to the field of Computer Science and carry out a mini project on the problem defined. Each student is expected to do the mini project individually. The code developed towards the project will be reviewed by a panel of experts during the course of the semester. Plagiarized projects will automatically get an "F" GRADE and the student will be liable for further disciplinary action. At the completion of a project the student will submit a project report, which will be evaluated by duly appointed examiner(s).

CIE - Continuous Internal Evaluation (25 Marks)

Bloom's Taxonomy	Mini Project
Remember	
Understand	
Apply	25
Analyze	
Evaluate	
Create	

SEE – Semester End Examination (25marks)

Bloom's Taxonomy	Mini Project
Remember	
Understand	
Apply	25
Analyze	
Evaluate	
Create	

SIXTH SEMESTER
SYLLABUS

WEB INTERNET PROGRAMMING

Course Code: ISE61

Credits: 04

L:P:T:S: 3:1:0:0

CIE Marks: 50+25

Exam Hours: 3+2

SEE Marks: 50+25

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Design web pages using XHTML and HTML5.
CO2	Apply Cascading Style Sheets to web pages.
CO3	Develop JavaScript programs to validate and create dynamic WebPages.
CO4	Develop server side programs using PHP and accessing database through PHP.
CO5	Describe the methods to handle data through the web and design XML document.
CO6	Inspect the management of state in web applications and JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.

Mapping of Course Outcomes to Program Outcomes:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	2	1	-	1	1	1	-	-	1
CO2	2	3	3	2	1	-	1	1	1	-	-	1
CO3	2	3	3	2	1	-	1	1	1	-	-	1
CO4	2	3	3	2	1	-	1	1	1	-	-	1
CO5	2	3	3	2	1	-	1	1	1	-	-	1
CO6	2	3	3	2	1	-	1	1	1	-	-	1

Mapping of Course Outcomes to Program Specific Outcomes:

CO	PSO 1	PSO 2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No	Module Contents	Hours	Cos
1	<p>XHTML: Basic syntax, Standard XHTML document structure; Basic text markup, Images; Hypertext Links, Lists, Tables, Forms, Syntactic differences between HTML and XHTML.</p> <p>Cascading Style Sheets: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, The Box model, Background images, The and <div> tags, Advanced CSS: Layout, Normal Flow, Positioning Elements, Floating Elements, Constructing Multicolumn Layouts, Approaches to CSS Layout, Responsive Design, CSS Frameworks.</p>	10	CO1 CO2
	<p>List of programs:</p> <p>1. Using Linux platform with Apache, design an XHTML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 2 students. Create a CSS style sheet and use it to display the document.</p>	2	
2	<p>HTML 5: Detecting HTML 5 features – Canvas, video, local storage, web workers, offline applications, geo-location, input types. What does it all mean – doctype, root, headers, articles, dates and times, navigation and footers. Let's call it drawing surface - Simple shapes, canvas, Paths, texts, gradients and images. A Form of madness – place holders, autofocus fields, email, web addresses, numbers as spinboxes and sliders, date and color pickers, search boxes.</p>	9	CO1
	<p>List of programs:</p> <p>1. Design a personal web page using HTML5 which should include:</p> <ol style="list-style-type: none"> A brief description about yourself. A small quote describing you. Your photo as the profile picture. An index which should be a list of different headings/sections present in a document in the form of link which when clicked takes you to that heading/section <p>The different sections:</p> <ul style="list-style-type: none"> ○ Your educational details(Has to be displayed using a table) ○ Your hobbies/interests with small description about that particular hobby. ○ Your Achievements. <p>Apply styles to the web page using CSS.</p>	4	

3	<p>JAVASCRIPT: Overview of JavaScript, General syntactic characteristics: Primitives, Operations and Expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructor, Pattern matching using regular expressions.</p> <p>JavaScript and HTML Documents: The Document Object Model, Element access in JavaScript, Events and event handling: Handling events from the Body elements, Button elements, Text box and Password elements.</p> <p>Dynamic documents with JavaScript: Introduction, Moving elements, Element visibility, Changing colors and fonts, Dynamic content, Stacking elements, Slow movement of elements.</p>	10	CO3
	<p>List of programs:</p> <ol style="list-style-type: none"> 1. Using Linux platform with Apache, develop and demonstrate a XHTML file that includes Javascript script for the following problem: <ul style="list-style-type: none"> a) Input: A number n obtained using prompt <p style="padding-left: 40px;">Output: The first n Fibonacci numbers</p> 2. Develop and demonstrate, using Javascript, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected. 3. Develop and demonstrate, using Javascript, a XHTML document that displays text “TEXT-GROWING” with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays “TEXT-SHRINKING” in BLUE color. Then the font size decreases to 5pt. 	6	
4	<p>PHP Programming Creating PHP Pages Using PHP6 : Overview of PHP Structure and Syntax, Creating Your First Program, Using HTML to Spice Up Your Pages, Using Constants and Variables to Add Functionality, Using if/else Arguments, Using Includes for Efficient Code, Using Functions for Efficient Code, All about Arrays. Database Access with PHP and MySQL.</p>	8	CO4
	<p>List of programs:</p> <ol style="list-style-type: none"> 1. Using Linux platform with Apache, write a PHP program that will process the data from a student marks card form. Student marks card form must collect the student name, USN and marks 	4	

	<p>of any 3 subjects. The CGI program must compute the total marks, grade and the data must be sent back to the user as another XHTML document to display.</p> <p>Table for calculating the grade is given below:</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Marks in Percentage</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>>=90</td> <td>A</td> </tr> <tr> <td>>=80</td> <td>B</td> </tr> <tr> <td>>=60</td> <td>C</td> </tr> <tr> <td>>=40</td> <td>D</td> </tr> <tr> <td><40</td> <td>F</td> </tr> </tbody> </table> <p>2. Using Linux platform with Apache, write a PHP program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.</p>	Marks in Percentage	Grade	>=90	A	>=80	B	>=60	C	>=40	D	<40	F		
Marks in Percentage	Grade														
>=90	A														
>=80	B														
>=60	C														
>=40	D														
<40	F														
5	<p>XML: Introduction to XML, The Syntax of XML, Document structure, Displaying XML documents with CSS, XSLT style sheets.</p> <p>Managing State, Passing Information via Query Strings, Passing Information via the URL Path, Cookies, Serialization, Session State, jQuery Foundations, AJAX, Asynchronous File Transmission, Animation, Backbone MVC Frameworks, JSON.</p>	8													
	<p>List of programs:</p> <ol style="list-style-type: none"> Using Linux platform with Apache, write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page. Using Linux platform with Apache, design XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document. 	4	CO5 CO6												

