



# **STELLA MARIS COLLEGE**

**(AUTONOMOUS), CHENNAI - TAMILNADU**

**M.Sc. Degree**  
**INFORMATION TECHNOLOGY**  
**(CHOICE BASED CREDIT SYSTEM)**

**SYLLABUS**  
**(Effective from the academic year 2019 – 2020)**

## **STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

### **Institutional Learning Outcomes**

Stella Maris College, an autonomous Catholic institution of higher education, is committed to the highest standards of academic excellence based on sound values and principles, where students are strengthened with whole person education to lead purposeful lives in service to the community and the nation.

The Institutional Learning Outcomes (ILOs) of Stella Maris College (SMC) reflect the broader mission and purpose of the institution. They are the overarching set of learning outcomes that all students, regardless of discipline, must achieve at graduation. All programme and course learning outcomes are mapped to the institutional outcomes, thus reflecting an overall alignment of values, knowledge and skills expected at programme completion. ILOs are designed to help guide individual departments and disciplines in the development of their programme learning outcomes.

The ILOs of SMC are formed by two components:

1. **Core commitments:** Knowledge and scholarship, values and principles, responsible citizenship, service to community
2. **Institutional values:** Quest for truth, spirit of selfless service, empowerment

**Upon graduation, students of Stella Maris College will**

- Display mastery of knowledge and skills in their core discipline (**Knowledge and Scholarship**)
- Exhibit in all actions and attitudes a commitment to truth and integrity in all contexts, both personal and professional (**Values and Principles**)
- Demonstrate knowledge about their role in society at local and global levels, and actively work for social and environmental justice (**Responsible Citizenship**)
- Engage in the process of self-discovery through a life-long process of learning (**Quest for truth**)
- Demonstrate readiness to serve those who are in need (**Spirit of selfless service**)
- Be able to function effectively and with confidence in personal and professional contexts **Empowerment**)

## **STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

### **Programme Learning Outcomes/Intended Programme Learning Outcomes**

Graduates of a Master's Degree of Stella Maris College will have a comprehensive knowledge of their disciplines, with indepth knowledge of the underlying principles and concepts in one or more disciplines as a basis for independent lifelong learning.

#### **At the end of a postgraduate programme students will be able to**

- Demonstrate mastery in the discipline
- Demonstrate deep understanding of the broad principles of science and technology and apply them in varied contexts
- Demonstrate knowledge, understanding and professionalism required for the discipline
- Demonstrate capability to locate, evaluate, manage, and use information/data and research to develop and guide their own knowledge, learning, and practice
- Demonstrate the ability to organise a presentation in a coherent fashion
- Demonstrate the literacy and numeracy skills necessary to understand and interpret information/data and communicate according to the context
- Draw on multiple, relevant/interrelated fields of study to understand, analyse and solve problems
- Exhibit principled decision making and reasoning to identify creative solutions to ethical problems
- Practice/act in ways that show a commitment to social justice and the processes of peace/conflict resolution
- Demonstrate the skills to appropriately interact with people from a range of cultural, linguistic, and religious backgrounds
- Demonstrate an understanding of local, regional, national, and global issues
- Identify themselves as agents of change
- Demonstrate the ability to solve an issue
- Show self-awareness and emotional maturity
- Demonstrate career and leadership readiness
- Exhibit the ability to work in teams
- Demonstrate sensitivity and readiness to share their knowledge and capabilities with the marginalised and oppressed in their communities

**DEPARTMENT OF COMPUTER SCIENCE**

**PROGRAMME DESCRIPTION**

Master of Science in Information Technology offers knowledge on the underlying concepts of computer technology, use of different programming languages as a tool for solving problems in different domains and the technology trends. This degree not only helps the students pursue career in IT industry or higher education in the discipline but also opens up avenues in different domains of their interest as computer technology plays a vital role in almost all disciplines.

The programme enables the students to master concepts , answers the questions on why, what and how of computer technology, introduces students to various programming tools and techniques and the design and development of solutions, enables students to understand the security issues involved, and apply the knowledge appropriately to solve different problems in business/research. It gives students understanding on discrete mathematics, formal languages and finite automata and helps them acquisition to analyse different problem solving techniques. The programme not only emphasises acquisition of knowledge in computer technology but also focusses on value education and ethics.

To give emphasis to research, a course on research methodology has been included. Students are also expected to do a summer internship which gives them a better understanding on the work environment and the technology.

**PROGRAMME SPECIFIC LEARNING OUTCOMES**

On successful completion of the programme, the students will be able to

- Understand theoretical background knowledge, scientific and technology principles underlying Information Technology
- Demonstrate the ability to apply mathematical foundations, algorithmic principles, and computer hardware in creation and maintenance of computer-based systems
- Understand, analyse and interpret data
- Understand and analyse the current research issues
- Demonstrate the ability to define and analyse a problem, identify different strategies and approaches to solve the problem and design, implement, and evaluate the solutions for business/research needs

- Show the ability to understand the professional, ethical, legal, and security issues and responsibilities, and the societal impact of computing
- Demonstrate the ability to analyse the local and global impact of computing on individuals, organisations and society
- Use current techniques, skills, and tools necessary for modern Information Computing Technology
- Communicate effectively in both oral and written individually and in team
- Show responsibility towards local and global issues
- Perceive themselves as agents of change
- Demonstrate intercultural and ethical competency
- Show self-awareness and emotional intelligence
- Demonstrate career and leadership readiness
- Show the ability to work in teams

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**DISTRIBUTION OF CREDITS AND HOURS**  
**M.Sc. Information Technology 2019-2020**

Courses	Semester 1		Semester 2		Semester 3		Semester 4		Total Credits	Total Hours
	C	H	C	H	C	H	C	H		
PC	4	6	5	6	4	5	4	5	17	22
	4	5	4	5	4	6	5	6	17	22
	4	5	4	5	4	5			12	15
	4	6			5	6			9	12
Project							8	10	8	10
PE-dept.	5	6	5	6			5	6	15	18
PE-Common			3	3	3	3			6	6
PV			2	2	2	2			4	4
PK			2	2					2	2
PA	2	2							2	2
PN					2				2	0
Library				1		3		3	0	7
TOTAL	23	30	25	30	24	30	22	30	94	120

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI 600 086**

**M.Sc. DEGREE : INFORMATION TECHNOLOGY**

**COURSES OF STUDY**

**(Effective from the academic year 2019-2020)**

**CHOICE BASED CREDIT SYSTEM**

C-Credit, L-Lecture Hours, T-Tutorial Hours, P- Practical Hours, Ex-Exam Hours,

CA- Continous Assessment Marks, ES-End Semester Marks, M-Maximum Marks

<b>Subject Code</b>	<b>Title of Course</b>	<b>C</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Ex</b>	<b>CA</b>	<b>ES</b>	<b>M</b>
<b>SEMESTER-I</b>									
19CS/PC/PP14	Programming with Python	4	2	0	4	3	50	50	100
19CS/PC/DM14	Discrete Mathematics for Computer Science	4	4	1	0	3	50	50	100
19CS/PC/SE14	Software Engineering	4	4	1	0	3	50	50	100
19CS/PC/OC14	Operating Systems : Concepts and Applications	4	2	0	4	3	50	50	100
	PA/PL	2	2	0	0	-	50	-	100
	Department Elective I								
<b>SEMESTER-II</b>									
19CS/PC/DB25	Database Management Systems	5	3	0	3	3	50	50	100
19CS/PC/AA24	Design and Analysis of Algorithms	4	4	1	0	3	50	50	100
19CS/PC/OO24	Object Oriented Programming	4	3	0	2	3	50	50	100
19CS/PK/SS22	Soft Skills	2	2	0	0	0	50	-	100
CD / ET	Value Education	2	2	0	0	-	50	-	100
	Department Elective II								
	Common Elective I								
<b>SEMESTER-III</b>									
19CS/PC/NA34	Network Management and Administration	4	3	0	2	3	50	50	100
19CS/PC/RM34	Research Methodology	4	3	1	2	1.5	50	50	100
19CS/PC/DA34	Data Analytics	4	3	0	2	3	50	50	100
19CS/PC/AI35	Artificial Intelligence	5	3	0	3	3	50	50	100
19CS/PN/SI32	Summer Internship	2	0	0	0	-	50	0	100
CD / ET	Value Education	2	2	0	0	-	50	-	100
	Common Elective II								
<b>SEMESTER-IV</b>									
19CS/PC/FF44	Formal Languages and Finite Automata	4	4	1	0	3	50	50	100
19CS/PC/CT45	Cloud Computing : Theory and Practice	5	3	0	3	3	50	50	100
19CS/PC/DS48	Dissertation	8	0	0	10	-	50	50	100
	Department Elective III								
<b>Postgraduate Elective Courses Offered to Parent Department</b>									
19CS/PE/XI15	UI, UX and Design Thinking	5	3	0	3	1.5	50	50	100
19CS/PE/CS15	Cyber Security	5	5	1	0	3	50	50	100
19CS/PE/ST15	Software Testing	5	3	0	3	3	50	50	100
19CS/PE/MC15	Mobile Computing	5	5	1	0	3	50	50	100
19CS/PE/AT15	Advanced Technologies	5	5	1	0	3	50	50	100
19CS/PE/VP15	Visual Programming	5	3	0	3	1.5	50	50	100
19CS/PE/AD15	Advanced Database Systems	5	5	1	0	3	50	50	100

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**COURSES OF STUDY**

**(Effective from the academic year 2019-2020)**

**CHOICE BASED CREDIT SYSTEM**

**C-Credit, L-Lecture Hours, T-Tutorial Hours, P- Practical Hours, Ex-Exam Hours,**

**CA- Continous Assessment Marks, ES-End Semester Marks, M-Maximum Marks**

<b>Subject Code</b>	<b>Title of Course</b>	<b>C</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Ex</b>	<b>CA</b>	<b>ES</b>	<b>M</b>
<b>Postgraduate Elective Courses Offered to Other Departments</b>									
19CS/PE/DP23	Documentation and Presentation	3	2	0	1	3	50	50	100
19CS/PE/ET23	Emerging Trends in Information Technology	3	3	0	0	3	50	50	100
19CS/PE/MM23	Multimedia	3	2	0	1	1.5	50	50	100
19CS/PE/EC23	E-Commerce and Content Management Systems	3	2	0	1	1.5	50	50	100
<b>Social Awareness</b>									
19CS/PA/RD12	Rights of Differently Abled	2	2	0	0	-	50	-	100
19CS/PA/CR12	Child Rights	2	2	0	0	-	50	-	100
19CS/PA/CA12	Civic Awareness	2	2	0	0	-	50	-	100
19CSPA/HW12	Health and Wellbeing	2	2	0	0	-	50	-	100
19CS/PA/LC12	Learning from Communities	2	2	0	0	-	50	-	100
19CS/PA/RR12	Rural Realities	2	2	0	0	-	50	-	100
19CS/PA/SE12	Social and Economic Issues	2	2	0	0	-	50	-	100
19CS/PA/UR12	Urban Realities	2	2	0	0	-	50	-	100
19CS/PA/SZ12	Care of Senior Citizens	2	2	0	0	-	50	-	100
<b>Service Learning</b>									
19CS/PL/CB12	Computer Basics	2	2	0	0	-	50	-	100
<b>Independent Elective Courses</b>									
19CS/PI/AC24	Advanced Computer Graphics	4	0	0	0	3	0	100	100
19CS/PI/IP24	Digital Image Processing	4	0	0	0	3	0	100	100

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**PROGRAMMING WITH PYTHON**

**CODE: 19CS/PC/PP14**

**CREDITS : 4**

**L T P : 2 0 4**

**TOTAL TEACHING HOURS: 78**

**OBJECTIVES OF THE COURSE**

- To understand the elements of a program
- To structure simple Python programs for solving problems
- To understand modular programming
- To represent compound data using Python lists, tuples and dictionaries
- To read and write data from/to files

**COURSE LEARNING OBJECTIVES**

On successful completion of the course, students will be able to

- Comprehend the elements of a program
- Understand the notion of data types, and higher order data structures such as lists, tuples, and dictionaries
- Understand how Python can be used for application development
- Identify and repair coding errors in a program
- Write programs to read and write data from/to files

**Unit 1 (15 Hours)**

**1.1 Introduction to Python Programming**

History of Python-Getting Started with Python-Programming Style and Documentation-Programming Errors

**1.2 Elementary Programming**

Writing A Simple Program-Reading Input from Console-Identifiers-Variables-Assignment Statements and Expressions- Simultaneous Assignments-Named Constants-Numeric Data Types and Operators-Evaluating Expressions and Operator Precedence-Augmented Assignment Operators-Type Conversions and Rounding- Case Study-Displaying Current Time-Computing Distances

**Unit 2** **(16 Hours)****2.1 Mathematical Functions, Strings, And Objects**

Common Python Functions-String and Characters-Case Study-Introduction to Object and Methods- Formatting Numbers and Strings-Drawing Various Shapes-Drawing Various Shapes-Drawing with Colors and Fonts

**2.2 Selections and Loops**

Boolean Type, Values, Expressions-If Statements-Case Study-Two Way If Statements-Nested If-Common Errors in Selection Statement-Case Study-Logical Operators-Case Study-Conditional Expressions-Operator Precedence and Associativity -The While Loop-The For Loop-Nested Loops-Minimizing Numerical Errors-Case Study

**Unit 3** **(16 Hours)****3.1 Functions**

Defining A Function- Calling A Function- Function with or Without Return Values-Positional and Keyword Arguments-Passing Argument by Reference- Modularizing The Code- Case Study-The Scope of the Variables-Default Arguments-Returning Multiple Values- Case Study-Function Abstraction-Recursion

**3.2 Object and Classes**

Defining Classes for Objects-Constructing Objects-Accessing The Member of the Objects-Self Parameters- Using Classes- Hiding Data Filed- Immutable Objects Vs Mutable Objects-Class Abstraction and Encapsulation-Case Study

**3.3 Strings and Special Methods**

The Str Class-Creating Strings-Functions of Strings- Functions for Strings-Index Operator []-The Slicing Operator-Concatenations Operators-In and Not in Operators-Comparing, Iterating and Strings-Searching, Converting and Formatting Strings

**Unit 4** **(15 Hours)****4.1 List Processing**

GUI Programming Using Tkinter-List Basics-Case Study-Copying The Lists-Passing Lists to Function-Returning List from Function-Case Study-Searching Lists-Sorting Lists-Case Study-Multidimensional Lists-Processing Two Dimensional List- Processing Two Dimensional List to Function-Case Study-Multidimensional Lists

**Unit 5** **(16 hours)****5.1 Tuples, Sets and Dictionaries**

Tuples- Sets-Comparing The Performances of Sets and Lists-Case Study-Dictionaries-Case Study

**5.2 Files and Exceptional Handling**

Text Input/Output- File Dialogs-Case Study-Retrieving Data from Web-Exception Handling-Raising Exceptions-Custom Exception Classes

## **BOOK FOR STUDY**

Y. Daniel Liang, *Introduction to Programming Using Python*, Prentice Hall, 2013.

## **BOOKS FOR REFERENCE**

Allen B. Downey. *Think Python. How to Think Like a Computer Scientist*, 2<sup>nd</sup> edition, O'Reilly Publishers, 2016.

David Beazley, Brian K. Jones. *Python Cookbook: Recipes for Mastering Python 3*, 3<sup>rd</sup> Edition, 2013

Harsh Bhasin. *Python for Beginners*. New Age International Publishers, 2018.

Martin C. Brown. *Python: The Complete Reference*. McGraw Hill Education; Fourth edition, 2018.

## **WEB RESOURCES**

[http://en.wikibooks.org/wiki/Python\\_Programming](http://en.wikibooks.org/wiki/Python_Programming)

<http://docs.python.org>

<http://diveintopython.org/>

<https://realpython.com/start-here/>

<https://www.geeksforgeeks.org/python-programming-examples/>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks: 50                  Duration: 90 minutes**

**Theory – 25 marks**

**Practical – 25 marks**

### **Section A**

$3 \times 5 = 15$  marks (3 out of 4)

### **Section B**

$1 \times 10 = 10$  marks (1 out of 2)

**Other Components              Total Marks:50**

Seminars/Group discussion/Assignments/Case studies/Mini Project

**End Semester Examination      Total Marks: 100                  Duration: 3 hours**

**Theory – 50 marks    Duration – 1 ½ hrs**

**Practical – 50 marks Duration – 1 ½ hrs**

### **Theory Pattern**

#### **Section A**

$5 \times 2 = 10$  marks (Answer all the questions)

#### **Section B**

$4 \times 5 = 20$  marks (4 out of 6)

#### **Section C**

$2 \times 10 = 20$  marks (2 out of 3) (Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**  
**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**DISCRETE MATHEMATICS FOR COMPUTER SCIENCE**

**CODE: 19CS/PC/DM14**

**CREDITS: 4**

**L T P: 4 1 0**

**TOTAL TEACHING HOURS: 65**

**OBJECTIVES OF THE COURSE**

- To gain knowledge about computing and mathematics appropriate to the discipline
- To learn sets and its operations and represent using Venn diagram
- To represent the problem using propositional logic and convert it as gates and truth table
- To visualize the given problem as graphs and tree representation
- To apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, formal logic and predicates.
- Represent problems using logics and truth table
- Solve problems by using set concepts and visualize using Venn diagram
- Understand propositional logic, relations, functions and also differentiate one-to-one and “onto” functions.
- Incorporate graphs and trees for the given problem

**Unit 1** **(12 Hours)**

**1.1 Sets and Induction**

Lattices and Boolean Algebras – Principles of Inclusion – Exclusion – Mathematical Induction

**1.2 Program Correctness**

Pseudocode Conventions - An Algorithm to Generate Perfect Squares - Two Algorithms for Computing Square Roots - Strong Form of Mathematical Induction - Application: Algorithm to Compute Powers - Application: Finding Factorizations - Application: Binary Search

## **Unit 2** **(10 Hours)**

### **2.1 Formal Logic**

Truth and Logical Truth - Tautologies - Substitutions into Tautologies - Logically Valid Inferences - Combinatorial Networks - Substituting Equivalent Subformulas - Simplifying Negations

### **2.2 Normal Forms**

Disjunctive Normal Form - Application: DNF and Combinatorial Networks - Conjunctive Normal Form - Application: CNF and Combinatorial Networks - Testing Satisfiability and Validity - The Famous  $P \neq NP$  Conjecture - Resolution Proofs: Automating Logic

## **Unit 3** **(14 Hours)**

### **3.1 Predicates and Quantification**

Predicates - Quantification - Restricted Quantification - Nested Quantifiers - Negation and Quantification - Quantification with Conjunction and Disjunction - Application: Loop Invariant Assertions

### **3.2 Relations**

Binary Relations - n-ary Relations - Special Types of Relations - Reflexive and Irreflexive Relations - Symmetric and Antisymmetric Relations - Transitive Relations - Reflexive, Symmetric, and Transitive Closures - Application: Finding a Minimal Element

## **Unit 4** **(15 Hours)**

### **4.1 The Pigeon-Hole Principle**

$k$  to 1 Functions - Pigeon-Hole Principle - Application: Decimal Expansion of Rational Numbers - Problems with Divisors and Schedules - Two Combinatorial Results

### **4.2 Analysis of Algorithms**

## **Unit 5** **(14 Hours)**

### **5.1 Graph Theory**

Introduction to Graph Theory – Definitions - Subgraphs - Paths and Cycles - Hamiltonian Cycles - Graph Isomorphism - Representation of Graphs - Adjacency Matrix - Adjacency Lists - Connected Graphs - The Relation CONN - Finding Connected Components

### **5.2 Trees**

Definition of Trees - Characterization of Trees - Application: Decision Trees - Directed Graphs - Basic Definitions - Directed Trails, Paths, Circuits, and Cycles - Directed Graph Isomorphism

## **BOOKS FOR STUDY**

Haggard, Gary, John Schlipf, and Sue Whitesides. *Discrete mathematics for computer science*, Brooks/Cole-Thomson Learning.

