SRI S. RAMASAMY NAIDU MEMORIAL COLLEGE, SATTUR - 626 203

(An Autonomous, Co-educational and Linguistic Minority Institution Affiliated to Madurai Kamaraj University)

(Re-Accredited with Grade 'A' by NAAC)

Programme: B.Sc. Computer Science

Programme Code: **UCS**

Regulations (OBE) 2019

(For I to VI Semester)

Outcome Based Education

Under

Choice Based Credit System (CBCS)

(Those who joined in 2019-2020 and after)

Vision

To renovate the rural students into high quality Software Professionals & Technologists by affording practical training as well as ethical and moral values.

Mission

- To offer strong theoretical foundation harmonized with extensive practical training.
- To revamp the rural students into innovative, competent and high quality Computer professionals.
- To enrich the talents of students to keep pace with the current industrial trends.
- To provide the students with best job opportunities and environment for quality education, professional competencies and life skills.
- To support students for their career development, professional growth and to sustain in lifelong learning.

Programme Educational Objectives (PEOs)

PEO1: Professionalism Accomplish their Professional Career by applying the knowledge of Computing and Technical Skills.

PEO2: Continuous Personal Development Participate in life-long learning through the successful completion of advanced degrees, continuing education, certifications and/or other professional developments.

Programme Outcomes (POs)

Upon completion of the programme, the graduate is expected to be a / an

PO1: Critical Thinker with Disciplinary Knowledge

Ability to apply critical thinking and problem-solving skills by demonstrating comprehensive knowledge understanding the major concepts and theoretical principles in their disciplines and other related fields of study.

PO2: Skilled Communicator

Ability to transmit complex technical information relating to their disciplines in a clear and concise manner orally and in writing.

PO3: Team Player/Worker

Work effectively in diverse teams in classrooms, laboratories, industries and field-based situations.

PO4: Digital Literate

Use computers and appropriate software for analysis of data and employing modern library search tools to locate, retrieve, and evaluate the information.

PO5: Ethically Upright Citizen

Ability to designate moral situations and dilemmas; critically analyse, evaluate and additionally change one's own moral esteems; and to look up the effects of one's own attitude in the lives of others.

PO6: Lifelong learner

Enhance social inclusion, active citizenship and personal development, as well as competitiveness and employability by voluntary and self-motivated pursuit of knowledge.

Programme Specific Outcomes (PSOs)

PSO1: Acquire a firm foundation in the software fundamentals and applications of algorithms in software project development.

PSO2: Develop skills in problem solving, critical thinking and analytical reasoning as applied to Computational and Societal Problems.

PSO3: Develop Programming and Designing skills with innovate new ideas and solutions to existing problems using latest technologies.

PSO4: Acquire professional and intellectual integrity, professional code of conduct and an understanding of responsibility to contribute to the community for sustainable development of society.

Eligibility for admission

Students who have passed the +2 examination conducted by the Board of Higher Secondary Education, Govt. of Tamil Nadu with Mathematics as one of the subjects or any other examination accepted by the Syndicate of the Madurai Kamaraj University as equivalent there to are eligible to join this programme.

Duration of the programme

Three academic years with six semesters.

Courses of Study

The main courses of study for Computer Science Degree programme consist of the following course pattern (Refer Table 1)

Part I :	Tamil	---	4	
Part II :	English	---	4	
Part III				
	1. Core Courses	---	14	(8 T & 6 P)
	2. Electives	---	4	(2 T & 2 P)
	3. Allied Courses	---	6	(4 T & 2 P)
Part IV				
	1. Non Major Elective Courses	---	2	
	2. Skill based Courses	---	6	(4 T & 2 P)
	3. Environmental Studies	---	1	
	4. Value Education	---	1	
Part V				
	Extension Activities			

A candidate shall be awarded a maximum of 1 Credit for Compulsory Extension Service. This should be carried outside the class hours. All the students shall have to enroll for NSS /NCC/ Sports & Games or any other service organizations in the college and shall have to earn minimum hours of attendance to be prescribed by the college.

Credits

The term "credit" refers to the weightage given to a course, usually in relation to the instructional hours assigned to it. The total credits required for completing a B.Sc. (Computer Science) degree programme is 140. The particulars of credits for individual components and courses are presented in Table 1.

Extra Credits Course

1. This course is optional. Students may or may not select this course. If he/she selects this course and if he/she passes the course, then 2 extra credits will be added in his/her total credit to the degree, even otherwise, it won't affect the completion of degree.
2. The course is common to all UG Programmes.
3. The title of this course is "Model Paper for Competitive Examinations"
4. Examination for this course will be held at the end of the 6^{th} semester examinations.
5. There is no internal examination and only external examination for this course.
6. Maximum marks for this course is 100.
7. There is no contact hours for this paper.

Scheme of Examination

100 questions (multiple choice) - one mark for each.
Passing minimum is 50 marks.
Duration of the Examination is two hours.

Question Paper Pattern for Part III

Theory

Part A 10 x 1 = 10 marks

Ten Multiple Choice Questions (No Choice)

Two Questions from each Unit

Part B 5 x 7 = 35 marks

Five Questions (either or type - One question from each Unit)

Part C 3 x 10 = 30 marks

Three Questions out of five (One Question from each unit)

Total **75 Marks**

Evaluation

	Internal	**External**	**Total**
Theory	25	75	**100**
Practical	40	60	**100**

Question Paper Pattern for Part IV

Theory

Part A

Three Questions (either or type) 3 x 10 = 30 Marks

Part B

Three Questions out of five 3 x 15 = 45 Marks

Total **75 Marks**

Internal Assessment

Average of two tests	15 marks
Assignment	5 marks
Seminar	5 marks
Total	**25 marks**

A candidate shall be declared as passed the program if he/she scores a minimum of 40% marks inclusive of both internal and external.

For each Theory course, the minimum marks required in the External examination is 27.

For each Practical/Project course, the minimum marks required is 23.

For Project Work (VI Semester)

The combined project shall be undertaken by the students as a team of two.

Total Marks: 100 (Internal: 40 marks, External: 60 Marks)

Parameters

For Internal Marks:	Two review meetings	:	2 X 10 = 20 Marks
	Overall Performance	:	= 20 Marks
For External Marks:	Project Report	:	= 15 Marks
	Project demo & Presentation	:	= 30 Marks
	Viva-Voce	:	= 15 Marks

From the Academic Year 2021-2022

Evaluation

The performance of a student is evaluated in terms of percentage of marks with a provision for conversion to grade points. Evaluation for each course is done by three Continuous Internal Assessment (CIA) tests by the concerned course teacher and by an End Semester written examination and will be consolidated at the end of the programme. The ratio of the marks to be allotted to Continuous Internal Assessment (CIA) and to End Semester Examination is 25 : 75 and for the Practical examinations the ratio is 40 : 60.
The components for Continuous Internal Assessment (CIA) are

Average of three written tests	20.0 marks
Seminar / Group Discussion / Quiz	2.5 marks
Assignment	2.5 marks
Total	**25.0 marks**

Assignment / Seminar marks will be awarded only to the candidates who have appeared for minimum two CIA tests. A candidate absenting for all the three CIA tests of a course cannot appear for the End Semester Examination even though he / she has required attendance / paid fee.

End Semester Exam Question Pattern for Part I and III

The question paper may have 3 parts.
Duration of the End Semester Examination is 3 hours.

Part A (No Choice)	10 x 1 = 10 marks
Ten questions (Objective type with 4 alternatives)	
(Two questions from each unit)	
Part B	5 x 7 = 35 marks
Five questions (either or type)	
(One question from each unit)	
(Answers not exceeding two pages	
Part C	3 x 10 = 30 marks
Three questions out of five	
(One question from each unit)	
Total	**75 marks**

Practical Examinations

Practical examinations will be conducted at the end of even semesters only.

Practical Record Note Book / Internal	10 + 30 = 40 marks
External Examination	60 marks
Total	**100 marks**

Question Paper Pattern (for Part IV)

Duration of the external examination is 2 hours

Part – A	
THREE Questions (either or type)	3 X 10 = 30 marks
(One Question from each unit)	
Part – B	
THREE questions out of FIVE	3 X 15 = 45 marks
(At least one question or at most two questions from each unit)	
Total	**75 marks**

B.Sc. COMPUTER SCIENCE

Table 1: Course pattern

Study Component	I Sem.	II Sem.	III Sem.	IV Sem.	V Sem.	VI Sem.	Total Hrs	Total Credit	No of Course	Total Marks
Part – I Tamil	6(3)	6(3)	6(3)	6(3)	-	-	24	12	4	400
Part – II English	6(3)	6(3)	6(3)	6(3)	-	-	24	12	4	400
Part- III										
Core (T)	4(4)	4(4)	4(4)	4(4)	6(5) 6(5)	6(5) 6(5)	40	36	8	800
Core (P)	6(4)	6(4)	6(4)	6(4)	6(4)	6(5)	36	25	6	600
Elective (T)	-	-	-	-	4(4)	4(4)	8	8	2	200
Elective (P)	-	-	-	-	4(4)	4(4)	8	8	2	200
Allied (T)	4(4)	4(4)	4(4)	4(4)	-	-	16	16	4	400
Allied (P)	2(2)	2(2)	-	-	-	-	4	4	2	200
Part- IV										
Non Major Electives	-	-	2(2)	2(2)	-	-	4	4	2	200
Skill Based (T)	2(2)	2(2)	2(2)	2(2)	-	-	8	8	4	400
Skill Based (P)	-	-	-	-	2(1)	2(1)	4	2	2	200
Environmental Studies	-	-	-	-	2(2)	-	2	2	1	100
Value Education	-	-	-	-	-	2(2)	2	2	1	100
Part- V										
Extension Activities	-	-	-	(1)	-	-	-	1	-	-
Total	30(22)	30(22)	30(22)	30(23)	30(25)	30(26)	180	140	42	4200
Extra Credits								2		
Grand Total								142		

