TRUTH CHARITY

# STELLA MARIS COLLEGE

(AUTONOMOUS), CHENNAI - TAMILNADU

**POST GRADUATE DIPLOMA COURSE IN COMPUTER SCIENCE**

**PGDCS**

**(CHOICE BASED CREDIT SYSTEM)**

# SYLLABUS

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

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

## DEPARTMENT OF COMPUTER SCIENCE

## PROGRAMME DESCRIPTION

The Postgraduate Diploma in Computer Science offers knowledge on the concepts of computer technology and use of various programming languages as tools for designing and solving problems.  This degree not only helps the students to pursue career in the IT industry or master's programme 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 understanding of concepts are enhanced with appropriate components which includes case studies, presentations and projects. The students are also given an opportunity to critically analyse an advanced technology of their interest.

Students completing postgraduate Diploma in Computer Science will be equipped in recent advances computer technology.

## PROGRAMME SPECIFIC LEARNING OUTCOMES

On successful completion of this programme, it is expected that students will be able to

- Describe and define concepts in Computer Science
- Understand, analyse and interpret data
- Understand and analyse the current research issues
- Interpret concepts in the discipline and apply them to new  areas
- Understand and analyse problems in different domains and develop solutions or strategies to solve those problems
- Communicate effectively in both oral and written contexts individually and in teams
- Cultivate skills for successful careers, entrepreneurship and higher studies

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

**POST GRADUATE DIPLOMA COURSE IN COMPUTER SCIENCE**

**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

| Subject Code | Title of Course | C | L | T | P | Ex | CA | ES | M |
|---|---|---|---|---|---|---|---|---|---|
| **SEMESTER-I** | | | | | | | | | |
| 19CS/DC/PP14 | Programming with Python | 4 | 3 | 0 | 2 | 3 | 50 | 50 | 100 |
| 19CS/DC/OS14 | Operating Systems : Concepts and Applications | 4 | 2 | 0 | 3 | 3 | 50 | 50 | 100 |
| 19CS/DC/SE14 | Software Engineering | 4 | 4 | 1 | 0 | 3 | 50 | 50 | 100 |
| 19CS/DC/RM14 | Research Methodology | 4 | 3 | 1 | 2 | 1.5 | 50 | 50 | 100 |
| 19CS/DC/DA14 | Data Analytics | 4 | 4 | 1 | 0 | 3 | 50 | 50 | 100 |
| 19CS/DC/DT13 | Design Thinking | 3 | 2 | 0 | 2 | 3 | 50 | 50 | 100 |
| **SEMESTER - II** | | | | | | | | | |
| 19CS/DC/OO24 | Object Oriented Programming | 4 | 3 | 0 | 2 | 3 | 50 | 50 | 100 |
| 19CS/DC/CC23 | Cloud Computing | 3 | 3 | 1 | 0 | 3 | 50 | 50 | 100 |
| 19CS/DC/DB25 | Database Management Systems | 5 | 3 | 0 | 3 | 3 | 50 | 50 | 100 |
| 19CS/DC/CA21 | Critical Analysis on an Advanced Technology | 1 | 0 | 0 | 2 | - | 50 | 50 | 100 |
| 19CS/DC/DI28 | Dissertation | 8 | 0 | 0 | 10 | - | 50 | 50 | 100 |

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

## POST GRADUATE DIPLOMA COURSE IN COMPUTER SCIENCE

## SYLLABUS

(Effective from the academic year 2019 - 2020)

## PROGRAMMING WITH PYTHON

**CODE: 19CS/DC/PP14** **CREDITS : 4**

**L T P : 3 0 2**

**TOTAL TEACHING HOURS: 65**

### 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

### 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

**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** **(3 Hours)**

**5.1 Tuples, Sets and Dictionaries**

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

**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*, 2ndedition, O'Reilly Publishers, 2016.

David Beazley, Brian K. Jones. Python *Cookbook: Recipes for Mastering Python 3*, 3rd 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://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 x 5 = 15 marks (3 out of 4)
Section B - 1 x 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 x 2 = 10 marks (Answer all the questions)
Section B - 4 x 5 = 20 marks (4 out of 6)
Section C - 2 x 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 DIPLOMA COURSE IN COMPUTER SCIENCE**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

## OPERATING SYSTEMS : CONCEPTS AND APPLICATIONS

**CODE:19CS/DC/OS14** **CREDITS : 4**

**L T P: 2 0 3**

**TOTAL TEACHING HOURS: 65**

### 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 about security

### 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 (10 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

**Unit 5 (8 Hours)**

**5.1 Disk Utilities**

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

**5.2 Security**

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

**BOOKS FOR STUDY**

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

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

Tanenbaum S., Andrew, Herbert Bos. *Modern Operating Systems.* 4th 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.* 2nd 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
www.unixtutorial.org/
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 x 5 = 15 marks (3 out of 4)
Section B - 1 x 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 x 2 = 10 marks (Answer all the questions)
(1 question to be set from each unit)
Section B - 4 × 5 = 20 marks (4 out of 6)
Section C - 2 ×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 | 5 | 5.1 |