## **BOOKS FOR REFERENCE**

Epp, Susanna S. *Discrete mathematics with applications*, Cengage learning

Hunter, David J. *Essentials of discrete mathematics*, Jones & Bartlett Publishers

Liben-Nowell, David. *Discrete Mathematics for Computer Science*, Wiley Global Education, 2017

## **WEB RESOURCES**

[https://www.tutorialspoint.com/discrete\\_mathematics/discrete\\_mathematics\\_predicate\\_logic.htm](https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_predicate_logic.htm)

<https://formal.iti.kit.edu/~beckert/teaching/Verification-SS06/02logic.pdf>

<https://people.cs.pitt.edu/~milos/courses/cs441/lectures/Class9.pdf>

<http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment Test      Total Marks: 50      Duration: 90 minutes**

Section A -  $5 \times 2 = 10$  marks (Answer all the questions)

Section B -  $4 \times 5 = 20$  marks (4 out of 5)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

**Other Components      Total Marks: 50**

Quiz/Seminar/Case Study/Assignment

**End Semester Examination      Total Marks: 100      Duration: 3 hours**

Section A -  $10 \times 2 = 20$  marks (Answer all the questions)  
(2 questions to be set from each unit)

Section B -  $6 \times 5 = 30$  marks (6 out of 8)  
(Atleast 1 question from each unit)

Section C -  $5 \times 10 = 50$  marks (5 out of 7)  
(Atleast 1 question from each unit)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**SOFTWARE ENGINEERING**

**CODE: 19CS/PC/SE14**

**CREDITS: 4**

**L T P: 4 1 0**

**TOTAL TEACHING HOURS: 65**

**OBJECTIVES OF THE COURSE**

- To understand software engineering principles
- To introduce software development life cycle models
- To introduce software estimation techniques
- To understand the need for software quality and ways to ensure it
- To understand project management techniques such as Configuration management, Scheduling, Training plan and Risk management

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Know software engineering principles
- Apply software life cycle models for software development
- Apply estimation techniques
- Model a software application
- Implement project management techniques

**Unit 1 (14 Hours)**

**1.1 Software and Software Engineering**

Nature of Software - Defining Software Engineering - Software Process - Process, Activities, Work Product - Process Framework - Categories of Activities (Framework, Umbrella)

**1.2 Process Models**

SDLC - Waterfall Model - Prototyping - Agile Philosophy - Agility, Agility and Cost Change, Agile Process - Agility Principles - Scrum - Test driven development - continuous integration - Impact of Process on End Product - Process Assessment and Improvement

**1.3 Software Engineering Principles**

Planning - Separation of Concerns - Modularity - Modeling - Abstraction - Anticipation of change - Reusability - Incrementality - Measurement – Tools

**Unit 2 (13 Hours)**

**2.1 Requirements Gathering**

Requirements Engineering Tasks - Software Requirements Specification - Types of Requirements (Normal, Expected) - Traceability Matrix

**2.2 Modeling**

Significance of requirement analysis - Arlow and Neustadt rules of thumb -

application domain analysis - Writing Use Cases - Use Case Diagram - Activity Diagram - Swimlane Diagram - Identifying classes – Attributes – Operations – associations and dependencies - Class diagram - - packaging classes - State Diagram - Sequence Diagram - Agile Requirements Elicitation (User Stories) - Agile Requirements Engineering

**Unit 3 (12 Hours)**

### **3.1 Software Designing**

Design Concepts (Abstraction, Architecture, Patterns, Separation of Concerns, Modularity, Information Hiding, Functional Dependence, Refinement, Aspects, Refactoring)

### **3.2 Basic Design Principles**

Open Closed - Liskov Substitution - Dependency Inversion - Interface Segregation - Release Reuse Equivalency- Common Closure - Common Reuse

### **3.3 Software Quality and Assurance**

McCall's quality factors - ISO 9126 Quality factors -Cost of Quality - Defect - Defect Amplification and removal -

Reviews – Informal, Formal Technical Reviews - Inspection - Walkthroughs - Audits – Testing

**Unit 4 (14 Hours)**

### **4.1 Software Testing**

Levels of Testing - Unit Testing, Integration Testing, Validation Testing, System Testing - Test Cases - Test Case Template -Types of Testing - White Box, Basis Path Testing , Control Structure Testing

### **4.2 Software Configuration Management**

Need - Baselines - Software Configuration Items - SCM Repository - SCM Process

### **4.3 Metrics**

Terms (Metrics, Measurement, Indicators) - Function Points - Deriving Function points - Metrics - CK Metrics - Defects per KLOC - FP per Person-Month - McCabe Cyclomatic Complexity - code coverage

**Unit 5 (12 Hours)**

### **5.1 Software Project Estimation**

Software sizing- LOC Based Estimation - FP based estimation - COCOMO Model II - Estimation for WebApp Projects

### **5.2 Project Management and Scheduling**

Training plan - Defect prevention meeting

Root causes for delays - Principles (Compartmentalization, Interdependence, Effort Validation, Time Allocation, Responsibilities, Outcomes, Milestones) - Relationship between People and Effort - Effort Distribution (40-20-40 rule) - Scheduling Tools and Techniques (Time- Line charts, Tracking the schedule)

### **5.3 Risk Management**

Term - Proactive Vs Reactive Risk Strategies - Risk Identification - Risk Projection (Risk Table, Assessing Risk Impact) - Risk Mitigation, Monitoring, Management - RMMM Plan

## **BOOKS FOR STUDY**

Ghezzi, Carlo, Mehdi Jazayeri, and Dino Mandrioli. *Fundamentals of software engineering*. Prentice Hall PTR, 2002.

Pressman, Roger S., and Bruce R. Maxim. *Software Engineering: A Practitioner's Approach.*, 2015.

## **BOOKS FOR REFERENCE**

Berenbach, Brian, et al. *Software & systems requirements engineering: in practice*. McGraw-Hill, Inc., 2009.

Brooks Jr, Frederick P. *The Mythical Man-Month: Essays on Software Engineering, Anniversary Edition*, 2/E. Pearson Education India, 1995

Cha, Sungdeok, Taylor, Richard N., Kang, Kyo C. *Handbook of Software Engineering*. Springer 2019

Galarath, Daniel D., and Michael W. Evans. *Software sizing, estimation, and risk management: when performance is measured performance improves*. Auerbach Publications, 2006.

Martin, Robert C. *Agile software development: principles, patterns, and practices*. Prentice Hall, 2002.

Schach, Stephen R. *Object-oriented software engineering*. McGraw-Hill, 2008.

Sommerville, Ian. "Software engineering 9th Edition." ISBN-10 137035152 (2011).

## WEB RESOURCES

<https://www.d.umn.edu/~gshute/softeng/principles.html>

## PATTERN OF ASSESSMENT

<b>Continuous Assessment</b>	<b>Total Marks: 50</b>	<b>Duration: 90 minutes</b>
Section A - $5 \times 2$	= 10 marks (Answer all the questions)	
Section B - $4 \times 5$	= 20 marks (4 out of 5)	
Section C - $2 \times 10$	= 20 marks (2 out of 3)	

**Other Components              Total Marks:50**

Seminars/Group discussion/Assignments/Case study

**End Semester Examination**      **Total Marks: 100**      **Duration: 3 hours**

Section A -  $10 \times 2 = 20$  marks (Answer all the questions)  
(2 questions to be set from each unit)

Section B -  $6 \times 5 = 30$  marks (6 out of 8)  
(Atleast 1 question from each unit)

Section C -  $5 \times 10 = 50$  marks (5 out of 7)  
(Atleast 1 question from each unit)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**OPERATING SYSTEMS : CONCEPTS AND APPLICATIONS**

**CODE:19CS/PC/OC14**

**CREDITS : 4**

**L T P: 2 0 4**

**TOTAL TEACHING HOURS: 78**

**OBJECTIVES OF THE COURSE**

- To learn the fundamentals of Operating Systems
- To learn the mechanisms of OS to handle processes, scheduling algorithms
- To acquire the knowledge on the mechanisms involved in memory management
- To understand Mutual exclusion principles and deadlock detection algorithms
- To learn programmatically to implement simple OS mechanisms
- To learn on security and virtualization

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Describe the basic components of an operating system and its services
- Define the concepts of processes and competitive system resource allocation
- Outline standard scheduling algorithms for multi-tasking
- Describe process synchronization and understand process utilities
- Describe memory management and File management concepts

**Unit 1 (16 Hours)**

**1.1 Introduction to Operating System**

Introduction to OS - Structure, Operations, Protection and Security, Kernel Data Structures, Computing Environments, Services, System Calls and its types, System Programs, OS Design and Implementation OS Debugging Operating, System Generation, System Boot

**1.2 UNIX Operating System**

History of UNIX, Shell, UNIX File System Structure

**1.3 Basic UNIX Commands**

Commands for files and directories cd, cp, mv, rm, mkdir, more, less, creating and viewing files, using cat, date, who, pwd - filter commands –head tail, cut, paste, grep – regular expression - sort

**Unit 2 (15 Hours)**

**2.1 Process Management**

Process - Concept, Process Control Block, Process operations, Scheduling Algorithms - Short term and long term process scheduling policies - Scheduling Criteria - Multiple Processor Scheduling

## **2.2 CPU Scheduling**

Scheduling Criteria – Scheduling Algorithms : FCFS, SJF, Priority and Round Robin Scheduling

## **2.3 Process Synchronization and Deadlocks**

The Critical-section Problem – Petersons solution – Mutex locks - Semaphores – Monitors, Deadlock Prevention and Avoidance, Deadlock Detection and Deadlock Recovery

## **2.4 Process Utilities** - sh process, Parents and children, Process status, System process, Mechanism of process creation, Internal and external commands, running jobs in background, KILL, NICE, Job control, at and batch, cron - Case Study on Processes in LINUX

**Unit 3** **(16 Hours)**

### **3.1 File Organisation**

File organisation and Access methods - Logical and Physical File structure - File Allocation methods, -Linked and Index Allocation - File Protection and Security - Directory structure - Single level, Two level, Tree structure - Free Space Management - Allocation Methods - Efficiency and Performance – Recovery – FAT32 and NTFS

### **3.2 File System**

File Access Permission – chmod, chown, chgrp - File Comparisons - View Files – Listing files with attributes – Wildcards - Translating Characters - Links and its types - The File System – Partitions, File Systems, Kernel Accesses – Mounting – umask, ulimit - I/O redirection – Pipes - Case Study on LINUX File System

**Unit 4** **(16 Hours)**

### **4.1 Memory Management**

Memory Management Techniques, Single Partition Allocation, Multiple Partition Allocation – Swapping - Paging and Segmentation - Segmented-Paged Memory Management Techniques - Logical and Physical Address space – Address Mapping - Demand paging - Virtual memory, protection and address mapping hardware, Page fault, Page replacement and Page removal algorithms

### **4.2 Device Management**

Classification of device according to speed, Disk structure - Disk scheduling – FCFS scheduling, SSTF scheduling - Access method and storage capacity

### **4.3 Disk Utilities**

Disk usage, disk free, dd, Backups- cpio, tar, System calls for file management, directory management - Case Study on Memory Management in LINUX

**Unit 5** **(15 Hours)**

### **5.1 Security**

The Security Environment – Operating System Security – Controlling Access to resources – Formal models of Secure systems - Basics of cryptography – Authentication – Exploiting Software – Insider Attacks – Malware - Defenses

### **5.2 Virtualization and the Cloud**

History – Requirements for virtualization – Type 1 and Type 2 Hypervisors – Techniques for efficient virtualization – Memory virtualization – I/O Virtualization –Virtual Appliances – Virtual machines on multicore CPUs – Clouds: Clouds as service – Virtual machine migration – checkpointing - Case Study on Security in LINUX

## **BOOKS FOR STUDY**

Silberschatz, Abraham, Peter Baer Galvin and Greg Gagne. *Operating System Concepts*. 10<sup>th</sup> ed. Addison Wesley. (Units 1 to 4 - Chapters 1-4, 6-13)

Sumitabha Das. *UNIX – Concepts & Applications*. 3<sup>rd</sup> ed. New Delhi: TataMcGraw Hill, 2000. (Chapters 4-13,15,16)

Tanenbaum S., Andrew, Herbert Bos. *Modern Operating Systems*. 4<sup>th</sup> ed. Pearson (Unit 5 - Chapter 7, 9, Case Studies – Chapter 10)

Yukun Liu,Yong Yue,Liwei Guo *UNIX Operating System The Development Tutorial via UNIX Kernel Services*. Beijing: Higher Education Press (Chapters 1,2, 6-10)

## **BOOKS FOR REFERENCE**

Kanetkar Yashwant. *UNIX Shell Programming*. BPB.

Rosen Kenneth, Douglas Host, Rachel Klee and Richard Rosinski.*UNIX: The Complete Reference*. 2<sup>nd</sup> ed. McGraw Hill/Osborne, 2007.

Sobell M. G. *A Practical Guide to Linux Commands, Editors, and Shell Programming*. USA: Pearson Education

## **WEB RESOURCES**

[www.tutorialspoint.com/unix](http://www.tutorialspoint.com/unix)

[www.unixtutorial.org/](http://www.unixtutorial.org/)

[www.guru99.com/unix-linux-tutorial.html](http://www.guru99.com/unix-linux-tutorial.html)

## **PATTERN OF ASSESSMENT**

**Continuous Assessment: Total Marks: 50**

**Duration: 90 minutes**

**Theory – 25 marks**

**Practical – 25 marks**

Section A -  $3 \times 5 = 15$  marks (3 out of 4)

Section B -  $1 \times 10 = 10$  marks (1 out of 2)

**Other Components: Total Marks: 50**

Implementation of OS Concepts

Case Study / Seminar / Assignment

**End Semester Examination: Total Marks: 100 marks Duration: 3 hours**

**Theory – 50 marks Duration – 1 ½ hours**

**Practical – 50 marks Duration – 1 ½ hours**

Section A-  $5 \times 2 = 10$  marks (Answer all the questions)

(1 question to be set from each unit)

Section B -  $4 \times 5 = 20$  marks (4 out of 6)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

(Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

## **Only for Practicals**

Unit 1 1.3

Unit 2 2.4

Unit 3 3.2

Unit 4 4.3

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**DATABASE MANAGEMENT SYSTEMS**

**CODE: 19CS/PC/DB25**

**CREDITS: 5**

**L T P: 3 0 3**

**TOTAL TEACHING HOURS: 78**

**OBJECTIVES OF THE COURSE**

- To learn the fundamentals of data models, database storage and Querying
- To convert from ER diagram into normalized table
- To study SQL and relational database design
- To learn SQL functions and PL/SQL Blocks
- To study cursors and triggers
- To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure
- To study NOSQL and its applications

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Define the features and Queries of database systems
- Normalize database effectively from ER Diagrams
- Understand and discuss the importance of relational data modeling and conceptual modeling
- Apply knowledge to new situations
- Describe the transaction processing, concurrency control and recovery control
- Understand the use of NOSQL and its approach to the database

**Unit 1** **(16 Hours)**

**1.1 Database Basics**

Introduction - Database-System Applications- Purpose of Database Systems- View of Data - Database Languages - Relational Databases - Database Design - Data Storage and Querying - Transaction Management - Database Architecture - Data Mining and Information Retrieval - Specialty Databases - Database Users and Administrators - Database Users and Administrators - History of Database Systems

**1.2 Introduction to the Relational Model**

Structure of Relational Databases - Database Schema – Keys - Schema Diagrams - Relational Query Languages - Relational Operations

<b>Unit</b>	<b>2</b>	<b>(16 Hours)</b>
	<b>2.1 Introduction to SQL</b>	Overview of the SQL Query Language- SQL Data Definition- Basic Structure of SQL Queries - Additional Basic Operations - Set Operations - Null Values - Aggregate Functions- Nested Subqueries - Modification of the Database
	<b>2.2 Intermediate SQL</b>	Join Expressions- Views- Transactions- Integrity Constraints - SQL Data Types and Schemas- Authorization
	<b>2.3 Advanced SQL</b>	Accessing SQL from a Programming Language - Functions and Procedures – Triggers - Recursive Queries- Advanced Aggregation Features – OLAP
	<b>2.4 Formal Relational Query Languages</b>	The Relational Algebra - Fundamental Operations - Formal Definition of the Relational Algebra - Additional Relational-Algebra Operations - Extended Relational-Algebra Operations
<b>Unit</b>	<b>3</b>	<b>(16 Hours)</b>
	<b>3.1 Database Design and the E-R Model</b>	Overview of the Design Process - The Entity-Relationship Model – Constraints - Removing Redundant Attributes in Entity Sets - Entity-Relationship Diagrams - Reduction to Relational Schemas - Entity-Relationship Design Issues - Extended E-R Features - Alternative Notations for Modeling Data - Other Aspects of Database Design
	<b>3.2 Relational Database Design</b>	Features of Good Relational Designs - Atomic Domains and First Normal Form - Decomposition Using Functional Dependencies - Functional-Dependency Theory - Algorithms for Decomposition - Decomposition Using Multivalued Dependencies - More Normal Forms - Database-Design Process - Modeling Temporal Data
<b>Unit</b>	<b>4</b>	<b>(15 Hours)</b>
	<b>4.1 PL/SQL Blocks</b>	PL/SQL- Predefined Exceptions- User Defined Exceptions
	<b>4.2 Cursors and triggers</b>	Cursors and Cursor Management- Implicit and Explicit Cursors- Advanced Cursors- Procedures and Functions- Database triggers- Parts of a Trigger- Types of Triggers
<b>Unit</b>	<b>5</b>	<b>(15 Hours)</b>
	<b>5.1 Transactions and Concurrency Control</b>	Transaction Concept - A Simple Transaction Model - Storage Structure – Transaction Atomicity and Durability - Transaction Isolation – Serializability - Transaction Isolation and Atomicity - Transaction Isolation Levels - Implementation of Isolation Levels - Transactions as SQL Statements – Lock-Based Protocols- Deadlock Handling -Multiple Granularity-Timestamp-Based Protocols - Validation-Based Protocols
	<b>5.2 NoSQL</b>	Definition and Introduction – Sorted Ordered Column – Oriented Stores –Key/Value Stores- Document Databases – Graph Databases – Working with Examples - Working with Language Bindings – Interfacing and Interacting with NOSQL: Storing and accessing Data – Querying Database - Language Bindings for NOSQL Data Stores

## **BOOKS FOR STUDY**

Gupta,Das, Pranab Kumar, Krishna and P. Radha. *Database Management System Oracle SQL and PL/SQL*. 2nd ed. PHI, 2013.(Unit 4.1)

Silberschatz, A., Henry F.Korth and Sudarshan S. *Database System Concepts*. 6th ed. McGraw Hill, 2011.