Course Structure - B.Sc. Computer Science

Semester	Core/Elective/ Skill Based	Title of the Course	Course Code	Contact Hrs.			Credits	Exam Hrs.	Marks		
				L	T	P			Int.	Ext.	Total
I	**Part - I**	Tamil I	U19LAT11	6	-	-	3	3	25	75	100
	Part - II	English I	U19LAE11	6	-	-	3	3	25	75	100
	Core - I (T)	Programming in C	U19CSC11	4	-	-	4	3	25	75	100
	Core - II (P)	Programming in C Lab	U19CSC1P1	-	-	6	4	3	40	60	100
	Allied - I (T)	Mathematical Foundations for Computer Science	U19CSA11	4	-	-	4	3	25	75	100
	Allied – II (P)	Web Design Lab	U19CSA1P1	-	-	2	2	3	40	60	100
	Skill Based- I (T)	Introduction to Computers and HTML	U19CSS11	2	-	-	2	2	25	75	100
	Total			**22**	**-**	**8**	**22**	**-**	**-**	**-**	**700**
II	**Part – I**	Tamil - II	U19LAT21	6	-	-	3	3	25	75	100
	Part – II	English - II	U19LAE21	6	-	-	3	3	25	75	100
	Core - III (T)	C++ and Data Structures	U19CSC21	4	-	-	4	3	25	75	100
	Core –IV (P)	C++ and Data Structures Lab – II	U19CSC2P1	-	-	6	4	3	40	60	100
	Allied - III (T)	Digital Fundamentals and Computer Architecture	U19CSA21	4	-	-	4	3	25	75	100
	Allied –IV (P)	PHP Lab	U19CSA2P1	-	-	2	2	3	40	60	100
	Skill Based - II (T)	Introduction to PHP	U19CSS21	2	-	-	2	2	25	75	100
	Total			**22**	**-**	**8**	**22**	**-**	**-**	**-**	**700**
III	**Part – I**	Tamil – III	U19LAT31	6	-	-	3	3	25	75	100
	Part – II	English – III	U19LAE31	6	-	-	3	3	25	75	100
	Core - V (T)	Object Oriented Programming with Java	U19CSC31	4	-	-	4	3	25	75	100
	Core – VI (P)	Java Programming Lab	U19CSC3P1	-	-	6	4	3	40	60	100
	Allied - V (T)	Numerical Methods	U19CSA31	4	-	-	4	3	25	75	100
	Skill Based- III (T)	E-Commerce	U19CSS31	2	-	-	2	2	25	75	100
	NME - I	Office Automation Lab	U19CSN3P1	-	-	2	2	3	40	60	100
	Total			**22**	**-**	**8**	**22**	**-**	**-**	**-**	**700**

L - Lecture Hours **T-** Tutorial Hours **P -** Practical Hours

Semester	Core/Elective/ Skill Based	Title of the Course	Course Code	Contact Hrs.			Credits	Exam Hrs.	Marks		
				L	T	P			Int.	Ext.	Total
IV	**Part – I**	Tamil – IV	U19LAT41	6	-	-	3	3	25	75	100
	Part – II	English – IV	U19LAE41	6	-	-	3	3	25	75	100
	Core - VII (T)	Relational Database Management Systems	U19CSC41	4	-	-	4	3	25	75	100
	Core - VIII (P)	Practical – IV DBMS Lab	U19CSC4P1	-	-	6	4	3	40	60	100
	Allied - VI (T)	Optimization Techniques	U19CSA41	4	-	-	4	3	25	75	100
	Skill Based - IV (T)	Software Engineering	U19CSS41	2	-	-	2	2	25	75	100
	NME - II	DTP Lab	U19CSN4P1	-	-	2	2	3	40	60	100
	Extension Activities			-	-	-	1	-	-	-	-
	Total			**24**	**-**	**8**	**23**	**-**	**-**	**-**	**700**
V	**Core – VIII (T)**	Data Mining and Data Warehousing	U19CSC51	6	-	-	5	3	25	75	100
	Core –IX (T)	Operating System Concepts	U19CSC52	6	-	-	5	3	25	75	100
	Core –X (P)	Practical – V Data Mining Lab	U19CSC5P1	-	-	6	4	3	40	60	100
	Elective – I (T)	a) Visual Programming	U19CSE51	4	-	-	4	3	25	75	100
		b) Android Programming	U19CSE52								
		c) Embedded Systems	U19CSE53								
	Elective - II (P)	a) Visual Programming Lab	U19CSE5P1	-	-	4	4	3	40	60	100
		b) Android Programming Lab	U19CSE5P2								
		c) Embedded Systems Lab	U19CSE5P3								
	Skill Based -V(P)	Linux Programming Lab	U19CSS5P1	-	-	2	1	3	40	60	100
	Environmental Studies		U19CNE51	2	-	-	2	2	25	75	100
	Total			**18**	**-**	**12**	**25**	**-**	**-**	**-**	**700**
VI	**Core – XIII (T)**	Introduction to Computer Graphics and Image Processing	U19CSC61	6	-	-	5	3	25	75	100
	Core –XIV(T)	Computer Networks and Security	U19CSC62	6	-	-	5	3	25	75	100
	Core –XV (P)	Practical – VI Project Viva-Voce	U19CSPT61	-	-	6	5	3	40	60	100
	Elective -III (T)	a) Web Technologies	U19CSE61	4	-	-	4	3	25	75	100
		b) Internet of Things	U19CSE62								
		c) Data Analytics Using R	U19CSE63								
	Elective– IV (P)	a) Web Technologies Lab	U19CSE6P1	-	-	4	4	3	40	60	100
		b) Internet of Things Lab	U19CSE6P2								
		c) R Programming Lab	U19CSE6P3								
	Skill Based–VI (P)	MATLAB Lab	U19CSS6P1	-	-	2	1	3	40	60	100
		Value Education	U19CNV61	2	-	-	2	2	25	75	100
	Total			**18**	**-**	**12**	**26**	**-**	**-**	**-**	**700**
	Extra Credit Paper	Model Course for Competitive Examination	U19CNX61	-	-	-	2	2	-	-	**100**

L - Lecture Hours **T-** Tutorial Hours **P -** Practical Hours

Core Course VIII (T) – Data Mining and Data Warehousing

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	V	U19CSC51	6	5

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Summarize Data Mining Principles and Data preprocessing.	**K2**
CLO2	Implement the association rules for mining.	**K3**
CLO3	Identify appropriate classification techniques for real life problems	**K3**
CLO4	Learn to cluster the high dimensional data for better organization of the data.	**K3**
CLO5	Inculcate knowledge on Data Warehousing fundamentals, OLAP Operations and the concepts of Complex Types of data.	**K2**

K2 – Understanding K3 – Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**2**			**2**		**3**
CLO2	**3**	**2**		**2**		**3**
CLO3	**3**	**2**		**2**		**2**
CLO4	**2**					**2**
CLO5	**3**	**2**		**2**		**3**

Strong – 3 Medium – 2 Weak - 1

UNIT I

Data Mining: Introduction to Data Mining - Architecture of Data Mining - Kind of data - Data Mining Functionalities - Classification of Data Mining System - Data Mining Techniques - Major Issues - In Data Mining.

Data Preprocessing: Data preprocessing - Data Cleaning - Data Integration - Data Transformation - Data Reduction - Data Discretization and Concept Hierarchy Generation - Data Mining Primitives - Data Mining Query Language - Designing the GUI based on DMQL- Architecture of Data Mining System.

UNIT II

Association Rules Mining: Introduction – Basics – The Task and Naïve Algorithm – The Apriori Algorithm – Improving the Efficiency of the Apriori Algorithm – Mining Frequent Patterns without Candidate Generation.

UINT III

Classification: Introduction – Decision Tree – Building a Decision Tree – The Tree Induction Algorithm – Split Algorithm Based on Information Theory – Split Algorithm Based on Gini Index – Decision Tree Rules – Naïve Bayes Method – Improving Accuracy of Classification Accuracy – Other Evaluation Criteria for Classification Methods.

UNIT IV

Cluster Analysis: Introduction – Desired Features of Cluster Analysis – Types of Data – Computing Distance – Types of Cluster Analysis Methods – Partitional Methods – Hierarchical Methods - Density-Based Methods – Dealing with Large Databases.

UNIT V

Data Warehousing and OLAP Technology and Data Mining: Introduction – data warehouse Components – Multidimensional Data Model – data Warehouse Architecture – data Warehouse Implementation – From Data Warehousing to Data Mining – On-Line Analytical Processing (OLAP). **Mining Complex Types of Data:** Multidimensional Analysis and Descriptive Mining of Complex of Data Objects – Spatial Data Mining – Multimedia Data Mining – Mining Time-Series Data – Mining Text Databases – Mining The World-Wide Web.

Text Books:

1. B.S.Charulatha, (2017), Data Mining and Data Warehousing, Charulatha Publication.
2. G.K.Gupta, (2011), Introduction to Data Mining with Case Studies, PHI Learning Publication.

Reference Books:

1. Arun K.Pujari, (2013), Data Mining Techniques, University Press (India) Private Limited. Third Edition.
2. K.P.Soman, Shyam Diwakar and V.Ajay , (2006), Insight into Data Mining Theroy and Practice, PHI Learning Publication.

Core Course IX (T) Operating System Concepts

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	V	U19CSC52	6	5

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Generalize the structure and functions of operating system.	**K2**
CLO2	Demonstrate the concept of CPU Scheduling and Processes.	**K2**
CLO3	Summarise the Process Synchronization and Deadlocks.	**K3**
CLO4	Describe the techniques of Memory Management.	**K2**
CLO5	Summarize the basic concepts of Linux Programming.	**K3**

K2 – Understanding K3 – Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**	**2**		**3**		
CLO2	**3**	**2**		**3**		
CLO3	**3**	**2**		**3**		
CLO4	**3**	**2**		**3**		
CLO5	**3**			**3**		**2**

Strong – 3 Medium – 2 Weak - 1

Unit I

Overview : Introduction - What Operating Systems Do – Computer System Organization – Computer System Architecture – Operating System Operations - Resource Management - Security and Protection - Distributed Systems - Kernel Data Structures. **Operating System Structures** – Operating System Services - User and Operating - System Interface - System Calls - System Services - Linkers and Loaders. Operating-System Design and Implementation - Operating-System Structure - Building and Booting an Operating System - Operating-System Debugging

Unit II

Process Management: Processes – Process – Concept – Process Scheduling – Operation on Processes – Inter process Communication – IPC in Shared memory systems- IPC in Message Passing Systems – **CPU Scheduling** - Basic Concepts - Scheduling Criteria - Scheduling Algorithms - **Process Synchronization**- **Synchronization Tools**-The Critical-Section Problem - Peterson's Solution - Hardware Support for Synchronization - Mutex Locks - Semaphores.