Text Books:

- Robert W. Sebesta, "Programming the World Wide Web", 8th Edition, Pearson Education, 2015.
- Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 1st Edition, Pearson Education India. (ISBN:978-9332575271)
- Timothy Boronczyk, Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz, Michael K. Glass, "Beginning PHP6, Apache, MySQL® Web Development", John Wiley & Sons, 2009.

Reference Books:

1. Paul Deitel, Harvey Deitel, Abbey Deitel, “**Internet & World Wide Web How to program**”, 5th Edition, Pearson Education / PHI, 2012.
2. Erik Bruchez, Danny Ayers, Eric Van Der Vlist, “**Professional Web 2.0 Programming**”, 1st Edition, 2014, Wiley India Pvt. Ltd, ISBN: 9788126510665.
3. Robin Nixon, “**Learning PHP, MySQL & JavaScript with jQuery, CSS and HTML5**”, 4th Edition, O’Reilly Publications, 2015. (ISBN:978-9352130153)
4. David Sawyer Mcfarland, “**JavaScript & jQuery: The Missing Manual**”, 1st Edition, O’Reilly/Shroff Publishers & Distributors Pvt Ltd, 2014 (ISBN:978- 9351108078)
5. Zak Ruvalcaba Anne Boehm, “**Murach’s HTML5 and CSS3**”, 3rd Edition, Murachs/Shroff Publishers & Distributors Pvt Ltd, 2016. (ISBN:978-9352133246)

CIE - Continuous Internal Evaluation (50+25 Marks)

Bloom’s Taxonomy	Tests (25 Marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Curricular/Co- Curricular (10 Marks)	Lab (25 Marks)
Remember	5	-	5	-	-
Understand	10	-	-	-	-
Apply	10	10	-	-	-
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	25

SEE – Semester End Examination (50+25marks)

Bloom’s Taxonomy	Tests	Lab
Remember	10	-
Understand	20	-
Apply	20	-
Analyze	-	-
Evaluate	-	-
Create	-	25

COMPUTER NETWORKS

Course Code : ISE62

Credits: 04

L:P:T:S : 3:1:0:0

CIE Marks: 50+25

Exam Hours : 3+3

SEE Marks: 50+25

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	To understand the organization of computer networks, factors influencing computer network development and the reasons for having variety of different types of networks and to Enumerate the layers of the OSI model and TCP/IP and ATM Reference Model.
CO2	Describe physical layer signalling and encoding and List the basic characteristics of copper cable, fiber optic cable, and other transmission media and To apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.
CO3	Apply IP addressing and apply routing algorithms to find shortest paths for network-layer packet delivery and To contrast the IPv4 and IPv6 headers.
CO4	Describe the essential principles of a transport layer protocol (reliable data transfer, flow control, congestion control) .
CO5	To Analyze internals of main protocols such as DNS,HTTP, FTP, SMTP, TCP, UDP, IP.
CO6	To develop application layer protocols

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	-	-	-	-	-	1	-	-
CO2	3	2	2	2	-	-	-	-	-	1	-	-
CO3	3	3	2	2	2	-	-	-	-	1	-	1
CO4	3	3	3	2	2	-	-	-	-	1	-	1
CO5	3	3	3	2	2	-	-	-	-	1	-	1
CO6	3	3	3	2	2	-	-	-	-	1	-	1

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1	Introduction to computer networks: Network hardware, Network software, Types of Networks, network topologies , Protocols & Standards ,Reference Models: OSI Reference model, TCP/IP Reference model, Network security concepts with encryption and decryption techniques .	9	CO1
	<ol style="list-style-type: none"> Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present. Simulate a three nodes point – to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped. 	4	
2	Physical Layer: Analog & Digital transmission, Transmission media. Datalink Layer: design issues, CRC codes, Elementary Data Link Layer Protocols, sliding window protocol.	9	CO2
	<ol style="list-style-type: none"> Write a program for error detecting code using CRC-CCITT (16- bits). Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination. 	4	
3	Network Layer: Internetworking basics, IP addressing and subnet addressing, IPv4, IPv6, Transition from IPv4 to IPv6, Routing algorithms.	9	CO3
	<ol style="list-style-type: none"> Write a program for distance vector algorithm to find suitable path for transmission. Implementation of Bellman-Ford Algorithm . 	4	
4	Transport Layer: User Datagram Protocol (UDP) , Transmission Control Protocol (TCP) , Congestion Control , Quality of services (QOS).	9	CO4
	<ol style="list-style-type: none"> Write a program for congestion control using leaky bucket algorithm. Simulate a four node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP. 	4	

5	Application layer overview: Domain Name System (DNS), Remote Login Protocols, E-mail, File Transfer, World Wide Web and HTTP .	9	CO5
	<ol style="list-style-type: none"> 1. Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion. 2. Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets. 	4	

TEXT BOOKS:

1. Behrouz A. Forouzan, “Data Communications and Networking”, 5th Edition, Tata McGraw-Hills, 2013.
2. Andrew S Tanenbaum, “Computer Networks”, 4th Edition, Pearson Education, 2013.

REFERENCE BOOKS:

1. William Stallings, “Data and Computer Communication”, 10th Edition, Pearson Education, 2014.
2. James F. Kurose and Keith W. Ross, “Computer Networking”, 6th Edition, Pearson Education, 2013.
3. Larry L. Peterson and Bruce S. Davie, “Computer Networks – A Systems Approach”, 4th Edition, Elsevier, 2007.