Tiwari, Shashank. *Professional NoSQL*. John Wiley & Sons, 2011. (Unit 5.2)

## **BOOKS FOR REFERENCE**

Date, C. J., *Introduction to Database Systems*. 8<sup>th</sup> ed. New Delhi: Pearson Education, 2009.

Elmasri, Navathe, *Fundamentals of Database Systems*, 7<sup>th</sup> edition, Pearson Education Ltd, 2017.

Michael McLaughlin. Oracle Database 11g PL/SQL Programming.Oracle Press. McGraw Hill, 2008.

Ramakrishna,Raghu and Johannes Gerhke. *Database Management Systems*. New Delhi: Tata McGraw Hill, 2003.

## **WEB RESOURCES**

[www.w3schools.com](http://www.w3schools.com)

<http://beginner-sql-tutorial.com/sql-group-functions.htm>

<http://www.tutorialspoint.com/mysql/index.htm>

<http://www.studytonight.com/dbms/database-normalization.php>

<http://www.oracle.com/technetwork/tutorials/index.html>

<https://www.thoughtworks.com/>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks: 50                          Duration: 90 minutes**

**Theory – 25 marks**

**Practical – 25 marks**

Section A - 3 x 5 = 15 marks (3 out of 4)

Section B - 1 x 10 = 10 marks (1 out of 2)

**Other Components              Total Marks:50**

Seminar/Quiz/Group discussion//Assignment/Case Study - Normalizing tables and Extracting relevant data/Query analysis and optimization

<b>End Semester Examination</b>	<b>Total Marks:100</b>	<b>Duration: 3 hours</b>
<b>Theory – 50 marks</b>	<b>Duration – 1 ½ hours</b>	
<b>Practical – 50 marks</b>	<b>Duration – 1 ½ hours</b>	

### **Theory Pattern**

Section A-  $5 \times 2 = 10$  marks (Answer all the questions)  
(1 question to be set from each unit)

Section B -  $4 \times 5 = 20$  marks (4 out of 6)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

(Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**DESIGN AND ANALYSIS OF ALGORITHMS**

**CODE: 19CS/PC/AA24**

**CREDITS: 4**

**L T P: 4 1 0**

**TOTAL TEACHING HOURS: 65**

**OBJECTIVES OF THE COURSE**

- To learn the basic notations and review mathematically
- To know the basic data structures and analyze the time complexity for each operation
- To understand and design various solutions for the given problem
- To critically analyze the time complexity of the designed solutions for the same problem
- To apply design techniques for the algorithm that best fits

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Apply mathematical concepts to analyse the algorithms
- Use basic data structures, its operations and the time complexity of each operation
- Understand various techniques available to solve a problem
- Find the time complexity of the problem by applying the techniques learnt and observe the optimal solution
- Distinguish the polynomial and non-polynomial algorithms and their challenges

**Unit 1** **(12 Hours)**

**1.1 Analysing Algorithms**

Methodologies for analysis algorithms – Asymptotic Notations – Mathematical Review – Amortization – Experimental Setup – Data Visualization

**1.2 Basic Data Structures**

Stack – Queue – List – Trees – Graphs

**Unit 2** **(12 Hours)**

**2.1 Brute force and Exhaustive Search**

Bubble sort – String matching – Closest- pair problem – Exhaustive Search : Knapsack problem – Assignment problem

**2.2 Divide and Conquer**

Binary Search – Merge sort – Quick sort – Depth-First Search – Breadth-First Search- Strassen's matrix multiplication

<b>Unit</b>	<b>3</b>	<b>(14 Hours)</b>
	<b>3.1 Dynamic Programming</b>	
	Travelling Salesman Problem - Knapsack problem revised and memory function – Optimal Binary Search tree – Warshall's Algorithms – Floyd's Algorithm for All-pair Shortest path	
<b>Unit</b>	<b>4</b>	<b>(13 Hours)</b>
	<b>4.1 Greedy Method</b>	
	Prim's Algorithm - Kruskal's Algorithm – Dijkstra's Algorithm – Huffman Trees and Codes	
<b>Unit</b>	<b>5</b>	<b>(14 Hours)</b>
	<b>5.1 Backtracking and Branch and Bound Technique</b>	
	n-queen's problem – Assignment problem – Knapsack problem – bin packing algorithm	
	<b>5.2 Limitations of Algorithmic power</b>	
	P and NP problems – NP-Complete problem – Challenges of Numerical Algorithms	

## **BOOKS FOR STUDY**

Anany Levitin *Introduction to the Design and Analysis of Algorithms*" 3<sup>rd</sup> Edition, Pearson Publications, 2012. [Unit 2: Chapters 3.1 to 3.4, Chapters 4.4, 5.1, 5.2, 5.4, Unit 3: Chapter 8, Unit 4: Chapter 9, Unit 5: Chapter 12.1, 12.2, 11.3,11.4]

Goodrich, T. Micheal, Roberto Tamassia *Algorithm Design Foundations, Analysis and Internet Examples*, John Wiley & Sons Inc., 2014. [Unit 1: Chapters 1 & 2]

## **BOOKS FOR REFERENCE**

Aho, Hopcraft, Ullman, *The Design and Analysis of Computer Algorithms*, Pearson Education, 2008.

E. Horowitz & S Sahni, *Fundamentals of Computer Algorithms*, Computer Science Press

Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, *Introduction to Algorithms*, Prentice Hall of India.

## **WEB RESOURCES**

<https://www.geeksforgeeks.org/fundamentals-of-algorithms/#AnalysisofAlgorithms>

<https://www.javatpoint.com/daa-tutorial>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment Test      Total Marks: 50      Duration: 90 minutes**

Section A -  $5 \times 2 = 10$  marks (Answer all the questions)

Section B -  $4 \times 5 = 20$  marks (4 out of 5)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

**Other Components                          Total Marks:50**

Quiz/Seminar/Case Study/ Assignment

**End Semester Examination      Total Marks: 100      Duration: 3 hours**

Section A -  $10 \times 2 = 20$  marks (Answer all the questions)

(2 questions to be set from each unit)

Section B -  $6 \times 5 = 30$  marks (6 out of 8)

(Atleast 1 question from each unit)

Section C -  $5 \times 10 = 50$  marks (5 out of 7)

(Atleast 1 question from each unit)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**OBJECT ORIENTED PROGRAMMING**

**CODE: 19CS/PC/OO24**

**CREDITS: 4**

**L T P: 3 0 2**

**TOTAL TEACHING HOURS: 65**

**OBJECTIVES OF THE COURSE**

- To understand the significance of Object-Oriented Programming
- To introduce the basic concepts of Object-Oriented Programming
- To understand and demonstrate the concepts of object-oriented design, polymorphism, and inheritance
- To implement Object-Oriented Programming concepts
- To design interfaces and abstract classes

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Justify the use of Object-Oriented Programming
- Use the right access specifiers to protect the data
- Apply the different Object-Oriented features
- Develop applications using Object-Oriented concepts
- Create applications that are reusable

**Unit 1** **(11 Hours)**

**1.1 Introduction to Object-Oriented Concepts**

Procedural Versus OO Programming- Moving from Procedural to Object-Oriented Development- What Exactly Is an Object? - What Exactly Is a Class? - Using UML to Model a Class Diagram- Encapsulation and Data Hiding- Interfaces- A Real-World Example of the Interface/Implementation Paradigm- Inheritance -Superclasses and Subclasses -Abstraction -Is-a Relationships -Polymorphism - Composition - Abstraction - Has-a Relationships

**Unit 2** **(13 Hours)**

**2.1 How to Think in Terms of Objects**

Using Abstract Thinking When Designing Interfaces - Giving the User the Minimal Interface Possible - Determining the Users - Object Behavior - Environmental Constraints -Identifying the Public Interfaces - Identifying the Implementation

**2.2 Advanced Object-Oriented Concepts**

Constructors- Error Handling- The Concept of Scope- Operator Overloading- Multiple Inheritance - Object Operations

**Unit 3** **(13 Hours)**

**3.1 The Anatomy of a Class**

The Name of the Class - Comments - Attributes - Constructors - Accessors - Public Interface Methods - Private Implementation Methods

### **3.2 Class Design Guidelines**

Modeling Real World Systems - Identifying the Public Interfaces - The Minimum Public Interface -Hiding the Implementation -Designing Robust Constructors (and Perhaps Destructors) - Designing Error Handling into a Class - Documenting a Class and Using Comments

**Unit 4 (15 Hours)**

#### **4.1 Designing with Objects**

Design Guidelines - Performing the Proper Analysis - Developing a Statement of Work -Gathering the Requirements - Developing a Prototype of the User Interface - Identifying the Classes - Determining the Responsibilities of Each Class - Determining How the Classes Collaborate with Each Other - Creating a Class Model to Describe the System

#### **4.2 Mastering Inheritance and Composition**

Reusing Objects - Inheritance - Generalization and Specialization - Design Decisions -Composition - Types of Composition - Aggregations – Associations- Using Associations and Aggregations Together-Representing Composition with UML - Why Encapsulation Is Fundamental to OO - How Inheritance Weakens Encapsulation - A Detailed Example of Polymorphism - Object Responsibility

**Unit 5 (13 Hours)**

#### **5.1 Frameworks and Reuse: Designing with Interfaces and Abstract Classes**

Code: To Reuse or Not to Reuse? - What Is a Framework? -What Is a Contract? Abstract Classes - Interfaces -Tying It All Together - The Compiler Proof - Making a Contract -System Plug-in-Points - An E-Business Example - An E-Business Problem - The Non-Reuse Approach - An E-Business Solution - The UML Object Model

## **BOOKS FOR STUDY**

Matt Weisfeld, *The Object-Oriented Thought Process*. 3<sup>rd</sup> Ed.,2009

## **BOOKS FOR REFERENCE**

Schildt, Herbert. *Java: The Complete Reference*. McGraw-Hill Education Group, 2014

Liang, Y. Daniel. *Intro to Java Programming, Brief Version*. Pearson Higher Ed, 2015.

Eckel, Bruce. *Thinking in Java*. 4<sup>th</sup> ed. Pearson Education, 2006.

## **WEB RESOURCES**

<http://people.cs.aau.dk/~torp/Teaching/E03/OOP/handouts/introduction.pdf>

<https://www.cl.cam.ac.uk/teaching/0910/OOProg/OOP.pdf>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks: 50                  Duration: 90 minutes**

**Theory – 25 marks**

**Practical – 25 marks**

Section A -  $3 \times 5 = 15$  marks (3 out of 4)

Section B -  $1 \times 10 = 10$  marks (1 out of 2)

**Other Components      Total Marks: 50**

Seminars/Group discussion/Assignments/Case studies/ Mini Project

**End Semester Examination      Total Marks: 100                  Duration: 3 hours**

**Theory – 50 marks      Duration – 1 ½ hours**

**Practical – 50 marks      Duration – 1 ½ hours**

### **Theory Pattern**

Section A -  $5 \times 2 = 10$  marks (Answer all the questions)

(1 question to be set from each unit)

Section B -  $4 \times 5 = 20$  marks (4 out of 6)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

(Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 -2020)

**SOFT SKILLS**

**CODE: 19CS/PK/SS22**

**CREDITS: 2**

**L T P: 2 0 0**

**TOTAL TEACHING HOURS: 26**

**OBJECTIVES OF THE COURSE**

- To empower students and create opportunities for self-development.
- To instill confidence in students to face challenges.
- To manage emotions and resolve conflicts.
- To organize activities and manage time.
- To set goals and plan ahead.

**COURSE LEARNING OUTCOMES**

- Communicate with confidence and poise.
- Accept themselves and improve on their weaknesses.
- Strengthen their relationships through confronting and solving problems.
- Work more effectively and complete activities on time.
- Plan their future with clarity and focus.

**Unit 1**

**Behavioural Traits**

**(6 Hours)**

- 1.1 Self Awareness
- 1.2 Communication Skills –Verbal and Non Verbal
- 1.3 Leadership Qualities
- 1.4 Etiquette and Good Manners
- 1.5 Experiential Learning –Based on activities

**Unit 2**

**Team Work**

**(5 Hours)**

- 2.1 Interpersonal Skills
- 2.2 People Management
- 2.3 Creative Thinking
- 2.4 Critical Thinking
- 2.5 Experiential Learning – Based on activities

**Unit 3**

**Time Management**

**(5 Hours)**

- 3.1 Importance of time management

- 3.2. Planning and Prioritizing
- 3.3. Organizing skills
- 3.4. Action Plan
- 3.5. Experiential Learning – Based on activities

**Unit 4**

- Conflict Resolution** **(5 Hours)**
- 4.1. Reasons for conflict
  - 4.2. Consequences of conflict
  - 4.3. Managing emotions
  - 4.4. Methods of resolving conflicts
  - 4.5. Experiential Learning – Based on activities

**Unit 5**

- Career Mapping** **(5 Hours)**
- 5.1. Goal Setting and Decision Making
  - 5.2. Career Planning
  - 5.3. Resume Writing
  - 5.4. Handling Interviews
  - 5.5. Experiential Learning – Based on activities

**Workshop on Societal Analysis**

**BOOKS FOR REFERENCE**

Khera. Shiv. *You Can Win.* New Delhi: Macmillan India, 2002.

Mishra. Rajiv. K. *Personality Development: Transform Yourself.* New Delhi: Rupa 2004.

Newstorm, John. W. and Scannell. Edward. E. *Games Trainers Play: Experiential Learning.* New Delhi: Tata McGraw Hill, 1980.

**PATTERN OF EVALUATION**

**Internal Assessment:**

Quiz / Group Presentation /Assignment

**No End Semester Examination**

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 86**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**NETWORK MANAGEMENT AND ADMINISTRATION**

**CODE: 19CS/PC/NA34**

**CREDITS: 4**

**L T P: 3 0 2**

**TOTAL TEACHING HOURS: 65**

**OBJECTIVES OF THE COURSE**

- To understand the purpose of basic system administration
- To know how to install and administer a Linux machine
- To understand managing users and groups
- To understand how to provide remote access using FTP, SSH and Telnet
- To know how to set up a TCP/IP based local area network
- To understand how to setup a firewall

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Demonstrate the purpose of basic system administration
- Install and administer a Linux machine
- Manage users and groups
- Administer remote access using FTP, SSH and Telnet
- Setup a simple TCP/IP based local area network
- Setup a firewall

**Unit 1**

**(15 Hours)**

**1.1 Basics of Networking**

Computer Network – Workstation – Benefits of Networking –Sharing Information, Resources, Centralized Management – Classification of Networks by Geography – LAN, MAN, WAN – Classification of Networks by Component Roles – Peer-to-Peer networks, Server-Based networks – Client-Based networks – Addressing mechanisms – IP address, Ethernet address – Networking devices – Switch, Hub, Router, Gateway  
**Note: Student is expected to learn 1.1 during her semester holidays**

**1.2 Linux Installation**

Installation Software Media - Methods of Installation - Keyboard type - Setting root password - Selecting Time Zone - Disk Partitioning - Choosing a file system - Host name and Network Configuration

**1.3 Basic Administration**

Setting system date - Editing text with nano - Searching for a file - man pages – directory structure

**1.4 Managing Software**

Red Hat Package Manager - Debian Package Management System - dpkg – Software Management in Ubuntu - Compile and Install GNU Software

<b>Unit</b>	<b>2</b>	<b>(15 Hours)</b>
	<b>2.1 Managing Users and Groups</b>	
	Creating groups - /etc/group file - Creating Users - /etc/passwd and /etc/shadow files - Configuring a user - File access permissions - setuid and setgid programs - setting sticky bit	
	<b>2.2 Managing file systems</b>	
	File systems - ext3,ext4, Reiserfs,FAT32 - Mounting and unmounting file systems- /etc/fstab file - fsck - noatime setting - Volume Management	
	<b>2.3 Core System Services</b>	
	The init Daemon - xinetd and inetd - The Logging Daemon - The cron Program	
<b>Unit</b>	<b>3</b>	<b>(17 Hours)</b>
	<b>3.1 Shell scripting</b>	
	echo - shell variables - comments - positional parameters - decision making - checking exit status code	
	<b>3.2 TCP/IP</b>	
	The Layers - Headers - TCP Connection - ARP - Hosts and Networks - Subnetting - Netmasks- Static routing - Dynamic routing	
	<b>3.3 Network configuration</b>	
	/etc/hosts file - /etc/network/interfaces - /etc/resolv.conf - /etc/hostname - ifconfig - ping - route- netstat -Using dynamic IP address - Setting up a local area network	
<b>Unit</b>	<b>4</b>	<b>(10 Hours)</b>
	<b>4.1 Booting and shutting down</b>	
	Boot Loaders - The init Process - rc Scripts - Enabling and Disabling Service - Odds and Ends of Booting	
	<b>4.2 Remote Access</b>	
	FTP - Client/Server Interactions, vsftpd, configuring vstfpd, Starting and Testing FTP Server - Secure Shell - Public Key, Server start-up and Shutdown, Using OpenSSH - Telnet	
<b>Unit</b>	<b>5</b>	<b>(8 Hours)</b>
	<b>5.1 Linux Firewall</b>	
	How Netfilter Works- Configuring Netfilter	
	<b>5.2 Dynamic Host Configuration Protocol</b>	
	Mechanics of DHCP - DHCP Server - DHCP Client	
	<b>Demonstration</b>	
	1. Linux Installation over Virtual Box	
	2. Installing Software	
	3. User/Group management, File System Management	
	4. Network Configuration	
	5. Firewall Configuration	
	6. DHCP Configuration	
	7 Mounting and unmounting file systems	
	8. SSH configuration	
	9. FTP configuration	
	10. Setting up a LAN	

## **BOOKS FOR STUDY**

Basta, Alfred, et al. *Linux Operations and Administration*. Cengage Learning, 2013. (Unit 3 - 3.1 Chapter 5)

Helmke, Matthew et al. *The Official Ubuntu Book*. 9th Edition, Prentice Hall Press Upper Saddle River, NJ, USA, 2016 (Unit I - 1.1 – Chapter1)

Soynika, Wale. *Linux Administration A Beginner's Guide*. Seventh Edition, McGraw Hill, 2016 (Unit 1 - 1.4 , Unit 2, Unit 3- 3.2,3.3, Unit 4 & 5 – Chapters 4, 5, 6, 7, 8,11,12,13,17, 22, 29)

## **BOOKS FOR REFERENCE**

Hunt, Craig. *TCP/IP network administration*. Vol. 2. " O'Reilly Media, Inc.", 2002.