Unit III

Deadlocks - System Model -Applications - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock. **Memory Management: Main Memory** - Background - Contiguous Memory Allocation - Paging - Structure of the Page Table–Swapping.

Unit IV

Virtual Memory - Background - Demand Paging - Copy-on-Write - Page Replacement - Allocation of Frame – **Storage Management: Mass Storage Structure** – overview of Mass Storage Structure – HDD Scheduling. **File system: File System Implementation** – File System structure – File System Operations – Directory Implementation – Allocation Methods – Free Space management.

Unit V

The Linux System - Design Principles- Process Management - Scheduling – Memory Management - File Systems - Input and Output – **Linux Commands** – Directory oriented Commands – File Oriented Commands – File access Permissions – General Purpose Commands – **Pipes and Filters** - Pipe – Redirection – Filters – Sort – grep –uniq - Shell Programming

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne (2018),Operating System Concepts,10th Edition,Wiley Publishing Inc.,
2. B.Mohamed Ibrahim (2008), Linux A Practical Approach, First Edition, Firewall Media.

Reference Books:

1. A.S.Tanenbaum(2004), Modern Operating Systems, Third Edition, Prentice Hall of India.
2. Matthew. N, Stones. R, and Cox. A (2011), Beginning Linux Programming, Fourth Edition, Wiley Publishing Inc.,

Core Course X(P) – Data Mining Lab

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	V	U19CSC5P1	6	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Compare and evaluate different data mining techniques like prediction, clustering and association rule mining.	**K3**
CLO2	Design algorithms for real life problems.	**K4**
CLO3	Interpret the data sets for Linear Regression algorithm.	**K4**

K3 – Applying **K4 - Analysing**

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**	**2**		**3**	**2**	
CLO2	**3**	**2**		**2**	**2**	**3**
CLO3	**2**			**2**	**2**	**3**

Strong – 3 **Medium – 2** **Weak - 1**

1. Create data-set in .arff file format and perform preprocessing.
2. Implementation of Varying Arrays.
3. Implementation of Nested Tables.
4. Demonstration of Association rule process on data-set contact lenses.arff /supermarket (or any other data set) using apriori algorithm.
5. Demonstration of classification rule process using Decision Tree algorithm.
6. Demonstration of classification rule process using j48 algorithm.
7. Demonstration of classification rule process using Naive Bayes algorithm.
8. Demonstration of clustering rule process on data-set iris.arff using simple k-means
9. Find out the correctly classified instances, root mean squared error, kappa statistics, and mean absolute error for weather data set.
10. To perform the cluster analysis by k-means method
11. To perform the cluster analysis by K-Medoids method
12. To perform the Agglomerative hierarchical clustering
13. To perform the Divisive hierarchical clustering.
14. Execute and analyze Linear Regression algorithm.
15. Create a dataset for Mobile Users and analyze the data.

Elective Course I (a) (T) – Visual Programming

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	V	U19CSE51	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Demonstrate the basic components of Visual Basic.	**K2**
CLO2	Develop the programs using Looping statements, Arrays and Strings.	**K2**
CLO3	Generalize the concept of functions and procedure.	**K3**
CLO4	Develop programs using controls in Visual Basic.	**K3**
CLO5	Create an application using database.	**K3**

K2 – Understanding **K3 – Applying**

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**	**2**		**3**		**2**
CLO2	**3**	**2**		**3**		**2**
CLO3	**3**			**3**		**2**
CLO4	**3**			**3**		**2**
CLO5	**3**	**2**		**3**		**2**

Strong – 3 **Medium – 2** **Weak - 1**

UNIT-1

Customizing a form and writing simple programs: Starting a new project-The properties window-common form properties-scale properties-color properties - making a form responsive. B**uilding the user interface:** The toolbox-creating controls-The name property-properties of command buttons-simple event procedures for command Buttons-Access Keys-Image Controls-Text Boxes - Labels-Navigating between Controls-Message boxes-The Grid.

UNIT-2

First steps in programming: Visual basic editing tools-statements in visual basic-variables-setting properties with Code-Data Types-Working with Variables-More on Strings-More on numbers. **Controlling program flow:** Determinates Loops-Indeterminate Loops-Making Decisions-Select Case-Nested if-Then-The Goto.

UNIT-3

Functions and procedures: Function procedures-Sub Procedures-Advanced uses of procedures and functions. **Organising information via code:** Lists one dimensional array-The new array based String - Sorting and Searching-Records-With Statement- Enum.

UNIT-4

Built-in-functions: String function- **Organising information via controls:** Control arrays-list and combo box-The flex grid control. **Finishing the interface:** The toolbox revisited-common dialogue Boxes-Image List Control-List view controls-progress bar control-slider control, status bar control-toolbar control. **Displaying Information:** Picture boxes-rich textboxes.

UNIT-5

Menus - MDI Forms. **File system controls and file system objects:**File system controls.**A Survey of database development using Visual Basic:**Using the data control –structured query language basics-An introduction to programming with database Object-Other useful methods and event for the data Control-Monitoring changes to the database-The data form wizard.

Text Book:

Gary Cornell (2008),Visual Basic 6 from the Groundup,Tata McGraw Hill.

Reference Books:

1. NoelJerke (1999),VisualBasic 6(The Complete Reference),Tata McGraw Hill
2. Steve Brown(1998), Visual Basic 6 in Record Time, BPB Publications.

Elective Course I (b) (T) Android Programming

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	V	U19CSE52	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Launch Android Application in SDK, debug and publish the application.	**K2**
CLO2	Create an activity by applying styles and themes and to program an user interface.	**K2**
CLO3	Design an interface with different types of views and menus.	**K3**
CLO4	Create and use database based programming in Android.	**K3**
CLO5	Create an Android application to send messages and Email.	**K3**

K2 – Understanding **K3 – Applying**

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**		**2**	**3**		**2**
CLO2	**3**		**2**	**3**		**2**
CLO3	**3**	**2**	**2**	**3**		**2**
CLO4	**3**	**2**	**2**	**3**		**2**
CLO5	**3**		**2**	**3**		**2**

Strong – 3 **Medium – 2** **Weak - 1**

Unit I

Android – Android versions- Features of Android – Architecture of Android – Android devices in the market – Android studio- Android SDK – creating Android virtual devices – Launching Android application – Exploring the IDE – using code completion – debugging the application –publishing the application

Unit II

Activities, Fragments and Intents – Applying styles and themes to an Activity – Hiding the Activity title – Displaying a dialog window – displaying a progress dialog –linking activities using Intents –Fragments – Displaying notifications

Unit III

Getting to know the Android user interface -understanding the components of a screen- Adapting to display orientation – Managing changes to screen orientation – utilizing the action bar – creating the user interface programmatically – Listening for UI Notifications.

Unit IV

Designing user interface with views – using basic views – using picker views – using List views to display long lists – understanding specialized Fragments – using image views to display pictures – using menus with views – using web view

Unit V

Data Persistence-saving and loading user interfaces-persisting data to files-creating and using databases – Sharing Data in Android – using a content provider – creating content providers-SMS messaging – sending Email

Text Books:

J.F.DiMarzio(2017), Beginning Android Programming with Android Studio, Fourth Editon, Wrox Publications (Wiley Brand).

Reference Books:

1. WeiMeng Lee (2012), Beginning Android Application Development, Wrox Publications (John Wiley, New York).
2. Ed Burnette (2010), Hello Android: Introducing Google's Mobile Development Platform, 3rd Edition, The Pragmatic Publishers, North Carolina USA.
3. Reto Meier (2012), Professional Android 4 Application Development, Wrox Publications (John Wiley, New York).

Elective Course I (c) (T) Embedded Systems

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	V	U19CSE53	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Comprehend the basics of an embedded system.	**K2**
CLO2	Identify the typical components of an embedded system.	**K2**
CLO3	Accomplish depth knowledge about the Firmware, Characteristics and Attributes of embedded System	**K3**
CLO4	Analyse the Design of the Basic Micro Controller.	**K2**
CLO5	Develop code for embedded system using Arduino.	**K3**

K2 – Understanding K3 – Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**2**	**2**				**2**
CLO2	**2**	**2**				
CLO3	**3**	**3**		**2**		**2**
CLO4	**2**	**2**		**2**		**2**
CLO5	**3**	**3**		**2**	**2**	**3**

Strong – 3 Medium – 2 Weak - 1

Unit – I

Introduction to Embedded Systems: Introduction – Embedded System – Embedded Systems vs General Computing Systems - History of Embedded Systems - Classification of Embedded Systems based on Generation and Complexity and Performance - Application areas of Embedded System- Purpose of embedded systems. Typical Embedded System: Introduction – Core of the embedded system-Application Specific Integrated Circuits (ASICs) – Programmable Logic Devices – Commercial off-the-shelf Components(COTs) –Memory – Program Storage Memory (ROM) – Read-Write Memory (RAM) - Memory according to the Type of Interface - Memory Shadowing - Memory Selection for Embedded Systems.

Unit – II

Sensors – Actuators – I/O Sub System – Communication Interface - Onboard communication interfaces- Inter Integrated Circuit (I2C) Bus - Serial Peripheral Interface (SPI) Bus - Universal Asynchronous Receiver Transmitter (USRT) - External communication interfaces-RS 232 C and RS 485, Universal Serial Bus – IEEE 1394 (Firewire) - infrared – Bluetooth - Wi-Fi - ZigBee, GPRS - GSM.

Unit – III

Embedded Firmware - Design and Development – other System Components – Reset Circuit – Brown-out Protection Circuit – Oscillator Circuit – Real-Time Clock – Watchdog Timer – PCB and Passive Components.