CIE- Continuous Internal Evaluation (50 Marks+25 Marks)

Bloom’s Taxonomy	Tests (25 Marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Curricular/Co-curricular (10 Marks)	Lab (25 Marks)
Remember	5	-	-	-	-
Understand	10	5	2.5	-	-
Apply	5	5	2.5	5	-
Analyze	5	-	-	-	-
Evaluate	-	-	-	5	25
Create	-	-	-	-	-

SEE – Semester End Examination (50 marks + 25 Marks)

Bloom's Taxonomy	Tests	Lab
Remember	10	-
Understand	20	-
Apply	05	-
Analyze	10	-
Evaluate	05	25
Create	-	-

DATA WAREHOUSING AND DATA MINING

Course Code : ISE63

Credits: 04

L:P:T:S : 3:0:0:1

CIE Marks: 50

Exam Hours : 3

SEE Marks: 50

Course Outcomes:At the end of the Course, the Student will be able to:

CO1	Define the fundamental concepts benefits and problem areas associated with datawarehousing
CO2	Describe the various architectures and main components of a data warehouse.
CO3	Design a data warehouse, and be able to address issues that arise when implementing a data warehouse.
CO4	Compare and contrast OLAP and data mining as techniques for extracting knowledge from a data warehouse
CO5	Implementation of association rule mining, classification in data mining clustering methods in data mining
CO6	Analyze complex data with various data mining trends

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	1	1	1	1	1	2	1	1
CO2	3	2	2	2	1	1	1	1	1	2	1	1
CO3	3	2	2	2	1	1	1	-	1	2	1	1
CO4	3	2	2	2	1	-	1	-	1	2	1	1
CO5	3	2	2	2	1	-	1	-	1	2	1	1
CO6	3	2	2	2	1	-	1	-	1	2	1	1

Mapping of Course Outcomes to Program Specific Outcomes(PSOs):

	PSO1	PSO2
CO1	3	2
CO2	3	2
CO3	3	2
CO4	3	2
CO5	3	2
CO6	3	2

Module No	Module Contents	Hours	COs
1	Data Warehousing: Introduction, Differences Between Operational Database Systems and Data Warehouses, A Multitier Architecture, Data Extraction, Transformation and Loading.	9	CO1 , CO2
2	Online Analytical Processing(OLAP): Data warehouse modelling, Data warehouse design and Data warehouse implementation.	8	CO2 ,3,4
3	Data Mining: Introduction, Kinds of Data, Kinds of Patterns, Technologies used, Kinds of applications, Major Issues in Data Mining,Data Pre-processing.	8	CO1 ,CO 4
4	Association Rule Mining: Mining Frequent Patterns, Associations, And Correlations: Basic Concepts and Methods, Pattern Mining in Multilevel, Multidimensional Space, Sequential Pattern Mining. Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Bayesian Belief Networks, Classification by Back propagation, Support Vector Machines, Classification Using Frequent Patterns, Lazy Learners, Other Classification Methods.	10	CO1 , CO5
5	Cluster Analysis: Basic Concepts and Methods, Types of data, Types of cluster analysis methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Dealing with large databases. Outlier Detection: Outliers and Outlier Analysis, Outlier Detection Methods . Data Mining Trends: Mining Complex Data, Types Data Mining Applications, Data Mining and Society, Data Mining Trends.	10	CO1 ,CO 5 CO6

TEXT BOOKS:

- 1.AlexBerson and Stephen J.Smith, “**Data Warehousing, Data Mining and OLAP**”, Tata McGraw Hill Edition, Thirteenth Reprint 2008.
2. Jiawei Han and MichelineKamber, “**Data Mining Concepts and Techniques**”, Third Edition, Elsevier,2012.

3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, **“Introduction to Data Mining”**, Person Education, 2007.

4. G. K. Gupta, **“Introduction to Data Mining with Case Studies”**, 3 rd Edition, PHI, New Delhi, 2009.

REFERENCES:

1. K.P. Soman, ShyamDiwakar and V. Aja, **“Insight into Data Mining Theory and Practice”**, Eastern Economy Edition, Prentice Hall of India, 2006.

2. Daniel T.Larose, **“Data Mining Methods and Models”**, Wiley-Interscience, 2006

CIE - Continuous Internal Evaluation (50 Marks)

Bloom’s Taxonomy	Tests (25 Marks)	Quizzes (5 Marks)	Assignments(10 Marks)	SSA (10 Marks)
Remember	5	5	-	-
Understand	5	-	5	-
Apply	5	-	5	5
Analyze	5	-	-	5
Evaluate	5	-	-	-
Create	-	-	-	-

SEE – Semester End Examination (50 Marks)

Bloom’s Taxonomy	Tests
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	-

JAVA and J2EE

Course Code: ISE641

Credits : 05

L:P:T:S : 3:2:0:0

CIE Marks : 50+25

Exam Hours: 3+3

SEE Marks : 50+25

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	To understand the concepts of Java language and will model the real world applications using Object Oriented Programming concepts
CO2	Develop applications using collections for managing user defined types and to learn the importance of string handling.
CO3	To understand and apply the concept of Multithreading in concurrent programming.
CO4	Apply the JDBC concepts to create applications based on database.
CO5	To apply the Servlets and JSP concepts for building dynamic web pages by reducing the code complexity
CO6	Applying Servlets and JSP architecture to build dynamic web based application

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	1	1	1	1	1	2	-	1
CO2	3	2	3	1	1	1	1	1	1	2	-	-
CO3	3	2	3	1	1	-	-	-	1	2	-	-
CO4	3	2	3	1	1	-	-	-	-	2	-	-
CO5	3	2	3	1	1	-	-	-	-	2	-	-
CO6	3	2	3	1	1	-	-	-	-	2	-	-

Mapping of Course Outcomes to Program Specific Outcomes(PSOs):