Vazquez, Antonio. *Learn CentOS Linux Network Services*. Apress, 2017.

## **WEB RESOURCES**

<https://www.ibm.com/developerworks/library/l-lan/index.html>

<https://www.youtube.com/watch?v=PEa1xopeufQ>

<https://www.tecmint.com/linux-network-configuration-and-troubleshooting-commands/>

<http://linux-training.be/linuxnet.pdf>

<http://www.debianadmin.com/ubuntu-networking-for-basic-and-advanced-users.html>

## **PATTERN OF ASSESSMENT**

### **Continuous Assessment**

**Total Marks: 50**

**Duration: 90 minutes**

**Theory – 25 marks**

**Practical – 25 marks**

Section A -  $3 \times 5 = 15$  marks (3 out of 4)

Section B -  $1 \times 10 = 10$  marks (1 out of 2)

### **Other Components**

**Total Marks:50**

Seminars/Group discussion/Assignments/Case studies

### **End Semester Examination**

**Total Marks: 100**

**Duration: 3 hours**

Section A -  $10 \times 2 = 20$  marks (Answer all the questions)

(2 questions to be set from each unit)

Section B -  $6 \times 5 = 30$  marks (6 out of 8)

(At least 1 question from each unit)

Section C -  $5 \times 10 = 50$  marks (5 out of 7)

(At least 1 question from each unit)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**  
**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**RESEARCH METHODOLOGY**

**CODE: 19CS/PC/RM34**

**CREDITS: 4**

**L T P: 3 1 2**

**TOTAL TEACHING HOURS:78**

**OBJECTIVES OF THE COURSE**

- To develop an understanding of the research methods relevant to effectively address a research problem
- Understand research problem formulation
- Analyze research related information
- To understand about data and its analysis in research
- To learn and understand the importance of writing skills and the method of documentation

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Develop an understanding of research methods
- Formulate a research problem
- Collect and analyse data
- Effectively write a research paper
- Present the Paper more professionally.

**Unit 1** **(16 Hours)**

**1.1 Introduction to Research**

Meaning, Objectives and Characteristics of research - Research Methods Vs. Methodology - Types of research- Research process - Criteria of good research

**1.2 Research Project**

Shaping a Research Project-Research Planning-Students and Advisors - Checklist

**Unit 2** **(15 Hours)**

**2.1 Literature Review**

Reading and Reviewing - Hypotheses, Questions, and Evidence

**Unit 3** **(16 Hours)**

**3.1 Experiments for Computing**

Experimentation-Statistical Principles

**3.2 Writing a Paper**

Organization-Good Style-Style Specifics-Punctuation-Mathematics-Algorithms-Graphs, Figures, and Tables -Other Professional Writing

<b>Unit 4</b>	<b>(16 Hours)</b>
<b>4.1 Presentation</b>	
Editing- Presentations-Slides-Posters-Ethics	
<b>Unit 5</b>	<b>(15 Hours)</b>
<b>5.1 Report writing</b>	
Report writing using LATEX for a research problem	

### **BOOKS FOR STUDY**

Kothari C. R. *Research Methodology Methods and Techniques*. 2<sup>nd</sup> ed. New Delhi: New Age, 2004. (Unit 1.1)

Justin Zobel. *Writing for Computer Science*. 3<sup>rd</sup> ed. Springer-Verlag, 2014

### **BOOKS FOR REFERENCE**

Ranjit Kumar. *Research Methodology* -a step-by-step guide for beginners. 3rd ed. SAGE Publications India Pvt Ltd, 2011.

Panneerselvam R. *Research Methodology*. 2<sup>nd</sup> ed. New Delhi: Prentice Hall, 2014.

### **WEB RESOURCES**

<https://www2.le.ac.uk/offices/red/rd/research-methods-and-methodologies>  
<http://www.socscidiss.bham.ac.uk/methodologies.html>

### **PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks:50                          Duration: 90 minutes**

Section A -  $6 \times 5 = 30$  marks (6 out of 8)

Section B -  $2 \times 10 = 20$  marks (2 out of 3)

**Other Components      Total Marks:50**

Component 1: Literature Review and Problem Identification

Component 2: Writing a research Paper

**End Semester Examination      Total Marks: 100                          Duration: 1.5 hours**

**Theory:50 Marks**

Section A -  $6 \times 5 = 30$  marks (6 out of 8)

(At least 1 question from each unit)

Section B -  $2 \times 10 = 20$  marks (2 out of 3)

**Practical :50 Marks**

Paper Presentation with Poster or Prototype

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**DATA ANALYTICS**

**CODE : 19CS/PC/DA34**

**CREDITS:4**

**L T P:3 0 2**

**TOTAL TEACHING HOURS:65**

**OBJECTIVES OF THE COURSE**

- To enable the students to understand the types of data
- To enable a comprehensive and detailed understanding of the data formats and data analysis
- To explore different machine learning techniques
- To explore advanced analytic tools
- To understand and practice Big Data Analytics and Machine Learning approaches

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Critically analyze and follow the mechanisms to manage and explore
- Understand uncertain and complex data
- Apply Machine Learning techniques to extract actionable value from data
- Assess the use of data from acquisition through cleansing, analytics, and visualization
- Critically evaluate challenges in data analytics
- Think critically in decision making by applying analytics

**Unit 1 (12 Hours)**

**1.1 Fundamentals of Data Analysis**

Introduction- The process of data analysis –Types of analytics- Descriptive Analytics - Predictive Analytics - Prescriptive Analytics - Applications- Quantitative messages- techniques for analyzing quantitative data-barriers to effective analysis-initial data analysis-main data analysis

**1.2 Types of data**

Different Types of Data- Quantitative and Qualitative Data-Numerical, Categorical- Data loading, storage and file formats – Reading and writing data in text Format- Binary data formats-interacting with web API-interacting with databases- Getting started with pandas

**Unit 2 (13 Hours)**

**2.1 Data cleaning**

Data cleaning and preparation -Handling missing data -Data transformation -String manipulation

## **2.2 Data wrangling**

Join, combine and reshape -Hierarchical indexing –Combining and merging datasets - Reshaping and pivoting- Data aggregation and group functions-group by mechanics-data aggregation-general split-apply-combine-pivot tables and cross tabulation-numpy basics

**Unit 3 (13 Hours)**

### **3.1 Plotting and visualization**

Matplotlib-figures – subplots-colors, markers and line styles-Ticks, labels and legends, annotations and drawing on subplot-Plotting with pandas and seaborn

### **3.2 Time series**

Date and Time Data Types and Tools - Time Series Basics- Date Ranges, Frequencies, and Shifting- Time Zone Handling- Periods and Period Arithmetic- Resampling and Frequency Conversion

### **3.3 Data analysis examples**

**Unit 4 (13 Hours)**

### **4.1 Machine Learning**

Introduction to Machine learning- Why Machine Learning? – Supervised Learning – Unsupervised learning -Classifications and Regression-Generalization-overfitting-under fitting

### **4.2 Supervised machine learning algorithms**

k-nearest Neighbor-Linear Models-Naïve Bayes Classifiers-Decision Tree-Random forest- model evaluation

### **4.3 Unsupervised learning algorithms**

Types-dimensionality reduction, feature extraction-clustering-k-means clustering-agglomerative clustering-dB scan clustering techniques-model evaluation and improvement

**Unit 5 (14 Hours)**

### **5.1 Big data Analytics**

Introduction to big data Analytics-Big Data Overview-state of the practice in Analytics-Key roles for the new Big Data Eco System-Examples of Big Data Analytics- Advanced analytics –Technology and tools: MapReduce and Hadoop-Analytics for unstructured data– The Hadoop Eco system- NoSQL

### **5.2 Introduction to Streams Concepts**

Mining Data Streams- Stream Data Model –Sampling Data in A Stream – Filtering Streams – Counting Distinct Elements in A Stream – Estimating Moments – Counting Oneness in A Window – Decaying Window – Real-time Analytics Platform(RTAP) Applications – Case Studies – Real Time Sentiment Analysis, Stock Market Predictions.

## **BOOKS FOR STUDY**

Anand Raja Raman, Jeffrey David Ullman. *Mining of Massive Datasets*, Cambridge University Press, 2012. (Unit 5.2: Chapter 4)

Andreas C. Mueller, Sarah Guido. *Introduction to Machine Learning with Python*. O'Reilly Media, Inc., 2016. (Unit 4)

Data Science and Big Data Analytics, EMC Education Services (Unit 5: Chapter 1, 10) (E-book)

Wes McKinney. *Python for Data Analysis*. O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, second edition, 2018. (Unit 1: Chapter 5, 6,7, Unit 2: 7,8,10, Unit 3: 9,11)

## **BOOKS FOR REFERENCE**

Aurélien Géron. Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems. USA: O'Reilly Media, 2019.

Brian K. Jones. David Beazley. Python Cookbook. USA: O'Reilly Media, Incorporated, 2013.

## **WEB RESOURCES**

[https://en.wikipedia.org/wiki/Data\\_analysis#Exploratory\\_and\\_confirmatory\\_approaches](https://en.wikipedia.org/wiki/Data_analysis#Exploratory_and_confirmatory_approaches)

[http://en.wikibooks.org/wiki/Statistics/Different\\_Types\\_of\\_Data](http://en.wikibooks.org/wiki/Statistics/Different_Types_of_Data))

<https://searchdatamanagement.techtarget.com/definition/data-analytics>

<https://halobi.com/blog/descriptive-predictive-and-prescriptive-analytics-explained/>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks: 50                                  Duration: 90 minutes**

**Theory – 25 marks**

**Practical – 25 marks**

Section A -  $3 \times 5 = 15$  marks (3 out of 4)

Section B -  $1 \times 10 = 10$  marks (1 out of 2)

**Other Components      Total Marks:50**

Case Study /Seminar/Assignment/Mini Project

**End Semester Examination      Total Marks:100                                  Duration: 3 hours**

**Theory – 50 marks    Duration – 1 ½ hours**

**Practical – 50 marks    Duration – 1 ½ hours**

### **Theory Pattern**

Section A-  $5 \times 2 = 10$  marks (Answer all the questions)

(1 question to be set from each unit)

Section B -  $4 \times 5 = 20$  marks (4 out of 6)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

(Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**ARTIFICIAL INTELLIGENCE**

**CODE:19CS/PC/AI35**

**CREDITS: 5**

**L T P: 3 0 3**

**TOTAL TEACHING HOURS:78**

**OBJECTIVES OF THE COURSE**

- To gain knowledge on AI related problems and techniques
- To understand and present AI as the study of the design of intelligent computational agents
- To learn how to represent knowledge
- To provide a coherent vision of the foundations of the field as it is today, in terms of a multidimensional design space
- To understand AI has a coherent, formal theory and a lively experimental wing with learning and planning concepts

**COURSE LEARNING OUTCOMES**

After completing the course, the student will be able to:

- Ability to identify problems that are amenable to solution by AI methods
- Ability to analyse appropriate AI methods to solve a given problem.
- Ability to formalize a given problem in the language/framework of different AI methods
- Ability to create basic and advanced plan generation systems and to understand the concepts learning methods.
- An ability to understand the concepts of Ontologies

**Unit 1 (13 Hours)**

**1.1 What is AI**

The AI Problems - The Underlying Assumptions – What is an AI Technique – The Level of the Model – Criteria for Success.

**1.2 Problems, Problem Spaces & Search**

Defining the problem as a State Space Search – Production systems – Problem Characteristics - Production Systems Characteristics – Issues in the Design of Search Programs.

**1.3 Heuristic Search Techniques**

Generate and Test – Hill Climbing – Best First Search – Problem Reduction - Constraint Satisfaction – Means ends Analysis.

<b>Unit</b>	<b>2</b>	<b>(20 Hours)</b>
	<b>2.1 Knowledge Representation Issues</b>	Representations and Mappings – Approaches to KR – Issues in KR – The Frame Problem.
	<b>2.2 Using Predicate Logic</b>	Representing Simple Facts in Logic - Representing Instances and ISA Relationships – Computable Functions and Predicates – Resolutions – Natural Deductions.
	<b>2.3 Representing Knowledge using Rules</b>	Procedural versus Declarative Knowledge – Logic Programming – Forward Versus Backward Reasoning – Matching – Control Knowledge.
	<b>2.4 Statistical Reasoning</b>	Probability and Bayes Theorem - Certainty Factors and Rule based Systems – Bayesian Networks – Dempsters Shafer Theory - Fuzzy Logic.
<b>Unit</b>	<b>3</b>	<b>(18 Hours)</b>
	<b>3.1 Game Playing</b>	Overview – The Minimax Search Procedure – Adding Alpha Beta Cutoffs – Additional Refinements – Iterative Deepening.
	<b>3.2 Natural Language Processing</b>	Introduction – Syntactic Processing - Semantic Analysis – Discourse and Pragmatic Processing – Statistical NLP – Spell Checking.
	<b>3.3 Parallel and Distributed AI</b>	Psychological Modelling – Parallelism in Reasoning Systems – Distributed Reasoning Systems
<b>Unit</b>	<b>4</b>	<b>(17 Hours)</b>
	<b>4.1 Learning</b>	What is Learning - Rote Learning – Learning by Taking Advice – Learning by Problem Solving – Learning from Examples: Induction – Explanation based Learning – Discovery – Analogy – Formal Learning Theory – Neural Net Learning and Genetic Learning
	<b>4.2 Connectionist Models</b>	Introduction: Hopfield Networks – Learning in Neural Networks – Applications of Neural Networks – Recurrent Networks – Distributed Representations - Connectionist AI and Symbolic AI.
<b>Unit</b>	<b>5</b>	<b>(10 Hours)</b>
	<b>5.1 Expert Systems</b>	Expert systems – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems – MYCIN, DART, XOOM, Expert systems shells.

## **BOOKS FOR STUDY**

Kevin Night, Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, McGraw Hill2008. (Unit-1,2,3,4)

Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, 2007. (Unit 5).

## **BOOKS FOR REFERENCE**

Russell, Stuart J., and Peter Norvig. *Artificial intelligence: a modern approach*. Malaysia; Pearson Education Limited,, 2016.

Prolog Programming for Artificial Intelligence (International Computer Science Series), Addison-Wesley Educational Publishers Inc; 4th edition, 2011 By Ivan Bratko

## **WEB RESOURCES**

<http://www.aispace.org/index.shtml>

<https://www.britannica.com/technology/artificial-intelligence>

[https://www.sas.com/en\\_in/insights/analytics/what-is-artificial-intelligence.html](https://www.sas.com/en_in/insights/analytics/what-is-artificial-intelligence.html)

<https://www.theverge.com/ai-artificial-intelligence>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks: 50                  Duration: 90 minutes**

**Theory – 25 marks**

**Practical – 25 marks**

Section A -  $3 \times 5 = 15$  marks (3 out of 4)

Section B -  $1 \times 10 = 10$  marks (1 out of 2)

**Other Components      Total Marks: 50**

Seminars/Quiz/Group discussion/Assignments/Case Study/Mini Project

**End Semester Examination      Total Marks: 100                  Duration: 3 hours**

**Theory – 50 marks      Duration – 1 ½ hours**

**Practical – 50 marks      Duration – 1 ½ hours**

Section A-  $5 \times 2 = 10$  marks (Answer all the questions)

(1 question to be set from each unit)

Section B -  $4 \times 5 = 20$  marks (4 out of 6)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

(Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**SUMMER INTERNSHIP**

**CODE:19CS/PN/SI32**

**CREDITS:2**

**OBJECTIVES OF THE COURSE**

- To enable students to gain experiential learning in the field of Computer Science
- To acquire work experience in IT / IT related domains

The Summer Internship program is for a minimum period of three weeks. The students are expected to work in a real time environment and gain professional experience. Further, the student is expected to submit a report and present their work in the third semester.

**Guidelines for Evaluation**

The maximum marks for the Summer Internship is 50 and is divided into the following:

a) Report	(20 Marks)
b) Presentation	(15 Marks)
c) Viva-Voce	(15 Marks)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**  
**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**FORMAL LANGUAGES AND FINITE AUTOMATA**

**CODE: 19CS/PC/FF44**

**CREDITS : 4**

**L T P: 4 1 0**

**TOTAL TEACHING HOURS: 65**

**OBJECTIVES OF THE COURSE**

- To understand the theoretical foundations of computer science through study of mathematical and abstract models of computers and the theory of formal languages and finite automata
- To introduce concepts in automata theory and theory of computation
- To be able to identify different formal language classes and their relationships
- To design grammars and recognizers for different formal languages
- To prove or disprove theorems in automata theory using its properties

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Understand the core concepts in automata theory and formal languages
- Design grammars and automata (recognizers) for different language classes
- Identify formal language classes and prove language membership properties
- Apply formal mathematical methods to prove properties of languages, grammars and automata
- Understand and analyze the applications of Automata and finite state machines

**Unit 1** **(18 Hours)**

**1.1 Fundamentals and Finite Automata**

Basic concepts - Strings, Alphabets, Languages, Finite State Machine, Definitions, Finite Automaton model, Acceptance of Strings and Languages, Deterministic Finite Automaton (DFA) and Non-deterministic Finite automaton (NFA) - Transition diagrams and Language recognisers, Acceptance of languages, Equivalence of NFA and DFA (Proof needed), NFA with  $\in$  - transitions

**Unit 2** **(14 Hours)**

**2.1 Regular Languages**

The operators of Regular Expressions - Building Regular Sets Expressions, Precedence of Regular Expression operators, Finite Automata and Regular Expressions – From DFA's to Regular Expressions and Conversion of a given regular expression into a Finite Automata, Conversion of DFA into a Regular Expression by eliminating states, Pumping Lemma for Regular Sets (Proof needed), Closure Properties of Regular Sets (proofs not required)

**Unit 3** **(12 Hours)****3.1 Grammar Formalism**

Definition of a Context Free Grammars, Derivations using a Grammar, Language of a Grammar, Leftmost and rightmost derivation of strings and sentential forms, Parse Trees – Constructing parse trees, Yield of a parse tree, From Trees to derivations, Ambiguous Grammars, Removing Ambiguity from Grammars, Leftmost Derivation, Inherent ambiguity, Normal forms for Context Free Grammars

**Unit 4** **(11 Hours)****4.1 Pushdown Automata**

Definition – Model - Graphical notation - Instantaneous descriptions - Acceptance of Context Free Languages - Acceptance by Final State and Acceptance by Empty State and its Equivalence - Equivalence of Context Free Grammars and Pushdown Automata - Inter-conversion (Proofs not required) - Introduction to Deterministic Pushdown Automata

**4.2 Turing Machines**

Notation - Instantaneous descriptions - Transition Diagrams – Language - Turing Machines and Halting - Storage in the State - Multiple Tracks – Subroutines – Multitape Turing Machines

**Unit 5** **(10 Hours)****5.1 Mealy and Moore Machine**

Finite Automata with Output – Mealy machine, Moore Machine , Properties, Comparison of Mealy and Moore Machine - Conversion of Mealy to Moore and vice versa

**5.2 Applications**

Applications of Finite Automata - Text Search – Findings Strings in Text, Nondeterministic Finite Automata for Text Search, A DFA to Recognise a set of Keywords - Applications of Regular Expressions - Regular Expressions in UNIX, Lexical Analysis, Finding Patterns in Text - Applications of Context Free Grammars – Parsers, the YACC parser - Generator, Markup Languages, XML and Document – Type Definitions

**BOOKS FOR STUDY**

Martin, John C. *Introduction to languages and the Theory of Computation*. 4th ed. New Delhi: TMH, 2011.