Characteristics and Quality Attributes of Embedded Systems: Characteristics – Application and Domain Specific – Reactive and Real Time – Operates in harsh Environments – Distributed – Small Size and Weight – Power Concerns – Quality Attributes – Operational Quality Attributes – Non- Operational Quality Attributes. **Embedded System-Application-and Domain-Specific:** Washing Machine – Automotive – Inner workings – Automotive Communication Buses – key Players of the Automotive Embedded Market.

Unit – IV

Designing Embedded Systems with 8-bit Microcontroller-8051: Factors – Feature Set – Speed of Operation – Code Memory Space – Data Memory Space – Development Support – Availability – Power Consumption – Cost - Microcontroller – Designing with 8051 – Architecture – The Memory Organization – Registers – Oscillator Circuit – Port.

Unit – V

This is Arduino: Introduction – Microcontrollers – A Tour of an Arduino Boards – The Origins of Arduino – The Arduino Family – Arduino Clones and Variants. **Getting Started:** Powering Up – Installing the Software – Uploading first Sketch – The Arduino Application. **Input and Output:** Digital Outputs – Digital Inputs – Analog Outputs – Analog Inputs. **The Standard Arduino Library:** Random Numbers – Math Functions – Bit Manipulation – Advanced I/O – Interrupts.

Text Books:

1. K.V. Shibu, (2017) Introduction to Embedded Systems, Mc Graw Hill Education.
2. Simon Monk, (2012) Programming Arduino Getting Started with Sketches, Mc Graw Hill Company.

Reference Books:

1. Lyla b das, (2012) Embedded Systems- An integrated approach, Pearson education.
2. Raj Kamal (2008) Embedded Systems: Architecture, Programming and Design, Mc Graw Hill Publications.
3. Massimo Banzi, (2011) Getting Started with Arduino, O'REILLY Media Inc

Elective Course II (a) (P) Visual Programming Lab

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	V	U19CSE5P1	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Design simple Visual Basic applications.	**K3**
CLO2	Develop Front-End applications using various basic controls of Visual Basic.	**K3**
CLO5	Generate applications with database for real life examples.	**K4**

K3 – Applying **K4 - Analysing**

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**	**2**		**2**		**2**
CLO2	**3**	**3**		**3**		**2**
CLO3	**3**	**2**		**3**		**2**

Strong – 3 **Medium – 2** **Weak - 1**

Write a visual basic program to

1. Calculate the marks of the students using textbox, label box, command button.
2. Prepare the Electricity bill.
3. Design of a Colour Mixer using scroll bar.
4. Animate a picture using timer.
5. Find the sum of numbers from 1 to select the value (use scroll bar to set the maximum value).
6. Convert the temperature in Celsius into Fahrenheit and vice-versa (use function)
7. Implement handling String functions (use combo box)
8. Design a calculator using control arrays
9. Perform Matrix Addition using Flex Grid Control.
10. Create an application using File controls to load a picture and use two option buttons to show and hide a picture in the picture box.
11. Create an Editor with File and Edit menus.
12. Create an MDI application with tile and cascade child forms.
13. Create a mailing address database in Access and view the records using Data Control.
14. Design an application to implement remote data control and date grid control.
15. Design an application using ADO Control.
16. Create a database application using Visual Data Manager to Navigate the records, add a new record, update the record and delete a record.
17. Create an application to develop on online MCQ test using timer.
18. Generate a report for Employee pay bill.

Elective Course II(b) (P) Android Programming Lab

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	V	U19CSE5P2	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Design a mobile application with GUI components and Fragments.	**K2**
CLO2	Develop an interactive activity in Android programming.	**K3**
CLO3	Develop an interactive Android application that sends and receives messages.	**K4**

K2 – Understanding K3 – Applying K4 - Analysing

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**		**2**	**3**		**3**
CLO2	**3**		**2**	**3**		**3**
CLO3	**3**		**2**	**3**		**3**

Strong – 3 Medium – 2 Weak - 1

1. Develop an application with Fragments and pass data to an activity
2. Develop an application that uses different types of layouts and Notifications
3. Develop an application with user interface and Listeners
4. Design an application with different types of views including Time pickers.
5. Develop an application that makes use of List fragments
6. Implement an application that uses image switchers
7. Develop an application that uses menus with views
8. Develop an application that demonstrates the use of progress dialog and Async task.
9. Code a mobile application that uses alarm clock application
10. Implement an application that creates an alert upon receiving a message
11. Code a mobile application that sends and receives messages.
12. Code a mobile application that uses GPS location information.
13. Implement an application that writes data to the SD card.
14. Code a mobile application that implements multithreading.
15. Design a mobile application that uses database application.
16. Design a mobile application to understand the use of HTTP client and host

Elective Course II(c) (P) Embedded Systems Lab

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	V	U19CSE5P3	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Develop the hardware for embedded system application based on the processors.	**K2**
CLO2	Design simple applications using microcontrollers and provide apt solutions for any embedded application.	**K3**
CLO3	Incorporate suitable microcontroller along with appropriate interfacing circuits and implement the same for an application with software programs.	**K4**

K2 – Understanding K3 – Applying K4 - Analysing

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**2**		**2**	**3**		**3**
CLO2	**3**	**3**	**3**			**2**
CLO3	**3**	**2**	**3**	**2**		**3**

Strong – 3 Medium – 2 Weak - 1

1. Write a program to toggle all the led to port and with some time delay
2. Write a program to interface LCD
3. Write a program to interface 4*4 matrix keypad
4. Write a program for interfacing LED and PWM and to verify the output.
5. Write a program for interfacing of DC motor
6. Write a Program realization of low pass, high pass and band pass filters and their characteristics
7. Write a program to implement Analog to Digital conversion
8. Write a program to implement Digital to Analog conversion
9. Digital function implementation using digital blocks
    A. Counter for blinking LED.
    B. PWW Digital buffer and Digital inverter.
10. Write a program for Temperature measurements.
11. Write a program for pressure measurements.
12. Write a program to monitor heartbeat.
13. Write a program to implement digital lock.
14. Write a program to implement Counter.
15. Write a program to implement Timer.
16. Write a random number generation function using assembly language. Call this function from a C program to produce a series of random numbers and save them in the memory

Skill Based Course V(P) Linux Programming Lab

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	V	U19CSS5P1	2	1

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Utilize the linux utilities to create and manage simple file processing operations	**K2**
CLO2	Apply the security features on file access permissions by restricting the ownership using advance linux commands.	**K3**
CLO3	Develop shell scripts to perform more complex tasks in shell programming environment.	**K3**

K2 – Understanding **K3 – Applying**

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**			**2**		
CLO2	**3**	**2**		**2**		
CLO3	**3**			**2**		**2**

Strong – 3 **Medium – 2** **Weak - 1**

1. Write a Shell programming, which accepts the name of the file from the standard Input and then perform the following operations:
   i) Enter 5 names in a File
   ii) Sort the names in Existing File
   iii) List unsorted and sorted File
2. Write a Menu driven Shell Programming to Copy, Edit, Rename and Delete a File.
3. Write Menu Driven Shell Programming to perform the following tasks
   i) Enter the sentence in File
   ii) Search a Given word in an existing file
   iii) Quit
4. Write a Shell Programming to prepare the Electricity bill based on the following rules
   i) For first 100 units - Rs. 1.00 / unit
   ii) For next 100 units - Rs. 2.00 / unit
   iii) Above 200 units - Rs. 3.00 / unit
5. Write a Shell Programming to Sum up the following series

$$\frac{1}{1!}+\frac{2}{2!}+\frac{3}{3!}+\ldots\ldots$$

6. Write a Shell Programming to display the result “PASS” or “FAIL” using the information given below: Student name, Register Number, Mark 1, Mark 2, Mark 3. The Minimum pass mark is 50.
7. Write a Menu driven shell script to convert the characters from upper case to lower case.
8. Merge the contents of three given files, Sort them and display the sorted output.
9. Write a Shell Programming to check whether the user is Eligible for vote or not.
10. Write a Shell Programming to check whether a given string is Palindrome or not.
11. Write a shell Programming to delete all lines containing a specified word.
12. Write a shell Programming to find the factorial of given integer.

Environmental Studies

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	V	U19CNE51	2	2

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO 1	Explain the structure of the earth and its resources	**K2**
CLO 2	Outline the concepts related to echo systems	**K2**
CLO 3	Summarize the significance of biodiversity and disaster management.	**K2**

K2 – Understanding

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**					**3**
CLO2	**3**					**2**
CLO3	**3**					**3**

Strong – 3 Medium – 2 Weak - 1

UNIT – I: Earth and its Environment (10 hours)

1. Structure of earth and its components.
2. Atmosphere, Hydrosphere Lithosphere and Biosphere.
3. Resources-Renewable and Non-renewable resources.

UNIT – II: Ecology and Ecosystem Concepts (10 hours)

a) **Ecology**: Definition- Ecosystem: Definition- Structure and function –Food chain and food web- one example for an ecosystem.

b) Pollution and Global Issues:

Definition, causes, effects and control measures of Air, Water, Soil and Nuclear Pollution.

c) **Global issues**: Global warming, Green-house effect and ozone layer depletion.

UNIT – III: Biodiversity and Disaster Management (10 hours)

1. Introduction- Definition –Value of Biodiversity.
2. Biodiversity of India –Hot spots of Biodiversity.
3. **Disaster Management**- Flood and drought –Earthquake and Tsunami-cyclones and Hurricanes-precautions, warnings, rescue and rehabilitation.

Text Book:

A Text Book of Environmental Sciences, Curriculum Development Cell, Sri SRNM College, Sattur

Reference Books:

1. Odum, E.P. (1985). Fundamentals of Ecology. W.B. Publishers, Philadelphia.
2. Erach Bharucha. Textbook of Environmental studies for under graduate course
3. P.D. Sharma (2006). Environmental Biology Rastogi Publishers Ganapathi Shivaji Road, Meerut - 250 002.
4. J. Dharmaraj (2015) Environmental Studies. Tensy Publications, Sivakasi.