	PSO1	PSO2
CO1	3	1
CO2	3	1
CO3	3	1
CO4	3	1
CO5	3	1
CO6	3	1

Module No.	Module Contents	Hours	COs
	<p>Introduction to Java: The Java Language, Java Development Kit (JDK); Java Buzzwords, Byte Code, JVM ,JRE and Java environment, Datatypes, Arrays; Object Oriented Programming with JAVA: Object Oriented concepts, Classes, Objects and Methods, Method Overloading, Constructor, static members, Implicit this , Package Fundamentals,Inheritance,Method Overriding, Access specifiers, Abstract Classes, Final members, The Object Class, Interfaces</p>	9	CO1
1	<p>1.) A library needs to develop an online application for two types of users/roles, Adults and children. Both of these users should be able to register an account.</p> <p>Any user who is less than 12 years of age will be registered as a child and they can borrow a “Kids” category book for 10 days, whereas an adult can borrow “Fiction” category books which need to be returned within 7 days.</p> <p>Note: In future, more users/roles might be added to the library where similar rules will be enforced.</p> <p>Develop Interfaces and classes for the categories mentioned above.</p> <ol style="list-style-type: none"> 1. Create an interface LibraryUser with the following methods declared, <ul style="list-style-type: none"> • Method Name • registerAccount • requestBook 2. Create 2 classes “KidUsers” and “AdultUser” which implements the LibraryUser interface. 3. Both the classes should have two instance variables as specified below. <ul style="list-style-type: none"> • Instance variables Data type • age int • bookType String 4. The methods in the KidUser class should perform the following logic. registerAccount function: <ul style="list-style-type: none"> • if age < 12, a message displaying “You have successfully registered under a Kids Account” should be displayed in the console. • If(age>12), a message displaying, “Sorry, Age must be less than 12 to register as a kid” should be displayed in the console. • requestBook function: <ul style="list-style-type: none"> • if bookType is “Kids”, a message displaying “Book Issued successfully, please return the book within 10 days” should be displayed in the console. • Else, a message displaying, “Oops, you are allowed to take only kids books” should be displayed in the console. 	8	

	<p>5. The methods in the AdultUser class should perform the following logic. RegisterAccount function:</p> <ul style="list-style-type: none"> • if age > 12, a message displaying “You have successfully registered under an Adult Account” should be displayed in the console. • If age<12, a message displaying, “Sorry, Age must be greater than 12 to register as an adult” should be displayed in the console. • requestBook function: • if bookType is “Fiction”, a message displaying “Book Issued successfully, please return the book within 7 days” should be displayed in the console. • Else, a message displaying, “Oops, you are allowed to take only adult Fiction books” should be displayed in the console. <p>6. Create a class “LibraryInterfaceDemo.java” with a main method which performs the below functions,</p> <p>2.)Design a class that can be used by a health care professional to keep track of a patient’s vital statistics. Here’s what the class should do:</p> <ol style="list-style-type: none"> 1. Construct a class called Patient 2. Store a String name for the patient 3. Store weight and height for patient as doubles 4. Construct a new patient using these values 5. Write a method called BMI which returns the patient’s BMI as a double. BMI can be calculated as $BMI = (Weight\ in\ Pounds / (Height\ in\ inches \times Height\ in\ inches)) \times 703$ 6. Next, construct a class called “Patients” and create a main method. Create a Patient object and assign some height and weight to that object. Display the BMI of that patient. 		
	<p>Exceptionhandling:Fundamentals,Types,Usingtry,catch,throw,throws,finally,User Defined Exceptions.Collection Framework:Collections Overview,Collection Interfaces,Collection Classes,Type Wrappers,Accessing a collection using an Iterator.</p>	9	CO2
2	<p>1.) Write a Program to take care of Number Format Exception if user enters values other than integer for calculating average marks of 2 students. The name of the students and marks in 3 subjects are taken from the user while executing the program.</p> <ul style="list-style-type: none"> • In the same Program write your own Exception classes to take care of Negative values and values out of range (i.e. other than in the range of 0-100) • Include finally to output the statement “Program terminated”. <p>2.) Create an Employee class with the related attributes and</p>	8	

	<p>behaviours. Create one more class EmployeeDB which has the following methods. a. booleanaddEmployee(Employee e) b. booleandeleteEmployee(inteCode) c. String showPaySlip(inteCode) d. Employee[] listAll() Use an ArrayList which will be used to store the employees and use enumeration/iterator to process the employees. Write a Test Program to test that all functionalities are operational.</p> <p>3.) Create a HashMap to create a Telephone book storing name and phone number. Write a program so that when a name is given, corresponding phone number should be given back.</p>		
	<p>String Manipulation: Constructors, Length, Operations, Character Extraction, Comparison, Searching, Modifying, Conversion, Multi Threading: Java Thread Model, The main method, Creating Threads, Thread Priorities, Synchronization</p>	9	CO3
3	<p>1.) 1. Create class of SalesPersons as a thread that will display five sales persons name. 2. Create a class as Days as other Thread that has array of seven days. 3. Call the instance of SalesPersons in Days and start both the threads 4. suspend SalesPersons on Sunday and resume on wednesday Note: use suspend, resume methods from thread</p> <p>2.) Create three threads- with different priorities – MAX, MIN, NORM- and start the threads at the same time. Observe the completion of the threads.</p> <p>3.) Given a string and a non-empty word string, return a string made of each char just before and just after every appearance of the word in the string. Ignore cases where there is no char before or after the word, and a char may be included twice if it is between two words.</p> <ul style="list-style-type: none"> • If inputs are "abcXY123XYijk" and "XY", output should be "c13i". • If inputs are "XY123XY" and "XY", output should be "13". <p>If inputs are "XY1XY" and "XY", output should be "11".</p>	8	
	<p>Database Handling : Exploring web architecture models, Exploring the MVC architecture. Working with JDBC: Introducing JDBC, Exploring JDBC Drivers, Describing JDBC APIs, Exploring JDBC processes with java.sql package</p>	8	CO4
4	<ol style="list-style-type: none"> 1. Develop a JDBC program using statement object to display the student information to the console 2. Develop a JDBC program using Prepared statement object to insert a row the student table and display the updated data. 	8	
5	<p>Working with servlets 3.0: Exploring the features of java servlets, Exploring the servlets API, Servlets life cycle, Working with the Http servlets request and Http servlets response interfaces, Exploring request delegation and request scope, session tracking, Working with</p>	9	CO5 CO6

	java server pages: Introducing JSP, Listing advantages of JSP over java servlets, Exploring the architecture of a JSP page, Describing the life cycle of a JSP page, Working with JSP basic tags and implicit objects, Working with the action tags in JSP		
	<p>1.) Write a servlet to show all the parameters sent to the servlet via either GET or POST.</p> <p>2.) Create a HTML Page, which asks the user to enter a number in a textbox. On clicking the submit button, it places the request to a Servlet. The Servlet generates all Prime numbers which are less than the given number and adds them to an ArrayList and forwards the control to a JSP page. The JSP page iterates through the ArrayList and prints them.</p>	8	