Hopcroft,H.E., Rajeev Motvani and Ullman J. D. *Introduction to Automata Theory Languages and Computation*. 3rd ed. Pearson, 2014.

**BOOKS FOR REFERENCE**

Cohen, Daniel I.A. *Introduction to Computer Theory*. 2nd ed. USA: John Wiley, 2007.

Linz, Peter. *An Introduction to formal languages and Automata theory*. 6<sup>th</sup> Ed. Jones and Bartlett Learning, 2017.

Mishra and Chandrashekaran. *Theory of Computer Science –Automata Languages and Computation*. 3rd ed. India: PHI, 2012.

## **WEB RESOURCES**

[https://www.tutorialspoint.com/automata\\_theory/](https://www.tutorialspoint.com/automata_theory/)

<https://nptel.ac.in/courses/106103070/>

<https://www.ics.uci.edu/~goodrich/teach/cs162/notes/>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks: 50                  Duration: 90 minutes**

Section A -  $5 \times 2 = 10$  marks (Answer all the questions)

Section B -  $4 \times 5 = 20$  marks (4 out of 5)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

**Other Components      Total Marks:50**

Seminars /Quiz /Group discussion/Assignments/Problem solving

**End Semester Examination      Total Marks: 100                  Duration: 3 hours**

Section A -  $10 \times 2 = 20$  marks (Answer all the questions)

(2 questions to be set from each unit)

Section B -  $6 \times 5 = 30$  marks (6 out of 8) (Atleast 1 question from each unit)

Section C -  $5 \times 10 = 50$  marks (5 out of 7) (Atleast 1 question from each unit)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**CLOUD COMPUTING : THEORY AND PRACTICE**

**CODE: 19CS/PC/CT45**

**CREDITS : 5**

**L T P : 3 0 3**

**TOTAL TEACHING HOURS: 78**

**OBJECTIVES OF THE COURSE**

- To introduce the concept of Cloud Computing, Parallel and Distributed Computing
- To enable the students to learn about Virtualization and Cloud Architecture
- To give a detailed overview on Resource Pooling, Scaling, Capacity Planning and Load Balancing in the Cloud
- To familiarize concepts on Cloud Security, Service Oriented Architecture (SOA) and Cloud-based Storage
- To give a better understanding on the above said concepts through case studies on various cloud platforms

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Describe about cloud, parallel and distributed computing
- Define virtualization and the architecture of cloud computing
- Demonstrate the need for resource pooling, scaling, capacity planning and load balancing along with their roles in the cloud
- Interpret on securing and storing data over the cloud
- Build a simple application and host it using cloud

**Unit 1 (16 Hours)**

**1.1 Introduction**

Introduction - Limitations of the Traditional Computing Approaches - Solutions - Three Layers of Computing - Three Layers in Traditional Computing - The End of Traditional Computing – Example – Use of cloud in current scenario - Influences behind Cloud Service Adoption

**1.2 Evolution, Benefits and Challenges**

The Evolution of Cloud Computing - How Philosophies Converged into Cloud Computing - Comparison between Cluster, Grid and Cloud Computing - Origin of the Term ‘Cloud Computing’ - Early Initiatives - Utility Computing - Metering and Billing in Cloud - Separation of Data Center Operation - Benefits of Cloud Computing - Challenges of Cloud Computing - Cloud Computing and Business Challenges - Ethical Issues in

Cloud Computing - Cloud Computing: Network as Computer - Role of Web Service - Role of API - Ubiquitous Cloud - Cloud Vs. Internet

**Unit 2 (16 Hours)**

### **2.1 Cloud Computing Model and Services**

Standard Cloud Model - Cloud Deployment Models - Choosing the Appropriate Deployment Model - Service Delivery Models - Service Abstraction - The SPI Model - A Traditional System vs Cloud System Model - All applications delivered using web-services are not SaaS - SaaS and PaaS: Salesforce.com and Force.com - Other Category of Cloud Services - Open Cloud Services

### **2.2 Security Reference Model**

The Security Concern in Cloud - Cloud Security Working Groups - Elements of Cloud Security Model - Cloud Security Reference Model - Examining Cloud Security against Traditional Computing - Security Policy - Trusted Cloud Computing

**Unit 3 (15 Hours)**

### **3.1 Resource Virtualization**

What is Virtualization - Virtualizing Physical Computing Resources - Understanding Abstraction - Business Benefits of Virtualization - Machine or Server Level Virtualization - Exploring Hypervisor or Virtual Machine Monitor - Operating System Level Virtualization: Removal of the hypervisor - Major Server Virtualization Products and Vendors - High-Level Language Virtual Machine - Emulation - Some Other Types of Virtualizations - Advantages of Virtualization - Downsides of Virtualization - Virtualization Security Threats - Virtualization Security Recommendations - Virtualization and Cloud Computing

### **3.3 Resource Pooling, Sharing and Provisioning**

Resource Pooling - Commoditization of the Data Center - Standardization, Automation and Optimization - Resource Sharing - Resource Provisioning

**Unit 4 (16 Hours)**

### **4.1 Scaling in the Cloud**

What is Scaling? - Scaling in Traditional Computing - Scaling in Cloud Computing - Foundation of Cloud Scaling - Scalable Application - Scaling Strategies in Cloud - Auto-Scaling in Cloud - Types of Scaling - Horizontal Scaling is More Cloud-Native Approach - Performance and Scalability - The Resource Contention Problem - Cloud Bursting: A Scenario of Flexible Scaling - Scalability is a Business Concern

### **4.2 Capacity Planning**

What is Capacity Planning - Capacity Planning in Computing - Capacity Planning in Cloud Computing - Cloud Capacity: Consumers' View vs Providers' View - Capacity Planning: Then and Now - Approaches for Maintaining Sufficient Capacity - Role of Auto-Scaling in Capacity Planning - Capacity and Performance: Two Important System Attributes - Steps for Capacity Planning

### **4.3 Load Balancing**

Importance of Load Balancing in Cloud Computing - How Load Balancing is done in Cloud - Goals of Load Balancing - Categories of Load Balancing - Parameters for Consideration - Load Balancing Algorithms - The Persistence Issue - Application Delivery Controller - Case Study: Google Cloud - Case Study: Amazon Elastic Compute Cloud (EC2)

**Unit 5 (15 Hours)**

### **5.1 Service Oriented Architecture**

The Pre-SOA Era - Role of SOA in Cloud Computing Service - Oriented Architecture - Goal of System Designing - Service Represents Business Functionality - Open Standard Implementation - Benefits of SOA - SOA and Cloud Computing

### **5.2 File System and Storage**

Requirements of Data-Intensive Computing - Challenges before Cloud Native File System - Model for High-Performance Processing of Large Data-sets - Cloud Native File System - Storage Deployment Models - Storage Types - Popular Cloud Storages for Developers - Popular General Purpose Cloud Storages

### **5.3 Security Issues**

Cloud Security - Threats to Cloud Security - Infrastructure Security - Information Security - Identity Management and Access Control - Cloud Security Design Principles - Cloud Security Management Frameworks - Security-as-a-Service

## **BOOKS FOR STUDY**

Bhowmik, Sandeep. *Cloud Computing*. Cambridge University Press, 2017

## **BOOKS FOR REFERENCE**

Buyya, Rajkumar, Christian Vecchiola, and S. Thamarai Selvi. *Mastering cloud computing: foundations and applications programming*. Elsevier, 2013.

Sosinsky, Barrie. *Cloud Computing Bible*. John Wiley & Sons, 2011.

Dan C Marinescu, *Cloud Computing: Theory and Practice*. Morgan Kaufmann, Elsevier, 2017.

Michael J. Kavis, *Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)*. John Wiley & Sons, 2014.

## **WEB RESOURCES**

<https://aws.amazon.com/what-is-cloud-computing/>

<https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/>

<https://www.salesforce.com/what-is-cloud-computing/>

<https://cloud.google.com/docs/>

<https://www.ibm.com/cloud/learn/what-is-cloud-computing>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks: 50      Duration: 90 minutes**

**Theory – 25 marks**

**Practical – 25 marks**

Section A -  $3 \times 5 = 15$  marks (3 out of 4)

Section B -  $1 \times 10 = 10$  marks (1 out of 2)

**Other Components      Total Marks:50**

Seminars/Group discussion/Assignments/Case studies/Hosting a simple cloud application

**End Semester Examination      Total Marks: 100      Duration: 3 hours**

**Theory – 50 marks      Duration –  $1\frac{1}{2}$  hours**

**Practical – 50 marks      Duration –  $1\frac{1}{2}$  hours**

### **Theory Pattern**

Section A -  $5 \times 2 = 10$  marks (Answer all the questions)

(1 question to be set from each unit)

Section B -  $4 \times 5 = 20$  marks (4 out of 6)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

(Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

**STELLA MARIS COLLEGE (AUTONOMOUS) – CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**DISSERTATION**

**CODE: 19CS/PC/DS48**

**CREDITS: 8**

**OBJECTIVES OF THE COURSE**

- To enable the students to understand and analyse a problem
- To understand the need of literature reviews formulating a problem and in problem solving
- To enable students to select an appropriate tool to solve the problem
- To help students to develop an application to suit the business needs/implement a research problem
- To enable the students to test the accuracy
- To enable students to document the process and the implementation

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Understand and analyze a problem
- Review necessary literatures to define a problem and to understand the problem better
- Select an appropriate tool based on the need
- Develop an application/implement a research problem effectively
- Test the accuracy of the result
- Document the process in an efficient manner

**GUIDELINES**

One of the important stipulations regarding Dissertation for M.Sc. is that it should be in the area of Computer Science/ Computer Applications. Students are required to develop an application/implement a research problem.

The Dissertation must include the following. These are general guidelines which may differ slightly as per the demand of the study topic.

***Introduction***

- Existing System
- Proposed System
- Create a set of Design principles to implement the proposed system

### ***System Analysis***

- Development Environment
- Requirement Specification
- Software Requirements Specification

### ***System Design***

- Logical Design of the System
- Database Design
- Screen Design
- Report Design

### ***Implementation***

- Database creation
- Coding

### ***Code Review and Testing***

- Code Review
- Testing Process
  - Front-end Validation
  - Back-end Validation

### ***Deployment***

### ***Conclusion***

- Summary of findings, conclusions for future enhancement
- Suggestions

### ***Bibliography***

### ***Appendix***

## **PATTERN OF ASSESSMENT**

### **Internal Assessment – 50 marks**

Based on the criteria listed below, internal marks will be awarded.

1. Timely completion of assigned tasks
2. Individual Involvement and team work
3. Quality of the Application and documentation (Design, Workflow, Testing, Precision, Relevance)
4. Achievement of Dissertation deliverables
5. Presentation of Completed work
6. Viva-Voce

## **End Semester Examination – 100 marks**

Dissertation Document must be submitted at the end of the semester. The student must present the completed work. A viva–voce based on the work will also be conducted.

Mark will be allotted based on the following criteria which may differ slightly as per the demand of the study topic.

Requirement Analysis	– 10 marks
Database Design	– 10 marks
Screen Design	– 10 marks
Coding	– 10 marks
Validation	– 10 marks
Testing	– 10 marks
Reports	– 5 marks
Documentation	– 20 marks
Special Features	– 5 marks
Viva – Voce	– 10 marks

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**UI, UX AND DESIGN THINKING**

**CODE: 19CS/PE/XI15**

**CREDITS: 5**

**LTP: 3 0 3**

**TOTAL TEACHING HOURS: 78**

**OBJECTIVES OF THE COURSE**

- To understand the User Experience (UX) Design
- To know the User Design Behaviour and Principles
- To create the Prototypes and the User Interface Design
- To implement UI Design using HTML5 and CSS
- To create an Interactive Web page using Javascript

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Appreciate product development as UX Designers
- Identify how, and when to use the HTML5 markup tags
- Effectively use the new CSS3 features to create websites
- Apply appropriately the JavaScript and its advanced features
- Use the bootstrap framework effectively

**Unit 1 (15 Hours)**

**1.1 UX and Design Process**

What is UX? - UX Design Process - Discovery and Planning, The UX Strategy, UX research Stages - UX analysis, Design, Production -

**1.2 User Behavior and User Research**

Basics, Gestalt theory, Psychology in UX, User Research, Benefits of User Research - Getting to know Your Users - User Personas

**Unit 2 (15 Hours)**

**2.1 Designing Behavior**

Five factors/preconditions for Users to take actions - Models of behavior change - Behavioral approach for Product Design

**2.2 Visual Design Principles and Processes**

Basics of Visual Design - Design Principles - Visual Design Tools

**Unit 3 (15 Hours)**

**3.1 Wireframes and Prototyping**

Wireframe - Creating Wireframes, Types, Tools - Prototyping - Methods, Creating Prototypes, Tools

### **3.2 UI Design and Implementation**

User Interface Design - UI design Tools - Design System - UI Design Handover - Tools - Post-launching UX Activities - User Feedback - Testing - Tracking and Recording - Creating and Analyzing Conversion funnels

**Unit 4** **(15 Hours)**

#### **4.1 HTML5 and CSS3**

HTML Elements – Structural/Semantic, Phrasing, Table, Embedded, Form - CSS Selectors – Positioning content – Text Styles – Borders and Backgrounds – Styling Tables – Flexbox – Animation and Transforms

**Unit 5** **(18 Hours)**

#### **5.1 JavaScript**

Javascript Essentials - Browser Environment – Window Object – DOM Elements – Constraint Validation API - JQuery – Dynamic styling - Events - TypeScript – Installing TypeScript, Benefits, Building a TypeScript file

#### **5.2 Bootstrap Framework**

Installation - Responsive Grid System - Bootstrap's Style Standard - Responsive CSS - Responsive Development with Browser devTools - Z dimension - Transform - Transition - Animation - Flexbox - Responsive Website Clone

## **BOOKS FOR STUDY**

Canziba, Elvis. *Hands-On UX Design for Developers: Design, prototype, and implement compelling user experiences from scratch*. Packt Publishing Ltd, 2018.

Clark, Nathan. *UI/UX Design for Designers & Developers Paperback*. 2018.

Clark, Nathan. *UI/UX Design Basics and Fundamentals Paperback*. 2018.

Collins, Mark J. *Pro HTML5 with CSS, JavaScript, and Multimedia*. Apress, 2017.

Rahman, Syed Fazle. *Jump Start Bootstrap*. sitepoint, 2014.

## **BOOKS FOR REFERENCE**

Basarat Ali Syed. *TypeScript Deep Dive*. Samurai Media Limited, 2017

J. Hamm, Matthew. *Wireframing Essentials*. Packt Publishing. ISBN: 978184969854

Yayici, Emrah. *UX Design and Usability Mentor Book: With Best Practice Business Analysis and User Interface Design Tips and Techniques*. Emrah Yayici, 2014.

## **WEB RESOURCES**

<https://getbootstrap.com/docs/4.2/getting-started/introduction/>

<https://git-scm.com/book/en/v2>

<https://www.typescriptlang.org/docs/handbook/typescript-in-5-minutes.html>

<https://developer.mozilla.org/bm/docs/Web/JavaScript>

## **Practical**

Create a sketch, Wireframe and Template for an app, Prototyping

**HTML/CSS** - Creating a Non Responsive Site, creating a Responsive Site using Media Query/Bootstrap, Javascript - Form validation

Deployment with GitHub

## **PATTERN OF ASSESSMENT**

**Continuous Assessment                      Total Marks:50                      Duration: 90 minutes**

Theory – 25 marks

Practical – 25 marks

Section A -  $3 \times 5 = 15$  marks (3 out of 4)

Section B -  $1 \times 10 = 10$  marks (1 out of 2)

**Other Components                      Total Marks:50**

Quiz/Assignment/Seminar/Case Study

**End Semester Examination                      Total Marks: 100**

**Theory – 50 marks                      Duration – 1 ½ hours**

### **Theory Pattern**

Section A -  $5 \times 2 = 10$  marks (Answer all the questions)

(1 question to be set from each unit)

Section B -  $4 \times 5 = 20$  marks (4 out of 6)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

(Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

### **Project Demonstration and Viva: 50 Marks**

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**CYBER SECURITY**

**CODE: 19CS/PE/CS15**

**CREDITS:5**

**L T P: 5 1 0**

**TOTAL TEACHING HOURS:78**

**OBJECTIVES OF THE COURSE**

- To understand the Cybercrime, Cyber Offenses and Cyber Forensics
- To understand the security challenges in mobile devices
- To analyse the Tools and Methods Used in Cybercrime
- To have an understanding on Cyber Law and Cyber security
- To understand the Indian IT Act and its strengths and weaknesses

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Explain the major concepts of Cyber Security and Forensics
- Safeguard themselves from cyber crimes
- Demonstrate the use of tools and methods used in cybercrime
- Demonstrate critical thinking and information application related to the discipline of cyber security, to include intelligence, computer forensics, cyber operations and electronic crime
- Demonstrate understanding of the legal and technical aspects of a cybercrime investigation and the application of computer forensic tools

**Unit 1**

**1.1 Introduction to Cybercrime**

**(14 Hours)**

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, who are Cybercriminals? Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes

**1.2 Cyber Offenses: How Criminals Plan Them**

Introduction, How Criminals Plan the Attacks, Social Engineering Cyber stalking, Cyber cafe and Cybercrime, Botnets, the Fuel for Cybercrime, Attack Vector, Cloud Computing

<b>Unit 2</b>	<b>(14 Hours)</b>
<b>2.1 Cybercrime: Mobile and Wireless Devices</b>	Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Device Registry, Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops
<b>Unit 3</b>	<b>(14 Hours)</b>
<b>3.1 Tools and Methods Used in Cybercrime</b>	Introduction, Proxy Servers and Anonymizers, Phishing, Identity Theft (ID Theft), Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks
<b>Unit 4</b>	<b>(19 Hours)</b>
<b>4.1 Cybercrimes and Cyber security: The Legal Perspectives</b>	Introduction, Cybercrime and the Legal Landscape around the World, Why Do We Need Cyber laws - The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyber law, Technology and Students with respect to Indian Scenario
<b>Unit 5</b>	<b>(17 Hours)</b>
<b>5.1 Computer Forensics</b>	Understanding Computer Forensics · Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail · Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics. Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics · Special Tools and Techniques, Forensics Auditing · Antiforensics

## **BOOKS FOR STUDY**

Godbole Nina, Belapure Sunit. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives Wiley: April 2011 India Publications Released

## **BOOKS FOR REFERENCE**

Diogenes Yuri , Ozkaya Erdal Cybersecurity – Attack and Defense Strategies: Infrastructure security with Red Team and Blue Team tactics Paperback – January 30, 2018

Nelson Bill, Phillips Amelia, Steuart Christopher. Guide to Computer Forensics and Investigations. Cengage Learning, 2013.