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

**POST GRADUATE DIPLOMA COURSE IN COMPUTER SCIENCE**

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

## SOFTWARE ENGINEERING

**CODE: 19CS/DC/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 - Reusablity - 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

Galorath, 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

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

Section A - 5 ×2 = 10 marks (Answer all the questions)
Section B - 4 ×5 = 20 marks (4 out of 5)
Section C - 2 ×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 x 2 = 20 marks (Answer all the questions)
(2 questions to be set from each unit)
Section B - 6 × 5 = 30 marks (6 out of 8)
(At least 1 question from each unit)
Section C - 5 ×10 = 50 marks (5 out of 7)
(At least 1 question from each unit)

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

## POST GRADUATE DIPLOMA COURSE IN COMPUTER SCIENCE

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

### RESEARCH METHODOLOGY

**CODE: 19CS/DC/RM14**

**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

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

**4.1 Presentation**

Editing- Presentations-Slides-Posters-Ethics

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

**5.1 Report writing**

Report writing using LATEX for a research problem

**BOOKS FOR STUDY**

Kothari C. R. *Research Methodology Methods and Techniques.* 2nd ed. New Delhi: New Age, 2004. (Unit 1.1)
Justin Zobel. *Writing for Computer Science*.3rd 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*. 2nd 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 ×5 = 30 marks (6 out of 8)
Section B - 2 ×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**
**Theory:50 Marks** **Duration: 90 minutes**

Section A - 6 × 5 = 30 marks (6 out of 8)
(Atleast 1 question from each unit)
Section B - 2 ×10 = 20 marks (2 out of 3)

**Practical :50 Marks**
Paper Presentation with Poster or Prototype/Viva

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

## POST GRADUATE DIPLOMA COURSE IN COMPUTER SCIENCE

## SYLLABUS

(Effective from the academic year 2019 - 2020)

## DATA ANALYTICS

**CODE : 19CS/DC/DA14** **CREDITS:4**

**L T P:4 1 0**

**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 leaning 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

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**

Section A - 5 ×2 = 10 marks (Answer all the questions)
Section B - 4 ×5 = 20 marks (4 out of 5)
Section C - 2 ×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 x 2 = 20 marks (Answer all the questions)
(2 questions to be set from each unit)
Section B - 6 × 5 = 30 marks (6 out of 8)
(At least 1 question from each unit)
Section C - 5 ×10 = 50 marks (5 out of 7)
(At least 1 question from each unit)

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

## POST GRADUATE DIPLOMA COURSE IN COMPUTER SCIENCE

### SYLLABUS

(Effective from the academic year 2019 – 2020)

### DESIGN THINKING

**CODE: 19CS/DC/DT13** **CREDITS: 3**
**L T P: 2 0 2**
**TOTAL TEACHING HOURS: 52**

### OBJECTIVES OF THE COURSE

- To pursue practical skills in image editing and animation using GIMP
- To know how to use transformation tools
- To know to use the advanced tools in GIMP
- To impart creativity through logo design and 2D animation in GIMP
- To learn about the animation tools in GIMP

### COURSE LEARNING OUTCOMES

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

- Edit images using GIMP
- Use transformation tools locally and globally
- Design pictures using advanced tools in GIMP
- Design their own textures, logos and also to create animations using GIMP
- Create their own animations

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

**1.1 Photo Editing**

GIMP Basics – Image Handling Basics – Working with Images - Photograph Retouching

**Unit 2** **(7 Hours)**

**2.1 Transformation Tools**

Global Transformations – Local Transformations

**Unit 3** **(12 Hours)**

**3.1 Painting and Drawing**

Painting and Drawing - Dodging, Burning and Smudging – Selections, Overlaying and Blending Modes – Digital Collage

**Unit 4** **(9 Hours)**

**4.1 Textures, Logos and 2D Animation**

Creating Textures - Logos – Animation

**Unit 5**

**5.1 Animation Tools** **(12 Hours)**

Building an Animated GIF by Hand – Using Animation Tools – Using GAP

**BOOKS FOR STUDY**

Olivier Lecarme, Karine Delvare, *The Book of GIMP: A Complete Guide to Nearly Everything*, No Starch Press, 2013

**BOOKS FOR REFERENCE**

Jason van Gumster Robert Shimonski, *GIMP Bible,* Wiley Publishing, 2010.
Karin Kylander & Olof S Kylander The Complete Guide to Gimp.