Core Course XIII (T)
Introduction to Computer Graphics and Image Processing

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CSC61	6	5

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Demonstrate the working principles of Computer Graphics System.	**K2**
CLO2	Generalize the attributes of output primitives and 2D Transformations.	**K2**
CLO3	Apply viewing and Clipping techniques for the given image.	**K3**
CLO4	Describe the Digital Image Processing fundamentals.	**K2**
CLO5	Utilize image compression and segmentation Techniques for real time problems	**K3**

K2 – Understanding K3 – Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**2**			**3**		**2**
CLO2	**2**			**3**		**2**
CLO3	**3**			**3**		
CLO4	**2**			**3**		**3**
CLO5	**3**			**3**		**3**

Strong – 3 Medium – 2 Weak - 1

Unit I

Overview of Graphics Systems: Video Display Devices – Raster Scan Systems – Random scan systems – Output Primitives: Points and Lines – Line Drawing Algorithms – Circle Generating Algorithms – Ellipse Generating Algorithms – Filled Area Primitives.

Unit II

Attributes of output Primitives: Line attributes - Area Fill attributes - Two – Dimensional Geometric Transformations: Basic Transformations – Matrix Representations and Homogeneous Coordinates – Composite Transformations – Other Transformations.

Unit III

Two – Dimensional Viewing: The Viewing Pipeline – Viewing Coordinate Reference Frame – Windows – to – Viewpoint Coordinate Transformation - Clipping : Clipping Operations – Point Clipping – Line Clipping (Cohen Sutherland Line Clipping only) – Polygon Clipping – Curve Clipping – Text Clipping – Exterior Clipping – Graphical User Interfaces and Interactive input methods - Interactive picture construction Techniques.

Unit IV

Introduction to Image Processing: Digital Image Representation - Types of Images - Digital Image Processing Operations- Fundamental Steps in Image Processing - Digital Imaging System. Digital Imaging System: Sampling and Quantization - Image Storage and File Formats- Color Image Processing: Introduction - Color Image Storage and Processing- Color Models.

Unit V

Digital Image Processing Operations: - Classification of Image Processing Operations - Arithmetic Operations - Logical operations -Geometrical Operations. Image Compression: Image Compression Model - Compression Algorithm and its types - Run-length coding - Huffman Coding - Image - Segmentation: Introduction - Classification of Image Segmentation Algorithms - Deduction of Discontinuities - Edge Detection - Stages in Edge Detection - Types of Edge Detectors.

Text Books:

1. Donald Hearn and M. Pauline Baker (2009), Computer Graphics (C Version), Second Edition, Pearson Education.
2. S.Sridhar (2011), Digital Image Processing, OXFORD University Press.

Reference Books:

1. Angel and Edward (2011), Interactive Computer Graphics, Sixth Edition, Addison-Wesley Longman.
2. Donald Hearn, M. Pauline Baker and Warren Carithers (2010), Computer Graphics with Open GL, Fourth Edition, Pearson Education.
3. Rafel C. Gonzalez and Richard E. Woods (2017), Digital Image Processing, Fourth Edition, Pearson Education.
4. Rafael C.Gonzalez (2014), Digital Image Processing Using MATLAB, McGraw Hill Education(India) Private Limited.

Core Course XIV (T) – Computer Networks and Security

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CSC62	6	5

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Describe the basics of data communications and networking.	**K2**
CLO2	Identify various transmission media and the features of multiplexing concepts.	**K2**
CLO3	Describe the methods of Error Detection and Correction schemes.	**K3**
CLO4	Apply various Routing algorithms, Congestion control and Security fundamentals.	**K3**
CLO5	Utilize Data Encryption algorithms for securing the applications.	**K2**

K2 – Understanding **K3 – Applying**

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**2**	**2**		**2**		**2**
CLO2	**3**	**3**		**2**		**3**
CLO3	**3**	**3**		**3**		**3**
CLO4	**3**	**3**		**2**		**2**
CLO5	**3**	**2**		**3**		**3**

Strong – 3 **Medium – 2** **Weak - 1**

Unit I:

Introduction : Data Communication - Networks. **Basic Concepts :** Line Configuration – Topology - Transmission Mode- Categories of Networks– Internetworks . **The OSI Model:** The Model- Functions of the Layers- TCP/IP Protocol Suite-**Transmission of Digital Data & Interfaces and Modems :** Digital Data Transmission.

Unit II:

Transmission Media : Guided Media- Twisted Pair Cable-Coaxial Cable- Optical Fiber - Unguided Media-Radio Frequency Allocation – Propagation of Radio Waves – Terrestrial Microwave – Satellite Communication – Cellular Telephony. Multiplexing- Many to one / One to Many - Frequency Division Multiplexing (FDM) - Wave-Division Multiplexing (WDM) - Time-Division Multiplexing (TDM).

Unit III:

Error Detection and Correction: Types of Errors- Detection- Redundancy – Vertical Redundancy Check (VRC) – Longitudinal Redundancy Check (LRC) – Cyclic Redundancy Check (CRC) – Checksum – Error Correction. **Data Link Control**: Line Discipline – Flow Control-Stop and Wait – Sliding Window- Error Control – Automatic Repeat Request(ARQ)-Stop-and-Wait ARQ- Sliding Window ARQ.

Unit IV:

Routing Algorithms - Distance Vector Routing-Link State Routing. **Frame Relay:** Congestion Control - Leaky Bucket algorithm.

Introduction: Security Goals – Attacks – Services and Mechanism – Techniques. **Traditional Symmetric-Key Ciphers**: Introduction – Substitution Ciphers – Transposition Ciphers – Stream and Block Ciphers.

Unit V:

Data Encryption Standard (DES): Introduction – DES Structure – DES Analysis – Multiple DES – Security of DES. Asymmetric Key Cryptography : Introduction – RSA crypto System.

Text Books:

1. Behrouz A Forouzan (2006), Data Communications and Networking, 2nd Edition, Tata McGraw Hill Publishing Company Limited, New Delhi.
2. Behrouz A. Forouzan, Debdeep Mukhopadhyay (2007), Cryptography and Network Security, 2nd Edition, Tata McGraw Hill.

Reference Books:

1. Andrew S. Tanenbaum (2006), Computer Networks, 4th Edition, Prentice Hall of India.
2. William Stallings (2007), Data and Computer Communications, Prentice Hall of India.
3. William Stallings (2008), Cryptography and Network Security, Prentice Hall of India.

Core – Course XV(P) – Project Viva-Voce

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CSPT61	6	5

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Design Software Solutions from multiple Perspectives.	**K4**
CLO2	Develop the knowledege of Testing Strategies to be applied in Projects.	**K4**
CLO3	Develop Softwares for Global needs.	**K4**

K4 – Analysis

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**	**2**		**3**	**3**	**3**
CLO2	**3**	**2**		**3**	**3**	**3**
CLO3	**3**	**2**		**3**	**3**	**3**

Strong – 3 Medium – 2 Weak - 1

1. Implement optimization techniques.
2. Implement numerical methods.
3. Implement Network concepts
4. Implement Image Processing algorithms
5. Implement Data Mining applications
6. College administration system.
7. Student information system
8. Employee pay roll system
9. Inventory control system
10. Website creation.
11. Implement Embedded System
12. Implement IoT applications.
13. Data Analysis applications.

A project shall be undertaken by the students as a team of two or three.

Total Marks: 100 (Internal: 40 marks, External: 60 Marks)

Parameters

For Internal Marks : Two review meetings (2 X 10)		: 20 Marks
	Overall Performance	: 20 Marks
	Total	: **40**
For External Marks: Project Report		: 15 Marks
	Project Demo & Presentation	: 30 Marks
	Viva – Voce	: 15 Marks
	Total	**: 60**

Elective Course III(a) (T) Web Technologies

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CSE61	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Comprehend the fundamental concepts of web and Internet technologies.	**K2**
CLO2	Design and develop a dynamic WebPages using Javascript.	**K3**
CLO3	Design interactive web pages with validation techniques.	**K4**
CLO4	Program the web pages with Document Object Model and Represent web data using XML.	**K3**
CLO5	Design web applications by using JSP, Servlet and database connection.	**K3**

K2 – Understanding K3 – Applying K4 - Analysing

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**2**	**2**		**2**		**3**
CLO2	**3**	**2**		**2**		**3**
CLO3	**3**	**2**		**2**		**2**
CLO4	**3**	**2**		**3**		**3**
CLO5	**3**	**2**		**2**		**3**

Strong – 3 Medium – 2 Weak - 1

Unit I

Web Essentials: Clients, Servers, and Communication - The Internet-Basic Internet Protocols -The World Wide Web-HTTP Request Message- HTTP Response Message-Web Clients - Web Servers. Style Sheets: CSS-Introduction to Cascading Style Sheets- CSS Features-Core Syntax-Style Sheets and HTML.

Unit II

Java Script: An introduction to JavaScript - Introduction- Displaying a Line of Text with JavaScript in a Web Page - Obtaining User Input with prompt Dialogs Memory Concepts- Arithmetic - Decision Making: Equality and Relational Operators - JavaScript: Control Statements- if Selection Statement - if...Else Selection Statement - while Repetition Statement -Assignment Operators - Increment and Decrement Operators - for Repetition Statement - switch Multiple-Selection Statement - do...while Repetition Statement - break and continue Statements - Logical Operators

Unit III

JavaScript: Functions - Introduction - Program modules in javascript – Function definitions- Scope rules – Javascript Global functions –Recursion- Recursion vs. Iteration- JavaScript Arrays - Declaring and Allocating Arrays - Examples Using Arrays - Passing Arrays to Functions - Multidimensional Arrays - JavaScript: Objects -

Math Object - String Object - Date Object - Boolean and Number Objects - document Object - JavaScript Event Handling - the load Event - Event mousemove and the event Object - Rollovers with mouseover and mouseout - Form Processing with focus and blur - More Form Processing with submit and reset - Event Bubbling - More Events .