T. Britz Marjie. Computer Forensics and Cyber Crime: An Introduction. Pearson, 2013.

Wu Chwan-Hwa (John), Irwin J. David. Introduction to Computer Networks and Cyber security. CRC Press, 2013

## **WEB RESOURCES**

<https://www.javatpoint.com/cyber-security-introduction>

<https://www.sophia.org/tutorials/cyber-security>

<https://www.simplilearn.com/tutorials/cyber-security>

<https://intellipaat.com/tutorial/ethical-hacking-cyber-security-tutorial/>

<https://www.nersc.gov/users/training/online-tutorials/cybersecurity-tutorial/>

<https://www.geeksforgeeks.org/what-is-information-security/>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment Test                      Total Marks:50                      Duration: 90 minutes**

Section A -  $5 \times 2 = 10$  marks (Answer all the questions)

Section B -  $4 \times 5 = 20$  marks (4 out of 5)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

**Other Components                      Total Marks:50**

Seminar/Quiz/Open book test/Group discussion/Assignment/Role play/Case study

**List of case studies may include but not restricted to the following:**

### **Real-Life Examples**

Example 1: Official Website of Maharashtra Government Hacked

Example 2: E-Mail Spoofing Instances

Example 3: I Love You Melissa –Come Meet Me on the Internet

### **Mini-Cases:**

Mini-Case 1: Cyber pornography Involving a Juvenile Criminal

Mini-Case 2: Cyber defamation: A Young Couple Impacted

**Scams:**

Scam No. 1 –Foreign Country Visit Bait

Scam No. 2 –Romance Scam

Scam No. 3 –Lottery Scam

**Financial Crimes in Cyber Domain:**

Financial Crime 1: Banking Related Frauds

Financial Crime 2: Credit Card Related Frauds

**End Semester Examination              Total Marks:100              Duration: 3 hours**

Section A -  $10 \times 2 = 20$  marks (Answer all the questions)

(2 questions to be set from each unit)

Section B -  $6 \times 5 = 30$  marks (6 out of 8)

(atleast 1 question from each unit)

Section C -  $5 \times 10 = 50$  marks (5 out of 7)

(atleast 1 question from each unit)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**SOFTWARE TESTING**

**CODE: 19CS/PE/ST15**

**CREDITS:5**

**L T P:3 0 3**

**TOTAL TEACHING HOURS:78**

**OBJECTIVES OF THE COURSE**

- To understand software testing concepts
- To understand how testing can be automated
- To know the need for coverage criteria and when to stop testing
- To learn how to perform unit testing using JUnit
- To gain an insight of various testing techniques

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Appreciate the need for software testing
- Write test cases and perform manual testing
- Create automated test cases
- Use appropriate tools to test the software
- Apply various testing techniques to improve software quality

**Unit 1 (18 Hours)**

**1.1 Introduction to Software Testing**

Need for testing software - Fault, error and failures - Verification and validation - Testing, test failure and debugging - RIPR model - Unit testing, integration testing, system testing, acceptance testing, regression testing - Integration order - Stubs and mocks - SDLC and testing activities (V-model) - When to stop testing? - Black box and white box testing - Test plan, design, automation, execution, evaluation

**Unit 2 (18 Hours)**

**2.1 Test Automation**

Software Testability - Components of a Test Case - Test Automation Frameworks - JUnit - Test driven development - Cost-of-change curve - Continuous Integration - System tests in agile methods - code refactoring

**2.2 Criteria-Based Test Design**

Coverage - Minimal, minimum test set - coverage level - advantages of using coverage criteria

<b>Unit</b>	<b>3</b>	<b>(18 Hours)</b>
	<b>3.1 Input Space Partitioning</b>	
	Input Domain Modeling - Combination Strategies Criteria - Handling constraints among characteristics	
	<b>3.2 Graph Coverage</b>	
	Graph Coverage Criteria - Graph Coverage for Source Code - Graph Coverage for Design Elements - Graph Coverage for Specifications - Graph Coverage for Use Cases	
<b>Unit</b>	<b>4</b>	<b>(13 Hours)</b>
	<b>4.1 Logic Coverage</b>	
	Semantic Logic Coverage Criteria - Syntactic Logic Coverage Criteria - Structural Logic Coverage of Programs - Specification-based Logic Coverage	
<b>Unit</b>	<b>5</b>	<b>(11 Hours)</b>
	<b>5.1 Syntax-based Testing</b>	
	Syntax-based Coverage Criteria - Program-based Grammars - Integration and Object-Oriented Testing	
	<b>5.2 Security Testing</b>	
	What is Security Testing/ Penetration Testing? – Black Box – White Box – Gray Box – Testing teams - Types of penetration tests	
	<b>5.3 Case Study on different tools (Only for component)</b>	

## **BOOKS FOR STUDY**

Ammann, Paul, and Jeff Offutt. *Introduction to software testing*. Cambridge University Press, 2016.

Desikan, Srinivasan, and Gopalaswamy Ramesh. *Software testing: principles and practice*. Pearson Education India, 2006.

Tomek Kaczanowski , *Practical Unit Testing with JUnit and Mockito*. 2013

## **BOOKS FOR REFERENCE**

Naik, Sagar and Piyu Tripathy. *Software Testing and Quality Assurance: Theory and Practice*. Wiley.

## **WEB RESOURCES**

<https://resources.infosecinstitute.com/category/certifications-training/pentesting-certifications/introduction-overview/> [security testing]  
[https://www.tutorialspoint.com/security\\_testing/index.htm](https://www.tutorialspoint.com/security_testing/index.htm)  
<https://www.owasp.org/images/1/19/OTGv4.pdf>  
<https://www.coresecurity.com/penetration-testing-overview>

**Practical**

Writing Test cases manually  
Testing using JUnit  
Test Driven Development  
Integration testing  
Coverage Criteria

**PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks: 50      Duration: 90 minutes**

Theory – 25 marks  
Practical – 25 marks

Section A -  $3 \times 5 = 15$  marks (3 out of 4)

Section B -  $1 \times 10 = 10$  marks (1 out of 2)

**Other Components      Total Marks:50**

Seminars/Group discussion/Assignments/Case studies

**End Semester Examination      Total Marks: 100      Duration: 3 hours**

**Theory – 50 marks      Duration –  $1\frac{1}{2}$  hrs**

**Practical – 50 marks      Duration –  $1\frac{1}{2}$  hrs**

**Theory Pattern**

Section A -  $5 \times 2 = 10$  marks (Answer all the questions)

Section B -  $4 \times 5 = 20$  marks (4 out of 6)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

(Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**MOBILE COMPUTING**

**CODE: 19CS/PE/MC15**

**CREDITS: 5**

**L T P : 5 1 0**

**TOTAL TEACHING HOURS: 78**

**OBJECTIVES OF THE COURSE**

- To understand the basic concepts of mobile computing
- To be familiar with the network protocol stack
- To learn the basics of mobile telecommunication system
- To understand the functionality of Transport and Application layers
- To gain conceptual knowledge on Ad-Hoc networks

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Illustrate the generations of telecommunication systems in wireless networks
- Describe wireless and mobile communications systems and be able to choose an appropriate mobile system from a set of requirements.
- Determine the functionality of MAC, network layer and identify a routing protocol for a given Ad hoc network
- Explain the functionality of Transport and Application layers
- Appraise the quality and performance of mobile applications

**Unit 1 (18 Hours)**

**1.1 Basics of Communication Technologies**

Cell Phone System – Types of Telecommunication networks – Computer Networks – Traditional LAN – LAN Architectures – Components of Wireless Communication System – Architecture of Mobile Telecommunication System – Wireless Networking Standards – WLANs – Bluetooth Technology

**1.2 Mobile Computing and Wireless Networking**

What is Mobile Computing? - Mobile Computing vs Wireless Networking – Applications – Characteristics – Structure – Cellular Mobile Communication - GSM – GPRS – UMTS –Broadcast Systems – Market for mobile communications – Simplified reference model

**1.3 MAC Protocols**

Properties – Wireless MAC Protocols- Taxonomy of MAC Protocols – Fixed Assignment Schemes : FDMA, TDMA, CDMA – Radom Assignment Schemes: ALOHA, CSMA – Reservation-based Schemes – The 802.11 MAC standard – MAC protocols for Ad Hoc Networks

**Unit 2** **(18 Hours)****2.1 Mobile Internet Protocol**

Mobile IP – Packet delivery –Overview of Mobile IP – Desirable features – Key Mechanisms – Route Optimization – Dynamic Host Configuration Protocol (DHCP)

**2.2 Mobile Transport Layer**

Overview of TCP/IP – Terminologies – Architecture – Overview of the operation of TCP – Application layer protocols of TCP – TCP/IP vs ISO/OSI model – Adaptation of TCP window – Improvement in TCP Performance

**Unit 3** **(15 Hours)****3.1 Mobile Databases**

Issues in Transaction Processing – Transaction Processing Environment: Centralized , Client-server, Distributed Environment – Mobile Environment – Data Dissemination – Transaction processing in Mobile Environment : Atomicity, Consistency, Isolation, Durability – Data replication – Mobile Transaction Models – Roll back process – Query processing - Recovery

**3.2 Mobile Ad Hoc Networks**

Basic Concepts – Characteristics – Applications – MANET Design Issues – Routing Essentials of Traditional Routing Protocols : Link state, Distance vector – Routing in MANET's – Popular MANET protocols: DSDV, DSR, AODV, Zone Routing protocol, Multicast Routing protocols – Vehicular Ad Hoc networks – MANET vs VANET – Security issues in MANET – Attacks – Counter measures

**Unit 4** **(15 Hours)****4.1 Wireless Sensor Networks**

WSN vs. MANET – Applications – Architecture – Challenges – Characteristics – WSN Routing protocols – Target Coverage

**4.2 Operating Systems for Mobile Computing**

OS responsibilities in mobile devices – Basic concepts of mobile OS – Constraints and Requirements of mobile OS – Survey of commercial Mobile OS – Comparative study of mobile OS – OS for sensor Networks

**Unit 5** **(12 Hours)****5.1 Support for Mobility**

File systems – WWW – Wireless application protocol – Wireless telephony application - Push architecture – Push/Pull services - Introduction to LiFi

**5.2 Mobile Commerce (Example of Mobile Computing Infrastructure)**

Applications of M-Commerce – Business to Business Applications – Structure of M-Commerce – Pros and Cons – Mobile payment Systems – Security Issues

**BOOKS FOR STUDY**

Jochen H. Schller, “Mobile Communications”, Second Edition, Pearson Education, New Delhi, 2007.

Prasant Kumar Patnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHI Learning Pvt. Ltd, New Delhi – 2012.

## **BOOKS FOR REFERENCE**

Asoke Talukder, Hasan Ahmed, Rupa Yavagal, "Mobile Computing: Technology, Applications and Services Creation", Second Edition, TMH, 2010.

Mobile Communication and Computing by Dr. G T. Thampi, DT Editorial Services

William Stallings, "Wireless Communication and Networks", Pearson, 2009.

## **WEB RESOURCES**

<https://purelifi.com/technology/>

[https://www.tutorialspoint.com/mobile\\_computing/mobile\\_computing\\_overview.htm\](https://www.tutorialspoint.com/mobile_computing/mobile_computing_overview.htm)

<https://whatis.ciowhitepapersreview.com/definition/mobile-computing/>

<https://www.techopedia.com/definition/8270/mobile-computing-device-mcd>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks:50      Duration: 90 minutes**

Section A -  $5 \times 2 = 10$  (Answer all the questions)

Section B -  $4 \times 5 = 20$  (4 out of 5)

Section C -  $2 \times 10 = 20$  (2 out of 3)

**Other Components      Total Marks:50**

Quiz/Assignment/Seminar/Group Discussion/Paper presentation/Case study

**End Semester Examination      Total Marks: 100      Duration: 3 hours**

Section A -  $10 \times 2 = 20$  marks (Answer all the questions)

(2 questions to be set from each unit)

Section B -  $6 \times 5 = 30$  marks (6 out of 8)

(atleast 1 question from each unit)

Section C -  $5 \times 10 = 50$  marks (5 out of 7)

(atleast 1 question from each unit)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 86**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**ADVANCED TECHNOLOGIES**

**CODE: 19CS/PE/AT15**

**CREDITS: 5**

**L T P: 5 1 0**

**TOTAL TEACHING HOURS: 78**

**OBJECTIVES OF THE COURSE**

- To understand the fundamentals of Neural Network and deep learning architectures
- To explore the applications of Deep Learning
- To understand the fundamentals of BitCoin and BlockChain
- To learn the basic of Quantum Computing
- To demonstrate an understanding of leading technology

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Analyse how, and when, to use deep network architecture
- Comprehend the major concepts of BitCoin
- Discuss and asses real-life use cases of Blockchain technologies
- Apply the modern technology
- Learn the framework of quantum computation

**Unit 1**

**(15 Hours)**

**1.1 Neural Networks and Deep Learning**

Neural Networks - Training NN - Activation Functions - Loss Functions - Hyper Parameters

**Unit 2**

**(17 Hours)**

**2.1 Deep Networks**

Defining Deep Learning - Architectural Principles of Deep Networks - Building Blocks of Deep Networks - Unsupervised Pretrained Networks – Convolution Neural Networks - Recurrent NNs - Recursive NNs - Applications of Deep Learning in Natural Language Processing

## **Unit 3** (17 Hours)

### **3.1 BitCoin**

BitCoin – History of BitCoin- Bitcoin Uses, Users- Transactions, Blocks, Mining, and the Blockchain- Bitcoin Transactions- Constructing a Transaction-Bitcoin Mining- Mining transactions in blocks- Spending the transaction- Keys, Addresses, Wallets- Introduction- Bitcoin Addresses- Wallets- The Bitcoin Network- Peer-to-Peer Network Architecture- Nodes Types and Roles- The Extended Bitcoin Network- Network Discovery-Full Nodes - Exchanging “Inventory”- Simplified Payment Verification (SPV) Nodes- Bloom Filters- Transaction Pools

## **Unit 4** (15 Hours)

### **4.1 Blockchain**

The Blockchain- Structure of a Block- Block Header- Block Identifiers - Block Header Hash and Block Height - The Genesis Block- Linking Blocks in the Blockchain- Merkle Trees- Merkle Trees and Simplified Payment Verification (SPV)- Mining and Consensus- De-Centralized Consensus- Independent Verification of Transactions- Mining Nodes- Aggregating Transactions into Blocks- Mining the Block- Assembling and Selecting Chains of Blocks- Mining and the Hashing Race- Consensus Attacks- Bitcoin Security- Security principles- User Security Best Practices

## **Unit 5** (14 Hours)

### **5.1 Quantum Computing**

Overview- The Circuit Model of Computation- A Linear Algebra Formulation of the Circuit Model- Reversible Computation- A Preview of Quantum Physics- Quantum Physics and Computation- Qubits and The Framework of Quantum Mechanics- A Quantum Model of Computation – Quantum Computing Applications

## **BOOKS FOR STUDY**

Andreas M. Antonopoulos. *Mastering Bitcoin: Programming the Open Block chain*. O'Reilly Media, Inc.,2017. (Unit 3, Unit 4)

Patterson, Josh, and Adam Gibson. *Deep Learning: A Practitioner's Approach*. O'Reilly Media, Inc., 2017. (Unit 1, Unit 2)

Phillip Kaye, Raymond Laflamme and Michele Mosca. *An Introduction to Quantum Computing*, Oxford University press, 2007. (Unit 5)

## **BOOKS FOR REFERENCE**

Deng & Yu. *Deep Learning: Methods and Applications*, Now Publishers, 2013.

IanGoodfellow, Yoshua Bengio, and Aaron Courville.*Deep Learning*, MIT Press, 2016.

Karim, Md Rezaul. *Java Deep Learning Projects: Implement 10 real-world deep learning applications using Deeplearning4j and open source APIs*. Packt Publishing Ltd, 2018.

Michael A. Nielsen and Isaac L. Chuang. *Quantum Computation and Quantum Information*, Cambridge University Press, 2000.

Melanie Swan. *Blockchain*. O'Reilly Media, 2015.