TEXT BOOKS

1. Herbert Schildt, “**Java: The Complete Reference**”, 9th Edition, Oracle Press, Tata McGraw Hill.
2. “**Java Server Programming Java Ee6 (J2ee 1.6)**”, Kogent learning solution, Dreamtech press 2014.

REFERENCES:

1. Y. Daniel Liang, “**Introduction to JAVA Programming**”, 7th Edition, Pearson Education, 2007.
 2. Stephanie Bodoff et al, “**The J2EE Tutorial**”, 2nd Edition, Pearson Education, 2004.
- CIE- Continuous Internal Evaluation (50+25 Marks)**

Bloom’s Category	Tests (25 Marks)	Assignments (15 Marks)	Quizzes (10 Marks)	Lab (25 Marks)
Remember	5	-	-	-
Understand	5	-	5	5
Apply	5	5	5	5
Analyze	5	10	-	5
Evaluate	5	-	-	-
Create		-	-	10

SEE- Semester End Examination (50+25 Marks)

Blooms Category	Tests	Lab
Remember	10	-
Understand	10	-
Apply	10	10
Analyze	10	5
Evaluate	10	-
Create	-	10

PYTHON PROGRAMMING**Course Code : ISE651****Credits : 03****L:P:T:S : 3:0:0:0****CIE Marks : 50****Exam Hours : 3****SEE Marks : 50****Course Outcomes: At the end of the Course, the Student will be able to:**

CO1	Understand the benefits of python programming over other languages and program using python language.
CO2	Understand and implement classes and objects in python.
CO3	Implement various data structures in Python language.
CO4	Apply exception handling and gain efficient testing, debugging skills in python.
CO5	Apply python programming in solving computational problems in real time applications, web frameworks and cloud operations.
CO6	Analyze the real world problems in Data Science domain and solve them with Numpy, Pandas packages and visualize them in MatPlot Lib

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	-	1	-	-	1	-	-
CO2	2	3	2	2	-	-	1	-	-	1	-	-
CO3	2	3	3	3	-	-	2	-	-	2	-	-
CO4	1	2	3	2	-	-	2	-	-	2	-	-
CO5	1	3	3	3	-	1	2	1	1	2	-	-
CO6	1	3	3	3	-	1	2	1	1	2	-	-

Mapping of Course Outcomes to Program Specific Outcomes(PSOs):

	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	COs
1	Introduction to Python The basic elements of Python, Objects, Expression, Numerical Types, Variables, Keywords and Assignments, Operators and Operands, Order of operations, Installing Python, The first Program, IDLE, Branching programs, if tests, Strings and Input, Iterations, While loop, for loop.	9	CO1
2	Functions, Scoping and Abstraction: Functions and Scoping, Function calls, Type conversion, Type coercion, Math functions , Composition, Adding new functions , Definitions and use, Variables and parameters are local, Stack diagrams, Functions with results, Specifications, Recursion, Global variables, Modules, Files, Text Files, writing variables, Directories, Pickling.	9	CO2
3	Structured Types, Mutability: Tuples, Sequences, Lists and Mutability, Cloning, List Comprehension, Strings, Dictionaries. NumPy,Pandas,MatPlotLib –Library case study.	9	CO3
4	Exceptions and assertions Handling exceptions, Exceptions as a control flow mechanism, Assertions, Classes and Object-oriented Programming: Abstract Data Types and Classes, Inheritance, Encapsulation and information hiding.	9	CO4
5	Python Application Django: Python based Web Framework, MVT, URL Mapping, ORM and models, View, Template, Form Processing, Cookie Handling.	9	CO5

TEXT BOOKS:

1. John V Guttag, “**Introduction to Computation and Programming Using Python**”, , 2015,PrenticeHall of India
2. Allen Downey, Jeffrey Elkner and Chris Meyers, "**How to think like a Computer Scientist, Learning with Python**", ,Green Tea Press, 2014

- Arshadeep Bahga, Vijay Madiseti, "Cloud computing: A Hands-on Approach", Universities Press, 2014.

REFERENCE BOOKS:

- Mark Lutz "Learning Python", 5th Edition, O'Reilly publication, 2016
- Wesley J. Chun, "Core Python Programming", 2nd Edition, Prentice Hall, 2013
- "The Python Tutorial", <http://docs.python.org/release/3.0.1/tutorial/>
- "Learn Python the Hard way", <http://learnpythonthehardway.org/>

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonom	Tests (25 marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Co-Curricular (10 Marks)
Remember	5	-	-	-
Understand	5	-	5	-
Apply	10	10	-	10
Analyze	5	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	-
Create	-

Cloud Computing

Course Code: ISE652

Credits : 03

L:P:T:S : 3:0:0:0

CIE Marks : 50

Exam Hours : 3

SEE Marks : 50

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Understand the cloud computing model, Types and Characteristics.
CO2	Understand the cloud services, Applications and Virtualization
CO3	Explore the Cloud Services provided by the Cloud providers
CO4	Apply the Technology of the cloud computing
CO5	Describe the different services and company offerings
CO6	Analyze migrating to the cloud with services and solutions

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		-	-	-	-	-			-	-	-
CO2	3	-	3	-		3	-	-	3	-	2	-
CO3	3	3	3	3	3	3	2	1	3	2	2	2
CO4	3	3	3	3	3	3	2	1	3	2	2	-
CO5	3	-	3	3	3	3	2	1	3	-	2	-
CO6	3	-	3	3	3	3	2	1	3	-	2	-