Unit IV

Host Objects : Browsers and the DOM-Introduction to the Document Object Model DOM History and Levels-Intrinsic Event Handling-Modifying Element Style-The Document Tree-DOM Event Handling-Accommodating Noncompliant Browsers - Properties of window. . Representing Web Data: XML-Documents and Vocabularies-Versions and Declaration-Namespaces- DOM based XML processing Event-oriented Parsing: SAX-Transforming XML Documents-Selecting XML Data: XPATH-Template based Transformations: XSLT-Displaying XML Documents in Browsers.

Unit V

Server-Side Programming: Java Servlets : Servlet Architecture Overview – simple Servlet code - Servlets Generating Dynamic Content - Servlet Life Cycle - Parameter Data - Sessions - Cookies - URL Rewriting - Other Servlet Capabilities - Data Storage- Servlets and Concurrency - Introduction to JavaServer Pages (JSP) - JSP and Servlets - Running JSP Applications- Basic JSP- **Databases and Java Servlets -** JDBC Drivers - JDBC Database Access.

Text Books:

1. Jeffrey and C. Jackson (2006), Web Technologies–A Computer Science Perspective, Pearson Education.
2. Deitel and Nieto (2011), Internet and World Wide Web - How to Program, 5th Edition, Prentice Hall.

Reference Books:

1. Gopalan N.P. and Akilandeswari J. (2011) ―Web Technology, Prentice Hall of India,
2. Herbert Schildt (2011), Java-The Complete Reference, 8th Edition, McGraw Hill Professional.
3. Chris Bates (2009), Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications.

Elective Course III (b) (T) Internet of Things

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CSE62	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Explain the fundamentals of Internet of Things (IoT)	**K2**
CLO2	Describe various M2M and IoT architectures	**K2**
CLO3	Describe the Web Communication protocols.	**K2**
CLO4	Demonstrate the design issues in IoT applications and Raspberry PI.	**K2**
CLO5	Apply the concept of Internet of Things in the real world application.	**K3**

K2 – Understanding K3 – Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**	**2**		**3**		**2**
CLO2	**3**	**2**		**3**		**2**
CLO3	**3**	**2**		**3**		**3**
CLO4	**3**	**3**		**3**		**3**
CLO5	**3**	**3**		**3**		**3**

Strong – 3 Medium – 2 Weak - 1

Unit I

Introduction to Internet of Tings-Introduction-Characteristics of IoT-Application of IoT-IoT Categories-IoT Enablers and Connectivity Layers-Baseline Technologies-Sensors-Actuators-IoT Components and Implementation-Challenges for IoT.

Physical design of IoT-Logical design of IoT- Functional blocks of IoT-Communication models & APIs.

Unit II

Internet of Things Architectural - Conceptual Framework, Architectural view, technology behind IoT, Sources of the IoT, M2M Communication, IoTExamples.

Design Principles for Connected Devices -IoT/M2M systems layers and design standardization, communication technologies, data enrichment and consolidation, ease of designing and affordability.

Unit III

Design Principles for Web Connectivity-Introduction-Web Communication Protocols for Connected Devices-Message Communication Protocols for Connected Devices-Web Connectivity for Connected-Devices Network using Gateway.

Internet Connectivity Principles-Introduction-Internet Connectivity-Internet-Based Communication-IP Addressing in the IoT-Media Access Control-Application Layer Protocols.

Unit IV

IoT PLATFORMS -IoT Device -Building blocks of an IoT Device-Raspberry Pi -Board - Raspberry Pi Interfaces-Other IoT Devices: pcDuino, BeagleBoneBlack ,CubieBoard.

Raspberry Pi and Arduino-Raspberry Pi's GPIO in Review-Arduino Rescue-Using Arduino-A Brief Introduction to the Arduino Language.

Unit V

Domain specific applications of IoT-Home automation, Industry applications, Surveillance applications, Other IoT applications.

Text Books:

1. Vijay Madisetti and ArshdeepBahga (2014), "Internet of Things Hands-on Approach)",1st Edition, VPT.
2. Jeeva Jose (2018), "Internet of Things", Khanna Publishing House, Delhi.
3. Raj Kamal (2017), "Internet of Things: Architecture and Design", McGraw Hill.

Reference Books:

1. Adrian McEwen (2014), "Designing the Internet of Things", Wiley
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle (2014),"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",1st Edition, Academic Press.

Elective Course III(c) (T) Data Analytics Using R

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CSE63	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Interpret the fundamentals of R programming with basic problems	**K2**
CLO2	Elaborate on reading data from .csv files and data frames.	**K2**
CLO3	Summarize the concept of Linear Regression and Logistic Regression.	**K2**
CLO4	Analyze the data using various data visualization methods.	**K4**
CLO5	Apply the concept of Clustering and Association Rules to real life examples.	**K3**

K2 – Understanding K3 – Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**	**2**		**3**		**3**
CLO2	**3**	**2**		**2**		**3**
CLO3	**3**	**2**				**2**
CLO4	**3**	**2**				**3**
CLO5	**3**	**2**				**3**

Strong – 3 Medium – 2 Weak - 1

UNIT I

Introduction to R: Need for R-Advantages of R - Working with Directory - getwd() Command- setwd() Command - dir() Function- Data Types in R - IDEs and Text Editors - R Studio-Eclipse with StatET -Handling Packages in R - Commands for Data Exploration.

Challenges of Analytical Data Processing- Expression, Variables and Functions- Missing Values Treatment in R- Using the 'as' Operator to Change the Structure of Data- Vectors- Matrices - Matrix Access - Factors -Creating Factors –List

UNIT II

Simple Analysis Using R- Methods for Reading Data: CSV and Spreadsheets- Reading Data from Packages.

Data Frames- R Functions for Understanding Data in Data Frames- Load Data Frames- Exploring Data- Data Summary- Finding the Missing Values- Invalid Values and Outliers - Descriptive Statistics - Spotting Problems in Data with Visualization.

UNIT III

Linear Regression using R - Introduction - Linear Regression - Assumptions of Linear Regression - Validating Linear Assumption - Logistic Regression- Introduction to Generalized Linear Models - Logistic Regression.

UNIT IV

Decision Tree – Introduction - Decision Tree Representation in R - Appropriate Problems for Decision Tree Learning - Basic Decision Tree Learning Algorithm - Measuring Features. Time Series in R: Introduction - Basic R Commands for Data Visualization - Basic R Commands for Data Manipulation - Reading Time Series Data - Plotting Time series Data.

UNIT V

Clustering - Introduction - Basic Concepts in Clustering - Hierarchical Clustering - k-means Algorithm.

Association Rules: Introduction-Frequent Itemset - Data Structure Overview- Mining algorithm Interfaces.

Text Book:

Seema Acharya, (2018) Data analytics using R, McGraw Hill Education (India) Private Limited Chennai.

Reference Books:

1. Hadley Wickham, Garrett Grolemund (2017), R for Data Science: Import, Tidy, Transform, Visualize and Model Data, O′Reilly.
2. K G Srinivasa, G M Siddesh, Chetan Shetty, B J Sowmya (2017), Statistical Programming in R, Oxford University Press.

Elective Course IV (a) (P) Web Technologies Lab

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CSE6P1	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Perform string operation and Date operations	**K2**
CLO2	Analyze a web page and identify its elements and attributes	**K2**
CLO3	Develop interactive webpages using script languages and validation techniques	**K3**

K2 – Understanding **K3 - Applying**

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**			**3**		
CLO2	**3**	**3**	**3**	**3**	**2**	**3**
CLO3	**3**	**3**	**3**	**3**	**2**	**3**

Strong – 3 **Medium – 2** **Weak - 1**

Write a JavaScript to

1. Design a webpage for entering student bio-data.
2. Create a webpage with all types of Cascading style sheets.
3. Design a Webpage using Date Object.
4. Find the minimum of three given numbers.
5. Calculate the age by reading DOB (Date of Birth).
6. Design a page using Array Object.
7. Demonstrate the String In-Built functions.
8. Design a simple Calculator.
9. Design an application form.
10. Design a webpage to calculate Income Tax.
11. Validate the Login Form.
12. Display the calendar by reading the year from the user.
13. Design a simple Servlet.
14. Design a page with all mouse events.
15. Design a page for Feedback system.

Elective Course IV (b) (P) Internet of Things Lab

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CSE6P2	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Design simple IoT Applications for real life examples.	**K4**
CLO2	Develop an application to monitor the environmental parameters such as temperature and humidity using sensors.	**K3**

K3 – Applying **K4 - Analysing**

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**	**3**		**3**		**2**
CLO2	**3**	**3**		**3**		**3**

Strong – 3 **Medium – 2** **Weak - 1**

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
6. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
9. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud.
10. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.
11. To install MySQL database on Raspberry Pi and perform basic SQL queries.
12. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
13. Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
14. Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
15. Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.

Elective Course IV (c) (P) R Programming Lab

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CSE6P3	4	4

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Apply the basic concepts of R programming from Statistical perspective.	**K2**
CLO2	Develop application using Classification and Regression Models.	**K3**

K2 – Understanding **K3 – Applying**

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**	**3**		**3**		**2**
CLO2	**3**	**3**		**3**		**2**

Strong – 3 **Medium – 2** **Weak - 1**

Write a R program

1. To take input from the user (name and age) and display the values. Also print the version of R installation.
2. To create a sequence of numbers from 20 to 50 and find the mean of numbers from 20 to 60 and sum of numbers from 51 to 91.
3. To create a vector which contains 10 random integer values between -50 and +50.
4. To get the first 10 Fibonacci numbers.
5. To get all prime numbers up to a given.
6. To find the factors of a given number.
7. To create a list of heterogeneous data, which include character, numeric and logical vectors. Print the lists.
8. To create three vectors a,b,c with 3 integers. Combine the three vectors to become a 3×3 matrix where each column represents a vector. Print the content of the matrix and perform various matrix operations.
9. To read the .csv file and display the content.
10. To create a simple bar plot of five subject's marks.
11. To create a Data Frames which contain details of the employees and display summary of the data.
12. To create a simple pie chart of various ways for travelling to office such as walking, car, bus, cycle and train and analyse the data.
13. To read the .csv file contains the student mark information and display the details who has the maximum total.
14. Create your own excel file with the details of 20 students from your class with different fields –Reg No, Name, Subjects enrolled, Scores of 2 subjects and name it as student.xlsx. And display the maximum and minimum scores obtained by the students in both the subjects using any two functions.
15. Write the commands in R console to illustrate the linear model.
16. Implement a model for decision tree construction.
17. Implement a model to demonstrate clustering concepts.