## **WEB RESOURCES**

<http://deeplearning.net/>

<https://www.pyimagesearch.com/deep-learning-computer-vision-python-book/>

<https://blockgeeks.com/guides/what-is-blockchain-technology/>

<https://www.research.ibm.com/ibm-q/learn/what-is-quantum-computing/>

<https://www.research.ibm.com/ibm-q/learn/quantum-computing-applications/>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks: 50      Duration: 90 minutes**

Section A -  $5 \times 2 = 10$  (Answer all the questions)

Section B -  $4 \times 5 = 20$  (4 out of 5)

Section C -  $2 \times 10 = 20$  (2 out of 3)

**Other Components      Total Marks: 50**

Quiz/Assignment/Seminar/Group Discussion/Paper presentation/Case studies

**End Semester Examination      Total Marks: 100      Duration: 3 hours**

Section A -  $10 \times 2 = 20$  marks (Answer all the questions)  
(2 questions to be set from each unit)

Section B -  $6 \times 5 = 30$  marks (6 out of 8)  
(atleast 1 question from each unit)

Section C -  $5 \times 10 = 50$  marks (5 out of 7)  
(atleast 1 question from each unit)

Note: Syllabus is subject to change depending on the trends

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 86**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**VISUAL PROGRAMMING**

**CODE: 19CS/PE/VP15**

**CREDITS:5**

**L T P:3 0 3**

**TOTAL TEACHING HOURS:78**

**OBJECTIVES OF THE COURSE**

- To learn basics of C# programming
- To introduce the concepts of Web Programming using ASP.NET
- To understand state management
- To introduce advanced concepts of Web Technology and LINQ using C# and ASP.NET
- To generate reports using Crystal reports

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Write Object Oriented Programs using C#
- Create a web application
- Effectively use the concept of state management
- Create persistent applications using LINQ
- Generate required reports

**Unit 1**

**1.1 C# Fundamentals**

**(16 Hours)**

Overview of .NET Framework - C# Fundamentals- Variables and Constants, Value Types, Reference Types, Type Conversions, Boxing and Unboxing, Expressions and Operators, Flow Control and Exception Handling - Control Flow Statements: Selection Statements, Iteration Statements or Loops, Jump Statements - Exception Handling - try...catch...finally Statement, throw Statement - Exploring Namespaces, Classes and Objects - Syntax of a Class, Method as Class Member, Access Modifiers, Objects, Constructors and Destructors, Static Classes and Static Class Members - Properties

**Unit 2**

**(17 Hours)**

**2.1 ASP.NET**

Life cycle- Specifying a Location for a Web Application -Single-File Page Model - Code-Behind Page Model - Adding controls to web form

## **2.2 Web Server Controls**

The Control Class - The WebControl Class - The Button Control - The TextBox Control -The Label Control - The HyperLink Control -The LinkButton Control -The PlaceHolder Control - The HiddenField Control - The CheckBox Control -The RadioButton Control - The ListBox Control -The DropDownList Control -The Image Control -The ImageButton Control - The Table Control - Menus - Validation Server Controls - Master page - Web.Config

**Unit 3** **(15 Hours)**

### **3.1 State Management**

Understanding the session object - Sessions and the Event Model, Configuring, In-Process Session State, Out-of-Process Session state - Application Object - Query strings - Cookies, -ViewState - Global.asax

### **3.2 XML and .NET**

Basics of XML - Create XML Document - Reading XML with XmlReader - Reading XML with XmlDocument - Working with XmlNode - Using XPath with XmlDocument - Writing XML with XmlWriter - Writing XML with XmlDocument - The XMLDataSource Control

**Unit 4** **(16 Hours)**

### **4.1 LINQ**

Introducing LINQ Queries - Standard Query Operators - Introducing LINQ to Dataset, SQL and XML - The LinqDataSource Control - Data Binding – Grid View, Details view, Forms view

**Unit 5** **(14 Hours)**

### **5.1 ASP. NET AJAX**

Understanding the need for AJAX - Building a simple ASP.NET page without AJAX - Building a simple ASP.NET page with AJAX

### **5.2 Crystal Reports**

Overview to Crystal Reports - Creating Crystal Reports with wizards - Integrating with Web Applications

## **BOOKS FOR STUDY**

Deitel, Paul and Harvey M. Deitel. *C# 2012 for Programmers*. Pearson Education, 5<sup>th</sup> ed.

Kogent Learning Solutions. *C# 2012 Programming Covers .NET 4.5 Black Book*. Dreamtech press, 2013.

## **BOOKS FOR REFERENCE**

Liberty, Jesse. *Programming C#*. 4<sup>th</sup> ed. O'Reilly Media, 2009.

Schildt, Herbert. *Complete Reference C#*. New Delhi: TMH Publication, 2009.

## **WEB RESOURCES**

<https://msdn.microsoft.com/en-us/library/aa288436%28v=vs.71%29.aspx>  
<http://www.w3schools.com/aspnet/aspnet.asp>

<http://csharp.net-tutorials.com/xml/introduction/>  
<http://ajax.net-tutorials.com/basics/introduction/>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment Test:**      **Total Marks:50**      **Duration:90 minutes**

**Theory – 25 marks**

**Practical – 25 marks**

Section A -  $3 \times 5 = 15$  marks (3 out of 4)

Section B -  $1 \times 10 = 10$  marks (1 out of 2)

**Other Components:**      **Total Marks:50**

Quiz/Assignment/Debugging/Seminar/Analysis of real time applications/Developing web applications/ Code Reading

**End Semester Examination Total Marks: 100**

**Theory – 50 marks**      **Duration – 1 ½ hours**

### **Theory Pattern**

Section A -  $5 \times 2 = 10$  marks (Answer all the questions)

(1 question to be set from each unit)

Section B -  $4 \times 5 = 20$  marks (4 out of 6)

Section C -  $2 \times 10 = 20$  marks (2 out of 3)

(Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

### **Project Demonstration and Viva: 50 Marks**

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 86**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**ADVANCED TECHNOLOGIES**

**CODE: 19CS/PE/AT15**

**CREDITS: 5**

**L T P: 5 1 0**

**TOTAL TEACHING HOURS: 78**

**OBJECTIVES OF THE COURSE**

- To understand the fundamentals of Neural Network and deep learning architectures
- To explore the applications of Deep Learning
- To understand the fundamentals of BitCoin and BlockChain
- To learn the basic of Quantum Computing
- To demonstrate an understanding of leading technology

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Analyse how, and when, to use deep network architecture
- Comprehend the major concepts of BitCoin
- Discuss and asses real-life use cases of Blockchain technologies
- Apply the modern technology
- Learn the framework of quantum computation

**Unit 1**

**(15 Hours)**

**1.1 Neural Networks and Deep Learning**

Neural Networks - Training NN - Activation Functions - Loss Functions - Hyper Parameters

**Unit 2**

**(17 Hours)**

**2.1 Deep Networks**

Defining Deep Learning - Architectural Principles of Deep Networks - Building Blocks of Deep Networks - Unsupervised Pretrained Networks – Convolution Neural Networks - Recurrent NNs - Recursive NNs - Applications of Deep Learning in Natural Language Processing

## **Unit 3** (17 Hours)

### **3.1 BitCoin**

BitCoin – History of BitCoin- Bitcoin Uses, Users- Transactions, Blocks, Mining, and the Blockchain- Bitcoin Transactions- Constructing a Transaction-Bitcoin Mining- Mining transactions in blocks- Spending the transaction- Keys, Addresses, Wallets- Introduction- Bitcoin Addresses- Wallets- The Bitcoin Network- Peer-to-Peer Network Architecture- Nodes Types and Roles- The Extended Bitcoin Network- Network Discovery-Full Nodes - Exchanging “Inventory”- Simplified Payment Verification (SPV) Nodes- Bloom Filters- Transaction Pools

## **Unit 4** (15 Hours)

### **4.1 Blockchain**

The Blockchain- Structure of a Block- Block Header- Block Identifiers - Block Header Hash and Block Height - The Genesis Block- Linking Blocks in the Blockchain- Merkle Trees- Merkle Trees and Simplified Payment Verification (SPV)- Mining and Consensus- De-Centralized Consensus- Independent Verification of Transactions- Mining Nodes- Aggregating Transactions into Blocks- Mining the Block- Assembling and Selecting Chains of Blocks- Mining and the Hashing Race- Consensus Attacks- Bitcoin Security- Security principles- User Security Best Practices

## **Unit 5** (14 Hours)

### **5.1 Quantum Computing**

Overview- The Circuit Model of Computation- A Linear Algebra Formulation of the Circuit Model- Reversible Computation- A Preview of Quantum Physics- Quantum Physics and Computation- Qubits and The Framework of Quantum Mechanics- A Quantum Model of Computation – Quantum Computing Applications

## **BOOKS FOR STUDY**

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Patterson, Josh, and Adam Gibson. *Deep Learning: A Practitioner's Approach*. O'Reilly Media, Inc., 2017. (Unit 1, Unit 2)

Phillip Kaye, Raymond Laflamme and Michele Mosca. *An Introduction to Quantum Computing*, Oxford University press, 2007. (Unit 5)

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IanGoodfellow, Yoshua Bengio, and Aaron Courville.*Deep Learning*, MIT Press, 2016.

Karim, Md Rezaul. *Java Deep Learning Projects: Implement 10 real-world deep learning applications using Deeplearning4j and open source APIs*. Packt Publishing Ltd, 2018.

Michael A. Nielsen and Isaac L. Chuang. *Quantum Computation and Quantum Information*, Cambridge University Press, 2000.

Melanie Swan. *Blockchain*. O'Reilly Media, 2015.

## **WEB RESOURCES**

<http://deeplearning.net/>

<https://www.pyimagesearch.com/deep-learning-computer-vision-python-book/>

<https://blockgeeks.com/guides/what-is-blockchain-technology/>

<https://www.research.ibm.com/ibm-q/learn/what-is-quantum-computing/>

<https://www.research.ibm.com/ibm-q/learn/quantum-computing-applications/>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment      Total Marks: 50      Duration: 90 minutes**

Section A -  $5 \times 2 = 10$  (Answer all the questions)

Section B -  $4 \times 5 = 20$  (4 out of 5)

Section C -  $2 \times 10 = 20$  (2 out of 3)

**Other Components      Total Marks: 50**

Quiz/Assignment/Seminar/Group Discussion/Paper presentation/Case studies

**End Semester Examination      Total Marks: 100      Duration: 3 hours**

Section A -  $10 \times 2 = 20$  marks (Answer all the questions)  
(2 questions to be set from each unit)

Section B -  $6 \times 5 = 30$  marks (6 out of 8)  
(atleast 1 question from each unit)

Section C -  $5 \times 10 = 50$  marks (5 out of 7)  
(atleast 1 question from each unit)

Note: Syllabus is subject to change depending on the trends

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**

**Post Graduate Elective Course offered by the Department of Computer Science  
to M.A. / M.Sc. / M.Com. Degree Programme**

**SYLLABUS**

(Effective from the Academic Year 2019-2020)

**DOCUMENTATION AND PRESENTATION**

**CODE: 19CS/PE/DP23**

**CREDITS: 3**

**LTP: 2 0 1**

**TOTAL TEACHING HOURS: 39**

**OBJECTIVES OF THE COURSE**

- To give students the knowledge and understanding to prepare formatted documents and powerful presentations
- To provide hands-on use of Microsoft Office applications
- To learn the features of Latex to prepare for a writing of journals, Paper Publications
- To give the knowledge of other word processing tools to cope up with current technology
- To learn about other word processing tools

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Create a document in Word with proper formatting
- Use Word to create personal, academic and business documents following current industry standards
- Create an effective presentation in Microsoft PowerPoint that is interactive and legible content
- Write a proper journal paper or Publish a book with proper formatting using Latex
- Make use of new word processing tools and work in cloud environment

**Unit 1**

**(10 Hours)**

**1.1 Word Processing**

Introduction – The Style Advantage, Outlining, -Autocorrect – Compatibility with previous versions of word– Styles and Character/Font Formatting – Bullets and Numbering – Character Formatting – Paragraph Formatting – Styles and paragraph Formatting, Structural Formatting, paragraph Decoration – Find, Replace and GO To – Language Tools – Auto Correct – Auto Format – Tables – Pictures and SmartArt – Headers and Footers - Symbols and Equations - Charts – Inserting Objects and Files - Bookmarks –Tables of Contents –Footnotes and Endnotes - Citations and Bibliography – Indexing – Table of Authorities – Hyperlinks and Cross-References - Envelopes and Labels - Data Documents and Mail Merge- Protection Type - Integration with other office Applications – Excel, PowerPoint

**Unit 2** **(10 Hours)****2.1 Presentation Tool**

Introduction to PowerPoint – Changing the view – Creating a good presentation - Creating and saving Presentation Files –Creating New Slides and Text Boxes –Working with Layout, Themes and Masters –Formatting Text –Formatting Paragraphs –Correcting and Improving Text –Creating and Formatting Tables- Creating SmartArt Diagrams– Importing Image Files into PowerPoint –Compressing Images –Creating a Photo Album Layout- Working with Charts – Working with External Content- Copying Content from Other Programs - Adding Sound Effects, Music and Soundtracks –Creating Animation Effects and Transitions –Creating Support Materials –Preparing for a Live Presentation – Limiting User Access to a Presentation

**Unit 3** **(7 Hours)****3.1 LATEX**

Introduction – Installation of LATEX – Creating a simple Document -Using Simple Commands - Packages-Special characters and symbols – Lists - Fonts - Aligning material in Rows and Columns

**3.2 Structuring your Document**

Author and title information - Abstract - Chapters, Sections, Subsections - Creating a Table of contents - Cross-Referencing – Creating a Bibliography - Page Styles and Page Numbering – Multi Lingual Support: Using the babel package

**Unit 4** **(6 Hours)****4.1 Graphicx Package**

Graphical Transformations -Package Options – Floats – Figures -Side-By-Side Figures - Tables - Side-by-Side Tables - Sideways Floats - Sub-Floats -Defining Commands

**4.2 Mathematics**

In-Line Mathematics - Displayed Mathematics - Multiple Lines of Displayed Maths – Mathematical commands

**Unit 5** **(6 Hours)****5.1 Other tools**

Working with Zoho and creating documents/presentations- Working with Google Docs - Creating surveys with google forms and generating reports.

**BOOKS FOR STUDY**

Faith Wempen. *PowerPoint 2013 Bible*. Wiley Publishing, Inc.

Herb Tyson. *Microsoft® Word 2010 Bible*. Wiley Publishing, Inc.

Lisa A. Bucki. *Word 2013 Bible*. Wiley Publishing, Inc.

Nicola L. C. Talbot. *LATEX for Complete Novices*, 2012 Dickimaw Books.

## **BOOKS FOR REFERENCE**

Echo Swinford. *My PowerPoint 2016*. Pearson education

Freedman J. *Microsoft Word 2013 Plain & Simple* 2013. Microsoft Press

Helmut Kopka, Patrick W. Daly. *LATEX and Electronic Publishing*. Fourth Edition. Addison - Wesley 2004.

Lambert Joan. *Microsoft Word 2016 Step by Step* 1<sup>st</sup> ed. Microsoft Press. 2016.

Lambert Joan. *Microsoft Power point 2016 Step by Step* 1<sup>st</sup> ed. Microsoft Press. 2016.

Price Michael. McGrath Mike *Office 2016 Step by Step* 1<sup>st</sup> ed. Microsoft Press 2016.

Leslie Lamport. *LATEX -A Document Preparation System -User's Guide and Reference Manual*. Addison -Wesley Publishing Company. 1994

Stefan Kottwitz. *LaTeX Beginner's Guide*. Packt Publishing 2011

## **WEB RESOURCES**

<http://www.onlineprogrammingbooks.com/free-ebook-microsoft-office-powerpoint/>

<http://bookboon.com/en/microsoft-office-powerpoint-ebook#download>

[https://www.dit.ie/media/ittraining/msoffice/MOAC\\_Word\\_2016\\_Core.pdf](https://www.dit.ie/media/ittraining/msoffice/MOAC_Word_2016_Core.pdf)

<https://www.zoho.com/docs/help/content-management.html>

## **PATTERN OF ASSESSMENT**

**CONTINUOUS ASSESSMENT – Practical - 50 marks**

**Component 1 - 25 marks**

Mini Project Phase 1: Preparing a document using a documentation tool.

**Component 2 – 25 marks**

Mini Project Phase 2: Presenting a Report using a tool.

**END SEMESTER EXAMINATION – Practical (3 Hours) - 100 Marks.**

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**Post Graduate Elective Course offered by the Department of Computer Science  
to M.A. / M.Sc. / M.Com. Degree Programme**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**EMERGING TRENDS IN INFORMATION TECHNOLOGY**

**CODE: 19CS/PE/ET23**

**CREDITS : 3**

**L T P : 3 0 0**

**TOTAL TEACHING HOURS: 39**

**OBJECTIVES OF THE COURSE**

- To introduce the emerging trends of the current industry
- To enable students to learn about the current technologies
- To improve their research skills
- To provide students an opportunity to explore different areas of interest

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Enumerate the emerging technologies of IT industry
- Demonstrate knowledge about the significance of Emerging Technologies
- Identify areas in which these emerging technologies can be used
- Integrating more than one technology for effective solutions
- Identify research areas of interest from AR, VR, AI and Cloud Computing

**Unit 1 (9 Hours)**

**1.1 Introduction to Augmented and Virtual Reality**

Computer-Generated Worlds -What Is Augmented Reality? - What Is Virtual Reality?

**1.2 Applications**

Gaming and Entertainment, Architecture and Construction-Science and Engineering - Health and Medicine-Aerospace and Defense -Education-Telerobotic and Telepresence

**Unit 2 (8 Hours)**

**2.1 Artificial Intelligence**

Artificial Intelligence and Agents - What Is Artificial Intelligence? - A Brief History of AI-Agents Situated in Environments-Knowledge Representation-Dimensions of Complexity- Applications of AI

**Unit 3 (9 Hours)**

**3.1 3D Printing**

Introduction –The Basics of 3D printing -3D Print Methods and Materials-

Material Extrusion - Fused Filament Fabrication -General design considerations for 3D Printing – Applications of FFF

### **3.2 Applications**

Industrial Applications-3D Printing in space, Housing, Clothing, Medical Applications

## **Unit 4**

### **4.1 Cloud Computing**

**(7 Hours)**

Introduction-Cloud Computing at a glance-Building cloud computing Environments-Cloud Computing Architecture-Introduction -The cloud reference model -Types of clouds

## **Unit 5**

**(6 Hours)**

### **5.1 Applications**

Cloud Applications -Scientific applications -Business and consumer applications - Social networking-Media applications -Multiplayer online gaming

## **BOOKS FOR STUDY**

Ben Redwood, Filemon Schöffer. *The 3D Printing Handbook: Technologies, design and applications.*, 2018 (Unit 3.2)

David Poole Alan Mackworth. *Artificial Intelligence-Foundations of Computational Agents*. Cambridge University Press,2010. (Unit 2)

Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi. *Mastering Cloud Computing Foundations and Applications Programming*. Newnes.,2013 (Unit 4&5)

Steve Aukstakalnis. *Practical Augmented Reality -A Guide to the Technologies, Applications, and Human Factors for AR and VR*. Pearson Education, Inc.,2017. (Unit 1)

Victoria Zukas, Jonas A. Zukas. *An introduction to 3D Printing*. First Edition Design Pub.,2015. (Unit 3.1)

## **BOOKS FOR REFERENCE**

Dieter Schmalstieg, Tobias Hollerer. *Augmented Reality: Principles and Practice (Usability)*.