Mapping of Course Outcomes to Program Specific Outcomes(PSOs):

	PSO1	PSO2
CO1	2	2
CO2	2	2
CO3	2	2
CO4	2	2
CO5	2	2
CO6	2	2

Module No.	Module Contents	Hours	COs
1	Introduction: Defining Cloud Computing, Cloud Types, Cloud NIST, cloud cube models, Deployment models, service models, Examining the Characteristics of Cloud Computing, Benefits, disadvantages of cloud computing, Assessing the Role of Open Standard.	7	CO1
2	Understanding Services and Applications by Type: Defining Infrastructure as a Service, Defining Platform as a Service (PaaS), Defining Software as a Service (SaaS), SaaS characteristics, Open SaaS and SOA ,Salesforce.com and CRM SaaS ,Defining Identity as a Service (IDaaS), Defining Compliance as a Service (CaaS). Understanding Abstraction and Virtualization: Using Virtualization Technologies, Load Balancing and Virtualization, Understanding Hypervisors, Understanding Machine Imaging, Porting Applications	9	CO1 CO2
3	Cloud Services: Using Amazon Web Services: Understanding Amazon Web Service, Amazon Web Service Components and Service, working with the Elastic Compute Cloud (EC2), Working with Amazon Storage System, Understanding Amazon Database Service Using Microsoft Cloud Services: Exploring Microsoft Cloud Service, Defining the Windows Azure Platform, Using Windows Live. Using Google Web Services: Exploring Google Applications,	9	CO3 CO4

	Surveying the Google Application Portfolio, Exploring the Google Toolkit, Working with the Google App Engine.		
4	Technology, Cloud Storage, Standards: Cloud Computing Technology: Clients, Security, Network, Services. Overview of Cloud storage, Some providers of Cloud storage. Standards: Applications, Clients, Infrastructure, Service.	9	CO4
5	Issues: Overview of SaaS (Software as a Service), Driving forces, Company offerings: Google, Microsoft, IBM. Software plus Service: Overview, Mobile device integration Local Clouds, Thin Clients, Migrating to the Cloud: Virtualization, Server solutions, Thin clients, Cloud services for individuals, mid-markets, and enterprises, Migration.	9	CO2 CO5

TEXT BOOKS:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley Publishing, Inc, 2011
2. Cloud Computing - A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, Tata McGraw Hill.

References:

1. RajkumarBuyya , James Broberg, AndrzejGoscinski: Cloud Computing Principles and Paradigms, Willey 2014.
2. Soyata, Tolga, “Enabling Real-Time Mobile Cloud Computing through Emerging Technologies”, IGI Global, 2015, ISBN: 978-1-4666-8662-5
3. Cloud computing from Beginning to End by Mr.Ray J Rafaels.
4. Cloud Computing: Concepts, Technology & Architecture by Thomas Erl, Ricardo Puttini, Zaigham Mahmood

CIE- Continuous Internal Evaluation (50 Marks)

Bloom’s Taxonom	Tests (25 marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Co-Curricular (10 Marks)
Remember	5	-	-	-
Understand	5	-	5	-
Apply	10	10	-	10
Analyze	5	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

SEE- Semester End Examination (50 Marks)

Blooms Category	Tests
Remember	10
Understand	10
Apply	15
Analyze	10
Evaluate	5
Create	-

WIRELESS SENSOR NETWORKS

Course Code : ISE653

Credits: 03

L:P:T:S : 3:0:0:0

CIE Marks: 50

Exam Hours : 3

SEE Marks: 50

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO1	Define and list the concepts of overview of sensor technologies and architectures.
CO2	Design of new technology for sensor networks using MAC and routing layer protocols.
CO3	Demonstrate the routing protocols for Sensor Networks and Infrastructure establishment through the creation of small test beds.
CO4	To analyze the need for security in Wireless Sensor Networks.
CO5	Evaluate the Sensor Network platforms and tools
CO6	To design of new applications for Wireless Sensor Networks.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	-	-	-	-	-
CO2	2	2	3	2	2	-	-	-	-	-	-	-
CO3	2	2	3	3	2	-	-	-	-	-	-	-
CO4	2	2	3	3	2	-	-	-	-	-	-	-
CO5	2	2	3	3	3	-	-	-	-	-	-	-
CO6	2	2	3	3	3	-	-	-	-	-	-	-

Module No	Module Contents	Hours	COs
1	Overview of Wireless Sensor Networks: Key definitions of Sensor Networks, Advantages of Sensor Networks, Unique constraints and challenges, Driving applications, Enabling technologies for Wireless Sensor Networks. Architectures: Layered architecture, Clustered architecture, Single-Node architecture-hardware components, Energy consumption of sensor nodes, Operating systems and Execution Environments, Network Architecture-Sensor Network Scenarios, Optimization	9	CO1