Skill Based Course VI(P) MATLAB Lab

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CSS6P1	2	1

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Develop simple application to Process images using techniques of histogram processing and filtering	**K2**
CLO2	Apply Image Compression and Segmentation Techniques for real Life Image Samples.	**K3**

K2 – Understanding K3 – Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**			**3**		**3**
CLO2	**3**			**3**		

Strong – 3 Medium – 2 Weak - 1

Write a MATAB code to

1. Read and Display Images
2. Perform Arithmetic operations on images
3. Perform Logical operations on images
4. Perform Geometrical operations on images
5. Image Clipping
6. Image Sampling and Image Quantization
7. Histogram Processing
8. Image Thresholding
9. Image compression
10. Digital image color conversion
11. Digital image conversion from RGB to gray, gray to binary
12. Image Segmentation
13. Edge Detection algorithm

Value Education

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CNV61	2	2

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Develop their personality by teaching values	**K3**
CLO2	Facilitate the understanding of the national and global development	**K3**
CLO3	Construct values in the young minds	**K3**

K3 – Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**2**					
CLO2					**3**	
CLO3	**3**					

Strong – 3 Medium – 2 Weak - 1

Unit 1: Value Education for Personal Development

Value Education - Introduction, Objectives, Importance & Types of Human Values
Personality Development - Determinants, Significance. Five Factors Model
Personality Development for Life Success – Soft skills, Emotional Intelligence, Self-Image Management, Time Management and Goal Setting, Communication Skills, Etiquette and Good Manners

Unit 2: Value Education for National and Global Development

Constitutional Values: Democracy, Secularism, Socialism
National Values: Justice, Liberty, Equality, Fraternity
Social Values: Pity, Probity, Self- Control, Universal Brotherhood
Professional Values: Accountability, Sincerity, Regularity and punctuality, Honesty means truthfulness.
Religious Values: Tolerance, Broad mindedness, Simplicity, Welfare of mankind, Pursuit of truth, Holy life, Simple living, Purity, Prayer.
Moral Values: Faith, Nonviolence, Obedience
Aesthetic Values: Love and Appreciation of Literature and Fine Arts
National Integration and International Understanding

Unit 3: Measures taken to inculcate Values in the Young Minds

Values inculcated through examples of Great and Noble Persons
Values inculcated through stories

Text Book:

Value Education, Curriculum Development Cell, Sri SRNM College, Sattur.

References:

1. Bharadwaj, Tilak Raj. Education of Human Values. New Delhi: Mittal Publication.1999.
2. Bhanver, Jagmohan S. Pichai: The Future of Google. Hachette India, 2016.
3. Duling, Kaityln. Malala Yousafzai (In the Spotlight). Bullfrog Books, 2018.
4. Larsen, Kristine. Stephen Hawking: A Biography. Jaico Publishing House, 2012.
5. Tiwari, Arun. A.P.J. Abdul Kalam: A Life. HarperCollins India, 2015.
6. Vedanta Pr, The Life of Swami Vivekananda. 7th edition, 10th reprint Vedanta Press, 1980.
7. **https://www.momjunction.com/articles/moral-stories-for-kids_00369197/**

Extra Credit Course Model Paper for Competitive Examinations

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Computer Science	UCS	VI	U19CNX61	-	2

Course Learning Outcomes (CLOs)

Upon completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Prepare themselves for various competitive examinations.	**K4**

K4 - Analysing

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**3**			**3**	**3**	**3**

Strong – 3 Medium – 2 Weak - 1

UNIT-I: GENERAL SCIENCE

(i) Scientific Knowledge and Scientific temper - Power of Reasoning - Rote Learning Vs Conceptual Learning - Science as a tool to understand the past, present and future.

(ii) Nature of Universe - General Scientific Laws – Mechanics - Properties of Matter, Force,Motion and Energy.

(iii) Main concepts of Life Science, Classification of Living Organisms, Evolution, Genetics, Physiology, Nutrition, Health and Hygiene, Human diseases.

(iv) Environment and Ecology.

UNIT-II: CURRENT EVENTS

(i) History - Latest diary of events - National symbols - Profile of States - Eminent personalitiesand places in news – Sports - Books and authors.

(ii) Science - Latest inventions in Science and Technology.

UNIT III: HISTORY AND CULTURE OF INDIA AND TAMIL NADU

(i) Indus valley civilization-Guptas, Delhi Sultans, Mughals and Marathas-Age of Vijayanagaram and the bahmanis-South Indian history.

(ii) Culture and Heritage of Tamil people-India since independence-Characteristics of Indian culture-Unity in diversity –race, colour, language, custom-India-as secular state-Growth of rationalist. Dravidian movement in TN-Political parties and populist schemes.

UNIT IV: INDIAN POLITY

(i) Constitution of India - Preamble to the Constitution - Salient features of the Constitution -Union, State and Union Territory.

(ii) Citizenship, Fundamental rights, Fundamental duties, Directive Principles of State Policy.

(iii) Corruption in public life – Anti-corruption measures –Right to Information - Empowermentof women - Consumer protection forums.

UNIT V: APTITUDE AND MENTAL ABILITY

(i) Simplification – Percentage - Highest Common Factor (HCF) - Lowest Common Multiple (LCM).

(ii) Ratio and Proportion.

(iii) Simple interest - Compound interest - Area - Volume - Time and Work.

(iv) Logical Reasoning - Puzzles-Dice - Visual Reasoning - Alpha numeric Reasoning – NumberSeries.

Reference Books:

1. VVK Subburaj (2019) TNPSC Group 2 and 2A CCSE-II Preliminary All-In-One Exam Books, Sura's Publications.
2. VVK Subburaj (2019), TNPSC CCSE IV Group 4 cum VAO Q-Bank with Explanatory Answers
3. S. Sambasivan A.Basheer Ahamed (2018) Tnpsc Group Iv(4) & Vao Exam Book,Sakthi Publishing House,India
4. R S Aggarwal (2017) Quantitative Aptitude For Competitive Examinations, S Chand Publishing.
5. Tnpsc Group II Preliminary (2018), Sakthi Publishing House,India
6. Dr.S.Avani Madasamy (2020),Way To Success, Avvai Publications; 2nd Edition, India
7. M. Laxmikanth, Indian Polity for Civil Services and Other State Examinations, 6th Edition, Mc Graw Hill.

Allied-I (T) - Introduction to Information Technology

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Nutrition and Dietetics	UND	I	U19NDA11	4	4

Course Learning Outcomes (CLOs)

Upon Completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Explain various Components of Computer.	**K2**
CLO2	Outline process of CPU, Input and Output Devices.	**K2**
CLO3	Describe basic concepts of Windows Environment.	**K2**
CLO4	Explore fundaments concepts of Internet	**K2**
CLO5	Make use of computer in different applications.	**K2**

K2 – Understanding

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1		**3**		**3**		**3**
CLO2		**3**		**3**		**3**
CLO3		**3**		**3**		**3**
CLO4	**2**	**3**		**3**	**2**	**3**
CLO5	**2**	**3**		**3**	**2**	**2**

Strong – 3 Medium – 2 Weak - 1

UNIT I

Introduction to Computers: Introduction – Importance of Computers – Characteristics of Computers – Five Generations of Modern Computers – History of Computing – Classification of Digital Computer system – Anatomy of a Digital Computer.

UNIT II

Central Processing Unit & Memory: Introduction – CPU – Memory – Memory Organization – RAM – ROM – Registers – Input Devices – Output Devices – Operating System: Introduction – Function of an Operating System.

UNIT III

Windows 7: What's where in Windows 7? – Starting up – Leaving Your Computer – Starting a Program – Accessing Your Document –Mouse and Keyboard maneuvers – Files, Folders and Libraries – Searching a Specific Location – Accessing Everything – Switching among open Windows – Managing Windows. Computer Networks: Introduction – Overview of a Network – Communication Process – Communication Media – Types of Networks – Network Topology.

UNIT IV

Internet & World Wide Web: Introduction – What is Special about the internet? – Internet Access – Internet Basics – World Wide Web – Web pages and HTML – Web browsers – Searching the Web. Overview of Electronic Mail: Introduction – How E–mail Works? – Why Use E–mail? – E–mail Names and Addresses – Mailing Basics.

UNIT V

Computers at Home: Introduction– Household Business – Business Applications at Home – Smartcards – Communication, Education and Information – Home Entertainment Redefined – Creativity and Leisure. Computers in Education and Training: Introduction – Computers in School – Computers in Entertainment – Computers in Medicine – Computers in Science – Computers in Engineering.

Text Books:

1. Alexis Leon, Mathews Leon, Fundamentals of Information Technology, (2nd Edition), Leon Vikas.
2. Jerry Joyce, Marianne Moon, (2010), Windows 7 Plain and Simple, PHI Learning Pvt. Ltd.

Reference Books:

1. V.Rajaraman, (2004), Fundamentals of Computers, (4th Edition), PHI Publication.
2. Dr. N.Krishnan, Computer Fundamentals and Windows with Internet Technology, Scitech Publication Pvt Ltd.

Allied-I (T) - Office Automation

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Nutrition and Dietetics	UND	II	U19NDA21	4	4

Course Learning Outcomes (CLOs)

Upon Completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Explain various editing features in Word.	**K2**
CLO2	Implement various operations on Table and Mail Merge.	**K3**
CLO3	Apply different types of functions in Excel.	**K3**
CLO4	Describe Manipulation of Chart.	**K2**
CLO5	Outline PowerPoint for simple presentation	**K2**

K2 – Understanding K3 - Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	**2**	**3**		**3**		**3**
CLO2	**2**	**3**		**3**		**3**
CLO3		**3**		**3**		**2**
CLO4	**2**	**3**		**3**		**2**
CLO5		**3**		**3**		**3**

Strong – 3 Medium – 2 Weak - 1

UNIT I

Getting comfortable in Word 2013: Exploring the Word 2013 user interface-Modifying your document view-Changing other view options. **Editing and Composing Documents:** Inserting symbols, international characters, and other special characters- inserting special characters-Using AutoCorrect-Composing documents faster by using building blocks. **Formatting documents:** Formatting documents more efficiently-Setting default document formatting for your documents-Setting section formatting-Using styles for paragraph and character formats-Exploring other paragraph formats- Exploring other Character formats- Changing case.