**WEB RESOURCES**

https://docs.gimp.org/2.10/en/

**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**
Quiz/Assignments/Mini Project/Case study

**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 x 2 = 10 marks (Answer all the questions)
(1 question to be set from each unit)
Section B - 4 × 5 = 20 marks (4 out of 6)
Section C - 2 ×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 DIPLOMA COURSE IN COMPUTER SCIENCE**

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

## OBJECT ORIENTED PROGRAMMING

**CODE: 19CS/DC/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.* 3rd 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*. 4th 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 x 5 = 15 marks (3 out of 4)
Section B - 1 x 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**
Section A - 5 x 2 = 10 marks (Answer all the questions)
(1 question to be set from each unit)
Section B - 4 x 5 = 20 marks (4 out of 6)
Section C - 2 x 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 DIPLOMA COURSE IN COMPUTER SCIENCE

## SYLLABUS

(Effective from the academic year 2019 - 2020)

## CLOUD COMPUTING

**CODE: 19CS/DC/CC23** **CREDITS : 3**

**L T P : 3 1 0**

**TOTAL TEACHING HOURS: 52**

### 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

**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** **(10 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** **(10 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

**3.2 Resource Pooling, Sharing and Provisioning**

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

**Unit 4** **(10 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** **(6 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**

Section A - 5 ×2 = 10 marks (Answer all the questions)
Section B - 4 ×5 = 20 marks (4 out of 5)
Section C - 2 ×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 x 2 = 20 marks (Answer all the questions)
(2 questions to be set from each unit)
Section B - 6 × 5 = 30 marks (6 out of 8)
(At least 1 question from each unit)
Section C - 5 ×10 = 50 marks (5 out of 7)
(At least 1 question from each unit)

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

**POST GRADUATE DIPLOMA COURSE IN COMPUTER SCIENCE**

**SYLLABUS**

(Effective from the academic year 2019 - 2020)

## DATABASE MANAGEMENT SYSTEMS

**CODE: 19CS/DC/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

**Unit 2** **(16 Hours)**

**2.1 Introduction to SQL**

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

**2.2 Intermediate SQL**

Join Expressions- Views- Transactions- Integrity Constraints - SQL Data Types and Schemas- Authorization

**2.3 Advanced SQL**

Accessing SQL from a Programming Language - Functions and Procedures – Triggers - Recursive Queries- Advanced Aggregation Features – OLAP

**2.4 Formal Relational Query Languages**

The Relational Algebra - Fundamental Operations - Formal Definition of the Relational Algebra - Additional Relational-Algebra Operations - Extended Relational-Algebra Operations

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

**3.1 Database Design and the E-R Model**

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

**3.2 Relational Database Design**

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

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

**4.1 PL/SQL Blocks**

PL/SQL- Predefined Exceptions- User Defined Exceptions

**4.2 Cursors and triggers**

Cursors and Cursor Management- Implicit and Explicit Cursors- Advanced Cursors- Procedures and Functions- Database triggers- Parts of a Trigger- Types of Triggers

**Unit 5**

**5.1 Transactions and Concurrency Control** **(15 Hours)**

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

**5.2 NoSQL**

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.* 8th ed. New Delhi: Pearson Education, 2009.

Elmasri, Navathe, *Fundamentals of Database Systems*, 7th 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://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

**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 x 2 = 10 marks (Answer all the questions)
(1 question to be set from each unit)
Section B - 4 × 5 = 20 marks (4 out of 6)
Section C - 2 ×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 DIPLOMA COURSE IN COMPUTER SCIENCE**

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

## CRITICAL ANALYSIS ON AN ADVANCED TECHNOLOGY

**CODE: 19CS/DC/CA21** **CREDITS:1**
**L T P:0 0 2**
**TOTAL TEACHING HOURS:26**

### OBJECTIVES OF THE COURSE

- To enable students to explore and critically analyse the selected technology
- To enable students to adapt to changes in the technological landscape
- To train students with the skills and knowledge of the process of writing
- To enable students to present ideas clearly and firmly, both orally and in writing
- To equip them with skills to describe and synthesise new ideas
- To train students to work with academic integrity
- To train students to work in a group

### COURSE LEARNING OUTCOMES

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

- Demonstrate clear, precise, ethically sound ideas on the chosen topic
- Find, evaluate and use information from varied sources effectively
- Critically analyse, argue and counter argue on the topic chosen
- Understand the significance, bias and applications of the technology chosen
- Formulate and synthesise new ideas and opinions in the form of projects /and papers
- Create clear, grammatically correct, ethically sound, well-organised pieces of writing

Students will be formed into groups. The groups will have to select a topic related to the Emerging /Advanced Trends and Technologies in the field of Computer Science. Each group has to give three presentations to their fellow classmates and their guide. They need to prepare the synopsis and detailed report in consultation with their guide.

### PATTERN OF ASSESSMENT

**Internal Assessment** **50 marks**
Presentation / Review

**End-Semester Examination** **100 marks**
Documentation - 50 marks
Presentation - 30 marks
Viva - 20 marks

**Format of the report**

Abstract

Short description of the paper. Describe what the technology is, why it is significant or interesting, and your conclusion.

Introduction

- What is the technology?
- Literature review: what is the current thinking, findings, and approaches on the technology?
- What is the significance of the technology?
- How do you plan to use the technology?

Methods/ Approaches

- What is your opinion of the utility, relevance, challenges or quality of the technology you have selected?

Results

- What are your conclusions?
- What do your conclusions mean?
- How do your results fit into a broader context?

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

## POST GRADUATE DIPLOMA COURSE IN COMPUTER SCIENCE

## SYLLABUS

(Effective from the academic year 2019 - 2020)

## DISSERTATION

**CODE: 19CS/DC/DI28** **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 analyse 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 |