	goals and Figures of Merit, Gateway concepts.		
2	<p>Data Dissemination and Data Gathering: Flooding, Gossiping, Rumor Routing, Sequential assignment Routing, Directed Diffusion, Sensor protocols for Information via Negotiation, Cost-field approach, Geographic hash table, Small minimum energy communication network. Direct Transmission, Power efficient gathering for sensor information systems, Binary scheme, Chain-based three level scheme.</p> <p>MAC Protocols for Wireless Sensor Networks Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC protocol for Ad Hoc Wireless Networks, Classifications of MAC protocols, Contention-Based protocols, Contention-Based protocols with reservation mechanisms, Contention-Based MAC protocols with scheduling mechanisms, MAC protocols that use Directional Antennas, Other MAC protocols.</p>	9	CO2
3	<p>Routing protocols in Sensor Networks: Location-based Protocols: MECN, SMECN, GAF, GEAR, Span, TBF, BVGF, GeRaF, Data-centric Protocols: SPIN, Directed Diffusion, Rumor Routing, COUGAR, ACQUIRE, EAD, Information-Directed Routing, Gradient, Based Routing, Energy-aware Routing, Information-Directed Routing, Quorum-Based Information Dissemination, Home Agent Based Information Dissemination, Hierarchical Protocols: LEACH, PEGASIS, HEED, TEEN, APTEEN, Mobility-based Protocols: SEAD, TTDD, Joint Mobility and Routing, Data MULES, Dynamic Proxy Tree-Base Data Dissemination, Multipath-based Protocols: Sensor-Disjoint Multipath, Braided Multipath, N-to-, Multipath Discovery, Heterogeneity-based Protocols: IDSQ, CADR, CHR, QoS-based protocols: SAR, SPEED, Energy-aware routing.</p>	9	CO3
4	<p>Location Discovery, Infrastructure Establishment and Quality of a Sensor Network: Indoor localization, Topology Control, Clustering, Time Synchronization, Localization and Positioning, sensor Tasking and Control, Sensor Network localization, Coverage, Exposure, Other Issues.</p> <p>Security in Wireless Sensor Networks Security in Ad Hoc Wireless Networks, Network Security requirements, Issues and Challenges in security provisioning, network Security Attacks, Key management, Secure Routing in Ad Hoc Networks.</p>	9	CO4
5	<p>Sensor Network Platforms and Tools: Sensor node Hardware-Berkeley Motes, programming Challenges, Node-level software platforms, Node-level simulators, State-centric programming.</p> <p>Applications of WSNs: SUltra wide band radio communication, Wireless fidelity systems, Future directions, Home automation, Smart metering applications.</p>	9	CO5 CO6

TEXT BOOKS:

1. C. SivaRam Murthy and B.S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols, PHI, 2012 Edition, Prentice Hall communications Engineering and Emerging Technology Series, ISBN-10: 0133007065.

2. Holger Karl and Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley, 2007 ISBN: 0470519231, 9780470519233.
3. William B. Frakes, Ricardo Baeza-Yates; Information Retrieval Data Structures and Algorithms; First Edition; Pearson Education Limited; 2012; ISBN-9788131716922.
4. HinrichSchutze, PrabhakarRaghavan, Christopher D Manning; Introduction To Information Retrieval; First Edition; Cambridge University Press India Pl; 2014; ISBN-9781107666399

REFERENCE BOOKS:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, and Applications", John Wiley, 2007.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh ,1 ed. Pearson Education.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Taxonom	Tests (25 marks)	Assignments (10 Marks)	Quizzes (5 Marks)	Co-Curricular (10 Marks)
Remember	5	-	-	-
Understand	5	-	5	-
Apply	10	10	-	10
Analyze	5	-	-	-
Evaluate	-	-	-	-
Create	-	-	-	-

SEE- Semester End Examination (50 Marks)

Blooms Category	Tests
Remember	10
Understand	10
Apply	15
Analyze	10
Evaluate	5
Create	-

Compiler Design

Course Code: ISE654

Credits: 03

L:P:T:S : 3:0:0:0

CIE Marks: 50

Exam Hours: 3

SEE Marks: 50

Course Outcomes: At the end of the Course, the student will be able to:

CO1	Understand the basic concepts and application of Compiler Design
CO2	Apply their basic knowledge Data Structure to design Symbol Table, Lexical Analyzer
CO3	Understand and Implement a Parser -Top Down and Bottom Up Design
CO4	Understand strength of Grammar and Programming Language
CO5	Understand various Code optimization Techniques and Error Recovery mechanisms.
CO6	Comprehend and manipulate the different concepts in Compiler Design.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	3	1	-	-	-	-	1	-	-
CO2	3	2	2	3	1	-	-	-	-	1	-	-
CO3	3	2	2	3	1	-	-	-	-	1	-	-
CO4	3	2	2	3	1	-	-	-	-	1	-	-
CO5	3	2	2	3	1	-	-	-	-	1	-	-
CO6	3	2	2	3	1	-	-	-	-	1	-	-

Mapping of CO v/s PSO:

	PSO1	PSO2
CO1	2	1
CO2	2	1
CO3	2	1
CO4	2	1
CO5	2	1
CO6	2	1

Module No.	Module Contents	Hours	COs
1	Introduction: Overview of the Translation Process, Difference between interpreter, assembler and compiler, Overview and use of linker and loader, Analysis of the Source Program, Language processors; The structure of a Compiler; The evolution of programming languages; The science of building a Compiler; Types of Compiler, Applications of compiler technology; Programming language basics.	9	CO1, CO6
2	Lexical Analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens, A Language for Specifying Lexical Analyzers, Finite Automata From a Regular Expression, Design of a Lexical Analyzer Generator, Optimization of DFA.	9	CO2, CO6
3	Syntax Analysis: Introduction; Context-free Grammars; Writing a Grammar. Top-down Parsing; Bottom-up Parsing, Operator-Precedence Parsing, LR Parsers, Using Ambiguous Grammars, Parser Generators.	9	CO3, CO6
4	Syntax Directed Translation: Syntax-Directed Definitions, Construction of Syntax Trees, Bottom-Up Evaluation of S-Attributed Definitions, L-Attributed Definitions, syntax directed definitions and translation schemes, Applications of syntax-directed translation.	9	CO4, CO6
5	Code Generation: Principal Sources of Optimization-DAG-Optimization of Basic Blocks-Global Data Flow Analysis-Efficient Data Flow Algorithms-Issues in Design of a Code Generator - A Simple Code Generator Algorithm.	9	CO5, CO6

TEXT BOOKS:

1. Compilers: Principles, Techniques and Tools By Aho, Lam, Sethi, and Ullman, Second Edition, Pearson, 2014
2. Advanced Compiler Design and Implementation By Muchnick, Morgan and Kaufmann, 1998.

REFERENCES:

1. Compilers: Principles, Techniques and Tools By Aho, Sethi, and Ullman, Addison-Wesley, 1986
2. Compiler Design in C By Allen I. Holub, Prentice-Hall/Pearson.