UNIT II

Presenting Information: Formatting simple lists by using bullets and numbering-Creating tabbed lists-Inserting tables-Enhancing tables-Finalizing documents: Correcting proofing errors-Printing documents. **Work with Mail merge** : Preparing data sources – Preparing main documents – Merging main documents and data sources

UNIT III

Getting comfortable in Excel 2013: Starting Excel 2013 – **Creating and editing worksheets** :Entering and organizing data-Changing column widths- Using formatting to alter the appearance of data – Extending a series with auto fill –Introducing flash fill- Selecting and naming cell ranges – Using column headers to define names – Moving and copying rows and columns copying one or more cells to many **Manipulating numbers and**

text : Creating, editing and copying formulas – Using functions-Using the AutoSum button and built-in function-Inserting functions-Using relative, fixed and mixed cell references-Using names in formulas and validating cell entries-Looking at useful functions.

UNIT IV

Formatting worksheets : Apply number formatting – Formatting with styles – Formatting in cells – Working with custom number formats – Working with percentage formats – Working with fraction formats – Working with date formats. **Manipulating workbooks and worksheets**: Inserting rows and columns – Inserting and deleting cells. **Creating charts and graphics**: Creating and modifying a chart – Adding a Slicer to a pivot chart-Manipulating chart elements.

UNIT V

Getting comfortable in PowerPoint 2013: Getting started working with PowerPoint 2013– Exploring the PowerPoint 2013 tools. **Designing and Creating Presentations:** Creating a new presentation based on a theme or template – Applying a theme to an existing presentation – Customizing your file with colors, fonts & effects -Theme fonts-Theme colors– Applying theme effects to your presentation-Applying background styles to your presentation-Formatting placeholder on the slide master–Creating a custom Slide layout – **Adding animation and Multimedia**: Adding animation to text and shapes.– Editing video and applying transitions.

Text Book:

Beth Melton, Mark dodges Echo Swinford & ber M.Scherr (2014), Step by step Microsoft office Home & Student 2013, Microsoft Press.

Reference Books:

1. C. Nellai Kannan, (2011), MS Office, Nels Publications.
2. Dinesh Maidasani, (2005), Learning Computers Fundamentals and MS Office and Internet & Web Technology, (1st Edition), Firewall Media.

Allied-I (P) - Introduction to Information Technology & Office Automation Lab

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Nutrition and Dietetics	UND	II	U19NDA2P1	2	2

Course Learning Outcomes (CLOs)

Upon Completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Create Folder in Windows Environment	**K3**
CLO2	Create E-Mail Id in various domain	**K3**
CLO3	Implement Online chatting.	**K3**
CLO4	Implement various editing and formatting features in Word.	**K3**
CLO5	Prepare data sheet for various application.	**K4**
CLO6	Design a simple power point presentation using image, tables and charts	**K3**

K3 - Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1		**3**		**3**		**3**
CLO2	**2**	**3**		**3**	**2**	**3**
CLO3		**3**		**3**	**2**	**3**
CLO4	**3**	**3**		**3**		**3**
CLO5	**3**	**3**		**3**		**3**
CLO6	**2**	**3**		**3**		**3**

Strong – 3 Medium – 2 Weak - 1

List of Programs:

1) To Create a New Folder and save the file and Rename the folder.
2) To download your subject materials, images and save the file in your Folder.
3) Create an Email–id in Yahoo mail.
4) Create an Email–id in Gmail Account.
5) To send a Message and attach your file with CC to your friends.
6) Create a Group id of your class & send a message.
7) Chatting with your friends through email-id.
8) Submit online application for any company.
9) To view Results in Your College Website.
10) Video chatting through mail.

MS – WORD

1. Open a word document to prepare your Resume by performing the following operations.
    a. Formatting the Text – Alignment & Font style
    b. Page setup (margin alignment, page height & width)
2. Create a word document to prepare a student mark sheet using table and functions.

3. Design an invitation using different fonts, font sizes, bullets and Word Art / Clip Art.
4. Mail Merge Concept a) prepare an invitation and sent to specific addresses in the data source.

MS – EXCEL

5. Create a student mark sheet with necessary information and use Data sort to display results using suitable excel function. Also use Data Filters to answer at least five different criteria.
6. Create a student mark sheet with necessary information and make out a suitable chart showing gridlines, legends and titles for axes.

MS–POWER POINT

7. Create a Power point presentation to explain various aspects of your college using Auto play.
8. Create a Power point presentation to explain the sales performance of your company over a period of five years using table and chart

Allied Course II(T)- Web Designing

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Nutrition and Dietetics	UND	III	U19NDA31	4	4

Course Learning Outcomes (CLOs)

Upon Completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Explain basic tags in HTML.	**K2**
CLO2	Outline a web page formatting using header, paragraph and image tags.	**K2**
CLO3	Design a Web Page using various list and Table tags.	**K3**
CLO4	Describe concept of frameset for a web page.	**K2**
CLO5	Make use of Forms for various applications.	**K2**

K2 – Understanding K3 - Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1		**3**		**3**		**3**
CLO2	**2**	**3**		**3**		**3**
CLO3	**2**	**3**		**3**	**2**	**3**
CLO4	**2**	**3**		**3**	**2**	**3**
CLO5	**2**	**3**		**3**	**2**	**3**

Strong – 3 Medium – 2 Weak - 1

Unit- I

Introduction to HTML: History of HTML- HTML Generations- HTML Documents-Anchor Tag - Hyper Links – Head and Body Sections: Header Section- Title – Links - Colorful Web Page - Comment Lines.

Unit-II

Designing the body section: Heading Printing - Aligning the headings - Horizontal Rule – Paragraph - Tab setting - Images and pictures.

Unit-III

Ordered and Unordered Lists: Lists - Unordered lists - Headings in a List- Ordered lists - Nested lists.

Table Handling: Tables - Table Creation in HTML -Width of the Table and Cells- Cells Spanning Multiple Rows/Columns-Coloring Cells - Column Specification.

Unit – IV

Frames: Frameset Definition-Frame definition - Nested Framesets. A Web Page Design Project: Frameset definition – Animals – Birds – Fish.

Unit – V

Forms: Action Attribute- Method Attribute- Enctype Attribute - Drop Down List- Sample Forms.

Text Book:

C. Xavier (2000), World Wide Web Design with TML Hill Education Pvt.

Reference Books:

1. Teodoru Gugoiu (2009), HTML, XHTML, CSS AND XML by Examples Fire Wall Media.

2. C. Xavier (2009), Web Technology and Design New Age International (P) Limited Publishers, New Delhi.

Allied Course II(T)- PHP Programming

Programme	Programme Code	Semester	Course Code	Hours	Credits
B.Sc. Nutrition and Dietetics	UND	IV	U19NDA41	4	4

Course Learning Outcomes (CLOs)

Upon Completion of this course the students will be able to

No.	Course Learning Outcomes	Levels
CLO1	Explain basic concepts of PHP.	**K2**
CLO2	Describe Various Functions	**K2**
CLO3	Outline Arrays and various Built-in Functions	**K2**
CLO4	Apply Forms, Cookies and Sessions in a web page	**K3**
CLO5	Demonstrate file and directory operations	**K2**

K2 – Understanding K3 - Applying

Mapping of CLOs with POs

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1		**3**		**3**		**3**
CLO2		**3**		**3**		**3**
CLO3		**3**		**3**		**3**
CLO4	**2**	**3**		**3**	**2**	**3**
CLO5	**2**	**3**		**3**		**3**

Strong – 3 Medium – 2 Weak - 1

Unit I

The Basics of PHP Scripts-**The Building Blocks of PHP:** Variables-Data Types-Operators and Expressions- Constants.

Unit II

Flow Control Functions in PHP: Switching-Flow-Loops-Code Blocks and Browser Output. **Working With Functions:** What is a Function?-Calling Functions-Defining a Function-Returning Values from User - Defined Functions-Variable Scope-Saving State between Function Calls with the static Statement-More About Arguments-Testing for the Existence of a Function.

Unit III

Working with arrays: what are Arrays? - Creating Arrays-Some Array- Related Functions. **Working with objects:** Creating an Object-Object Inheritance. **Working with Strings, Dates, and time:** Formatting Strings with PHP-Investigating Strings in PHP-Manipulating Strings with PHP-Using Date and Time Functions in PHP-Other String, Date and Time Functions.

Unit IV

Working with Forms: Creating a Simple Input Form-Accessing Form Input with User-Defined Arrays-Combining HTML and PHP Code on a Single Page-Using Hidden Fields to Save State-Redirecting the User-Sending Mail on Form Submission-Working with File Uploads. **Working with Cookies and User Sessions:** Introducing Cookies-Setting a Cookie with PHP-Deleting a Cookie with PHP-Session Function Overview-Starting a Session-Working with Session Variables-Passing Session IDs in the Query String-Destroying Sessions and Unsetting Variables-Using sessions in an Environment with Registered Users.

Unit V

Working with Files and Directories: Including Files with include ()-Validating Files-Creating and Deleting Files-Opening a File for Writing, Reading, or Appending -Reading from Files- Writing or Appending to a File-Working with Directories-Opening Pipes to and from Processes Using popen ()-Running Commands with exec()-Running Commands with system() or passthru ().

Text Book:

Julie C.Meloni (2009), PHP, MySQL and Apache, 4th Edition, Pearson Education.

Reference Books:

1. Steven Holzner (2008), The PHP Complete Reference, McGraw Hill Education.
2. VikramVaswani (2008), PHP: A Beginner's Guide, McGraw Hill Education.