Helen Papagiannis. *Augmented Human: How Technology Is Shaping the New Reality*.

Nils J. Nilsson. *The Quest for Artificial Intelligence A History of Ideas And Achievements*. Web Version by Cambridge University Press.

Sean Morey and John Tinnell. *Augmented Reality: Innovative Perspectives across Art, Industry, and Academia*.

## **WEB RESOURCES**

<http://www.cambridge.org/us/0521122937>  
<https://artint.info/index.html>

### **PATTERN OF ASSESSMENT**

<b>Continuous Assessment Test</b>	<b>Total Marks:50</b>	<b>Duration: 90 minutes</b>
Section A - $5 \times 2 = 10$ (Answer all the questions)		
Section B - $4 \times 5 = 20$ (4 out of 5)		
Section C - $2 \times 10 = 20$ (2 out of 3)		

<b>Other Components</b>	<b>Total Marks:50</b>
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Case study on technology in real time scenarios  
Poster Presentation on any one Emerging Trends  
Dissertation

<b>End Semester Examination</b>	<b>Total Marks: 100</b>	<b>Duration: 3 hours</b>
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Section A - $10 \times 2 = 20$ marks (Answer all the questions) (2 questions to be set from each unit)	
Section B - $6 \times 5 = 30$ marks (6 out of 8) (atleast 1 question from each unit)	
Section C - $5 \times 10 = 50$ marks (5 out of 7) (atleast 1 question from each unit)	

**STELLA MARIS COLLEGE (AUTONOMOUS) – CHENNAI – 600 086**

**Post Graduate Elective Course offered by the Department of Computer Science  
to M.A. / M.Sc. / M.Com. Degree Programme**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

**MULTIMEDIA**

**CODE: 19CS/PE/MM23**

**CREDITS: 3**

**L T P: 2 0 1**

**TOTAL TEACHING HOURS: 39**

**OBJECTIVE OF THE COURSE**

- To know about Multimedia and its elements
- To acquire skills in Multimedia using tools - Photoshop, Flash and Dreamweaver
- To enable students, develop a static web site using the acquired skills

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Edit images using Photoshop
- Design their own textures, logos and also to create animations
- Design and structure a web page with different elements using Dreamweaver

**Unit 1 (3 Hours)**

**1.1 Introduction**

What is Multimedia – Where to use Multimedia – Introduction to Text, Images, Sound, Animation, Video – File Formats - Stages of a Multimedia Project – Hardware – Software – Authoring Systems – Multimedia Team – Introduction to designing for the World Wide Web

**Unit 2 (11 Hours)**

**2.1 Introduction to Adobe Photoshop**

Features of Adobe Photoshop - Workspace basics – Panels and menus, Tools, Rulers, Undo and History, Keyboard Shortcuts, Grids and Guides – Image and Color Basics - Palettes, Customizing Color Pickers and Swatches - Image and Color Basics - Blending Modes – Creating, Opening, Importing images in Photoshop - Layer Basics – Saving the Photoshop File

**2.2 Tools**

Selection Tools - Drawing and Painting - Assisting Tools – Image Adjustments – Repair and Restoration – Reshaping and Transformation – Adding Text

**Unit 3 (11 Hours)**

**3.1 Introduction to Adobe Flash**

Features, Flash Work Environment - Stage, Menu Bar, Drawing Tools and their Modifiers - Basic Drawing Techniques – Timeline - Layers - Symbols – Libraries - Object types - Image types - Graphics formats - Colors and Resolution

**3.2 Animation Techniques**

Animation basics - Tweening and its Types - Shape Hint - Frame-by-Frame Animation - Text Animations - Creating Guide Path, Banners - Layer Masking -

Onion Skinning - Spot Light Effects – Buttons - Linking Images - Slide Shows - Adding Sound to Movies - Working with Scenes - Publishing Movies

**Unit 4 (9 Hours)**

**4.1 Introduction to Adobe Dreamweaver**

Features of Dreamweaver - Customizing Your Workspace - HTML Basics - Text, Lists and Tables -Working with Images - Working with the Insert Panel - Copying and Pasting Images from Photoshop - Working with Navigation – Creating Internal Hyperlinks - Creating an Image-based Link - Creating an External Link - Working with Forms - Form Elements

**Unit 5 (5 Hours)**

**5.1 Mini Project**

Create a website using Dreamweaver, Photoshop and Flash

**BOOKS FOR REFERENCE**

Adobe Creative Team, *Adobe Photoshop CS6 Classroom in a Book*, Adobe Press, 2012.

Adobe Creative Team, *Adobe Flash Professional CS6 Classroom in a Book*, Adobe Press, 2012.

Adobe Creative Team, *Adobe Dreamweaver CS6 Classroom in a Book*, Adobe Press, 2012.

Jeremy Osborn, Jennifer Smith, AGI Creative Team, *Web Design with HTML and CSS Digital Classroom*, Wiley Publishing, 2011.

Tay Vaughan, *Multimedia: Making it Work Eighth Edition*, Mc Graw Hill, 2011.

**WEB RESOURCES**

[https://help.adobe.com/archive/en/photoshop/cs6/photoshop\\_reference.pdf](https://help.adobe.com/archive/en/photoshop/cs6/photoshop_reference.pdf)

[https://help.adobe.com/archive/en/flash/cs6/flash\\_reference.pdf](https://help.adobe.com/archive/en/flash/cs6/flash_reference.pdf)

[https://help.adobe.com/archive/en/dreamweaver/cs6/dreamweaver\\_reference.pdf](https://help.adobe.com/archive/en/dreamweaver/cs6/dreamweaver_reference.pdf)

<https://www.w3schools.com/html/default.asp>

<https://www.w3schools.com/css/default.asp>

**PATTERN OF ASSESSMENT**

**Continuous Assessment Test      Total Marks: 50      Duration: 90 minutes**

**Theory - 25 Marks**

**Practical - 25 Marks**

Section A -  $3 \times 5 = 15$  marks (3 out of 4)

Section B -  $1 \times 10 = 10$  marks (1 out of 2)

**Other Components      Total Marks:50**

Practical/Analysis/Case Study

**End Semester Examination      Total Marks: 100 marks**

**Theory – 50 marks      Duration – 1 ½ hrs.**

**Project Demonstration and Viva – 50 marks**

**Theory Pattern**

Section A:  $5 \times 2 = 10$  marks (Answer all the questions)

Section B:  $4 \times 5 = 20$  marks (4 out of 6)

Section C:  $2 \times 10 = 20$  marks (2 out of 3)

(Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**

**Post Graduate Elective Course offered by the Department of Computer Science  
to M.A. / M.Sc. / M.Com. Degree Programme**

**SYLLABUS**

(Effective from the academic year 2019-2020)

**E-COMMERCE AND CONTENT MANAGEMENT SYSTEM**

**CODE: 19CS/PE/EC23**

**CREDITS: 3**

**L T P: 2 0 1**

**TOTAL TEACHING HOURS: 39**

**OBJECTIVES OF THE COURSE**

- To understand overall framework of E-Commerce and the role of internet in modern business
- To learn the strategies for developing electronic commerce Web sites, various payment schemes and security issues in E-Commerce
- To provide hands-on experience in the implementation of E-Commerce using an open source software

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Demonstrate an understanding of E-commerce framework
- Describe the role of internet in modern business
- Apply appropriate strategies to develop an E-Commerce web site
- Implement payment systems appropriately
- Analyze security and search engine optimization

**Unit 1 (8 Hours)**

**1.1 Introduction**

E-Commerce - History, Overview of the Framework - E-Business Models - Network – Infrastructure - Role of Internet - E-commerce and World Wide Web

**1.2 Planning for Electronic Commerce**

Identifying Benefits and Estimating Costs of Electronic Commerce Initiatives - Strategies for Developing Electronic Commerce Web Sites - Managing Electronic Commerce Implementations

**Unit 2 (8 Hours)**

**2.1 Introduction to WordPress**

Discovering WordPress – Installing WordPress

**2.2 Getting Used to the WordPress Environment**

An overview of the Dashboard – WordPress Settings – RSS feeds – User Profile

**Unit 3** **(8 Hours)**

**3.1 WordPress's Site Building Tools and Pages**

Using WordPress's Site Building Tools – Appearance menu – Plugins – Media Library - Pages v Posts – Writing Posts – Internal linking of posts – Homepage of the Site - Custom Menus – User Management – Themes – Widgets – Configure WordPress as a CMS

**Unit 4** **(8 Hours)**

**4.1 Implementing eCommerce with Easycart**

Implementing eCommerce with Easycart - Understanding Easycart - Obtaining and Installing Easycart - Configuring Easycart - Managing Cart settings, Checkout Settings, Order settings, Price Handler settings, Product settings, Store settings - Store Administration - Enhancing Easycart

**Unit 5** **(7 Hours)**

**5.1 Electronic Payment Systems**

Digital Token based EPS – Smart cards – Credit cards – Risks – Designing EPS

**5.2 Electronic Commerce Security and SEO**

Online Security Issues Overview - Security for Client Computers – Communication Channel Security – Security for Server Computers – Main points for safe SEO – WordPress SEO

## **BOOKS FOR STUDY**

Kalakota ,Ravi and Andrew B Whinston. *Frontiers of E-COMMERCE*. Pearson. 2011.

Lonmo, Dennis. *Master WordPress Like A Boss: A Beginners Guide to Planning, Designing, and Creating Your Very Own Unique WordPress Website*. 2018.

Schneider, Gary P. *Electronic commerce*. Cengage Learning, Inc; 11th edition. 2014.

Williams, Brad, David Damstra, and Hal Stern. *Professional WordPress: design and development*. John Wiley & Sons, 2015.

## **BOOKS FOR REFERENCE**

Laudon, Kenneth C; Traver, Carol Guercio *E-Commerce: Business, Technology, Society*. 10<sup>th</sup>ed, Prentice Hall,2013

Plumley, George. *WordPress 24-hour trainer*. John Wiley & Sons, 2015.

Williams, Andy. *Wordpress for beginners, A visual step-by-step guide to creating your own wordpress site in record time, starting from zero*. Amazon Asia-Pacific Holdings Private Limited

## **WEB RESOURCES**

<http://docs.wpeasycart.com/wp-easycart-administrative-console-guide/?section=dashboard>  
<https://www.hostinger.com/tutorials/wordpress/>  
<https://wordpress.org/download/>

## **PATTERN OF ASSESSMENT**

**Continuous Assessment                      Total Marks: 50                      Duration: 90 mins.**

**Theory – 25 marks**

**Practical – 25 marks**

### **Theory Pattern**

Section A -  $3 \times 5 = 15$  marks (3 out of 5)

Section B -  $1 \times 10 = 10$  marks (1 out of 2)

**Other Components                      Total Marks:50**

Practical/Analysis/Case Study

**End Semester Examination                      Total Marks: 100**

**Theory – 50 marks                      Duration – 1 ½ hrs.**

**Project Demonstration and Viva – 50 marks**

### **Theory Pattern**

Section A:  $5 \times 2 = 10$  marks (Answer all the questions)

Section B:  $4 \times 5 = 20$  marks (4 out of 6)

Section C:  $2 \times 10 = 20$  marks (2 out of 3)

(Questions for forty marks towards Section B and Section C should be set such that equal weightage is given to all units)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**

**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**

(Effective from the academic year 2019 – 2020)

**ADVANCED COMPUTER GRAPHICS**

**CODE: 19CS/PI/AC24**

**CREDITS:4**

**OBJECTIVES OF THE COURSE**

- Understand the two dimensional graphics and their transformations.
- Gain knowledge about graphics hardware devices and software used.
- Understand the three dimensional graphics and their transformations.
- Understand illumination and color models.

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Designing 2D, 3D graphics and applying transformations.
- Apply clipping techniques to graphics.
- Apply Illumination and color models.

**Unit 1**

**1.1 Overview of graphics systems**

Video Display Devices - Raster Scan Systems - Random Scan Systems - Graphics Monitors and Workstations - Input Devices - Hard Copy Devices - Graphics Software.

**1.2 Output primitives**

Points and Lines - Line Drawing Algorithms - Loading the Frame Buffer - Line Function-Circle and Ellipse Generating Algorithms - Pixel Addressing and Object Geometry- Filled Area Primitives -Fill-Area Functions- Cell Array - Character Generation – Applications.

**Unit 2**

**2.1 Two Dimensional Geometric Transformations**

Basic Transformation – Matrix representations and homogeneous coordinates, Composite Transformations - Other Transformations-Point Clipping - Line Clipping - Polygon Clipping –Curve Clipping - Text Clipping - Exterior Clipping

**2.2 Three Dimensional Graphics**

Three Dimensional Concepts - Three Dimensional Object Representations – Polygon Surfaces - Polygon Tables- Plane Equations – Polygon Meshes - Curved Lines and Surfaces - Quadratic Surfaces - Blobby Objects.

**Unit 3****3.1 Visual – Surface Detection Methods**

Classification of Visible - Surface Detection Algorithms - Back-Face Detection - Depth-Buffer Method - A-Buffer Method - Scan-Line Method - Depth-Sorting Method - BSP-Tree Method - Area-Subdivision Method - Octree Methods - Ray-Casting Method - Curved Surfaces - Curved-Surface Representations - Surface Contour Plots - Wireframe Methods - Visibility-Detection Functions

**Unit 4****4.1 Illumination and Colour Models**

Light sources – Basic Illumination Models – Displaying Light Intensities - Halftone Patterns and Dithering Techniques – Polygon-Rendering Methods- Constant-Intensity Shading- Gouraud Shading - Phong Shading - Ray-Tracing Methods - Basic Ray-Tracing Algorithm- Ray-Surface Intersection- Calculations- Reducing Object-Intersection – Calculations - Space-Subdivision Methods- Antialiased Ray Tracing- Distributed Ray Tracing-Texture Mapping-Procedural Texturing Method- Bump Mapping- Frame Mapping

**Unit 5****5.1 Color Models and Color Applications**

Properties of Light – Standard Primaries and Chromaticity Diagram, Intuitive Colour Concepts – RGB Colour Model – YIQ Colour Model – CMY Colour Model – HSV Colour Model – HLS Colour Model-Colour Selection and Applications

**5.2 Computer Animation**

Design of Animation sequences – General Computer-Animation functions – Raster animation – Computer-Animation Languages - Key frame systems – Morphing – Simulating Accelerations - Motion Specifications - Direct Motion Specification Goal-Directed Systems-Kinematics and Dynamics.

**BOOKS FOR STUDY**

Donald Hearn and Pauline Baker M, *Computer Graphics*, Prentice Hall, New Delhi, 2007.

John F. Hughes, Andries Van Dam, Morgan Mc Guire ,David F. Sklar , James D. Foley, Steven K. Feiner and Kurt Akeley ,”Computer Graphics: Principles and Practice”, 3rd Edition, Addison- Wesley Professional,2013.

**BOOK FOR REFERENCES**

Donald Hearn and M. Pauline Baker, Warren Carithers, “Computer Graphics With Open GL”, 4th Edition, Pearson Education, 2010.

Hill F S Jr., “Computer Graphics”, Maxwell Macmillan” , 1990.

Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, Jeffrey McConnell, “Computer Graphics: Theory into Practice”, Jones and Bartlett Publishers, 2006.

Kelvin Sung, and AK Peters, Fundamental of Computer Graphics, CRC Press, 2010.

Steve Marschner; Peter Shirley,” Fundamentals of Computer Graphics, 4th Edition, Taylor and Francis Group CRC Press, 2015

William M. Newman and Robert F.Sproull, “Principles of Interactive Computer Graphics”, Mc GrawHill 1978.

## **WEB RESOURCES**

<http://nptel.ac.in/>

<https://www.edx.org/course/computer-graphics/>

## **PATTERN OF ASSESSMENT**

**End Semester Examination:**      **Total Marks: 100**      **Duration: 3 Hours**

Section A -  $10 \times 2 = 20$  marks (Answer all the questions)  
(2 questions to be set from each unit)

Section B -  $6 \times 5 = 30$  marks (6 out of 8)  
(Atleast 1 question from each unit)

Section C -  $5 \times 10 = 50$  marks (5 out of 7)  
(Atleast 1 question from each unit)

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086**  
**MASTER OF SCIENCE (INFORMATION TECHNOLOGY)**

**SYLLABUS**  
(Effective from the academic year 2019 – 2020)

**DIGITAL IMAGE PROCESSING**

**CODE: 19CS/PI/IP24**

**CREDITS:4**

**OBJECTIVES OF THE COURSE**

- To understand the fundamentals of digital image processing
- To know the techniques for transformation, enhancement, restoration and compression of images
- To learn segmentation and reconstruction of images

**COURSE LEARNING OUTCOMES**

On successful completion of the course, students will be able to

- Knowledge about the fundamentals in image processing
- Understand various spatial and frequency domain techniques available
- Understand the noise model available for image restoration
- Reducing the image size by compression techniques

**Unit 1**

**1.1 Fundamentals of Digital image**

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels

**Unit 2**

**2.1 Spatial Domain**

Gray level transformations – Histogram processing – Basics of Spatial Filtering – Smoothing and Sharpening Spatial Filtering

**2.2 Frequency Domain**

Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters

**Unit 3**

**3.1 Image Restoration**

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering

**Unit 4**

**4.1 Image Compression**

Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Wavelet Coding

**Unit 5**

**5.1 Image Segmentation**

Detection of isolated points – Line Detection – Edge Models – Basic Edge Detection

**5.2 Image Reconstruction**

Principles of Computed Tomography (CT) - Projections and the Radon Transform - The Fourier-Slice Theorem - Reconstruction Using Parallel-Beam Filtered Back projections

**BOOKS FOR STUDY**

Rafael C. Gonzales, Richard E. Woods, “*Digital Image Processing*”, Pearson Education, Third Edition, 2010.

**BOOKS FOR REFERENCE**

Anil Jain K. “*Fundamentals of Digital Image Processing*”, PHI Learning Pvt. Ltd., 2011.

Jayaraman S., Esaki Rajan S., T. Veera Kumar, “*Digital Image Processing*”, Tata McGraw Hill Pvt. Ltd., Second Reprint, 2010.

**WEB RESOURCES**

<http://eeweb.poly.edu/~onur/lectures/lectures.html>

<http://www.caen.uiowa.edu/~dip/LECTURE/lecture.html>

**End Semester Examination: Total Marks: 100 Duration: 3 Hours**

Section A -  $10 \times 2 = 20$  marks (Answer all the questions)  
(2 questions to be set from each unit)

Section B -  $6 \times 5 = 30$  marks (6 out of 8)  
(Atleast 1 question from each unit)

Section C -  $5 \times 10 = 50$  marks (5 out of 7)  
(Atleast 1 question from each unit)