CIE - Continuous Internal Evaluation (50 Marks)

Bloom's Taxonomy	Tests	Assignments	Quizzes	Self –Study
Marks (Out of 50)	25	10	5	10
Remember	5	-	-	-
Understand	5	-	-	-
Apply	5	5	-	-
Analyze	5	-	5	5
Evaluate	5	-	-	-
Create	-	5	-	5

SEE – Semester End Examination (50 Marks)

Bloom's Taxonomy	Tests
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	-

Mobile Application Development

Course Code : ISE655

Credits : 03

L: P: T: S: 3:0:0:0

CIE Marks : 50

Exam Hours : 3

SEE Marks : 50

Course Outcomes: At the end of the Course, the Student will be able to

CO1	Understand the basics of Android devices and Platform
CO2	Describe the architecture and advanced features of android technology.
CO3	Interpret and use the data storage, file sharing and IPC in android platform.
CO4	Develop the skills in designing and building mobile applications using android platform.
CO5	Build mobile applications using multimedia graphics and animations.
CO6	publish Android applications in to Android Market

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	2	-	-	-	2	-	-	2
CO2	3	3	1	1	2	-	1	2	1	-	-	2
CO3	3	3	2	2	2	-	1	2	2	-	2	2
CO4	3	3	3	2	3	-	2	2	2	-	2	2
CO5	3	3	3	3	3	-	2	2	3	-	2	2
CO6	3	3	3	3	3	-	2	2	3	-	2	2

Module No.	Module Contents	Hours	COs
1	Introduction to Android: Android OS design and Features – Android development framework, SDK features, Installing and running applications on Eclipse platform, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools, Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes	9	CO1
2	ANDROID UI ARCHITECTURE & UI WIDGETS Application context, Intents, Activity life cycle, Supporting different devices, multiple screen sizes, Fundamental Android UI design – Layouts, Drawable resources, UI widgets, Notification, Toasts, Menu, Dialogs, Lists & Adapters, Building dynamic UI with fragments.	9	CO2

3	DATA STORAGE, SERVICES & CONTENT PROVIDERS: Saving Data, Interacting with other Apps, Working with system permissions, Apps with content sharing, Shared Preferences, Preferences activity, Files access, SQLite database, Threads, Overview of services in Android, Implementing a Service, Service lifecycle, Inter Process Communication.	9	CO3
4	Intents and Broadcasts: Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS. Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity. Notifications – Creating and Displaying notifications, Displaying Toasts	9	CO4
5	Advanced applications: Building apps with Multimedia, Building apps with Graphics & Animations, Building apps with Location Based Services and Google maps, Building apps with Connectivity & Cloud, Sensors, Bluetooth, Camera, Telephony Services.	9	CO5 CO6

Text Books:

1. Reto Meier; Professional Android 2 Application Development; Wiley India Pvt. Ltd; 1st Edition; 2012; ISBN-13: 9788126525898.
2. Phillips, Stewart, Hardy and Marsicano; Android Programming, 2nd edition - Big Nerd Ranch Guide; 2015; ISBN-13: 978-0134171494
3. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

Reference Books:

1. Mark Murphy; Beginning Android 3; Apress Springer India Pvt Ltd.; 1st Edition; 2011; ISBN-13: 978-1-4302-3297-1
2. Eric Hellman; Android Programming – Pushing the limits by Hellman; Wiley; 2013; ISBN 13: 978 1118717370
3. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

CIE-Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests	Assignments	Quizzes	Curricular / Co-curricular
Marks (Out of 50)	25	10	5	10
Remember	5	-		
Understand	5	5	5	
Apply	5	-	-	
Analyze	5	5	-	
Evaluate	5	-	-	
Create		-	-	

SEE – Semester End Examinations (50 Marks)

Blooms Category	Tests
Remember	10
Understand	10
Apply	15
Analyze	10
Evaluate	5
Create	-

Mini Project

Course Code : ISE66
L:P:T:S : 0:2:0:0
Exam Hours : 3

Credits: 02
CIE Marks: 25
SEE Marks: 25

The student shall be capable of identifying a problem related to the field of Computer Science and carry out a mini project on the problem defined. Each student is expected to do the mini project individually. The code developed towards the project will be reviewed by a panel of experts during the course of the semester. Plagiarized projects will automatically get an “F” GRADE and the student will be liable for further disciplinary action. At the completion of a project the student will submit a project report, which will be evaluated by duly appointed examiner(s).

CIE - Continuous Internal Evaluation (25 Marks)

Bloom’s Taxonomy	Mini Project
Remember	
Understand	
Apply	25
Analyze	
Evaluate	
Create	

SEE – Semester End Examination (25marks)

Bloom’s Taxonomy	Mini Project
Remember	
Understand	
Apply	25
Analyze	
Evaluate	
Create	

APPENDIX A

Outcome Based Education

Outcome-based education (OBE) is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience each student should have achieved the goal. There is no specified style of teaching or assessment in OBE; instead classes, opportunities, and assessments should all help students achieve the specified outcomes.

There are three educational Outcomes as defined by the National Board of Accreditation:

Program Educational Objectives: The Educational objectives of an engineering degree program are the statements that describe the expected achievements of graduate in their career and also in particular what the graduates are expected to perform and achieve during the first few years after graduation. [nbaindia.org]

Program Outcomes: What the student would demonstrate upon graduation. Graduate attributes are separately listed in Appendix C

Course Outcome: The specific outcome/s of each course/subject that is a part of the program curriculum. Each subject/course is expected to have a set of Course Outcomes

Mapping of Outcomes



APPENDIX B

The Graduate Attributes of NBA

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

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

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.

Conduct investigations of complex problems: The problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline that may not have a unique solution. For example, a design problem can be solved in many ways and lead to multiple possible solutions that require consideration of appropriate constraints/requirements not explicitly given in the problem statement (like: cost, power requirement, durability, product life, etc.) which need to be defined (modeled) within appropriate mathematical framework that often require use of modern computational concepts and tools.

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

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.

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.

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

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

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.

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.

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.

APPENDIX C

BLOOM'S TAXONOMY

Bloom's taxonomy is a classification system used to define and distinguish different levels of human cognition—i.e., thinking, learning, and understanding. Educators have typically used Bloom's taxonomy to inform or guide the development of assessments (tests and other evaluations of student learning), curriculum (units, lessons, projects, and other learning activities), and instructional methods such as questioning strategies.

