VIVEKANANDHA

COLLEGE OF ARTS AND SCIENCES FOR WOMEN

ELAYAMPALAYAM, TIRUCHENGODE (Tk.), NAMAKKAL (Dt.).

(Affiliated to Periyar University, Approved by AICTE & Re-Accredited with A Grade by NAAC)

Recognized under section 2(f) and 12(B) Under UGC Act, 1956

A U T O N O M O U S

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

B.Sc. INFORMATION TECHNOLOGY

SYLLABUS & REGULATIONS

FOR CANDIDATES ADMITTED FROM 2022-23
ONWARDS UNDER AUTONOMOUS & OBE PATTERN

VIVEKANANDHA EDUCATIONAL INSTITUTIONS
Angammal Educational Trust
Elayampalayam, Tiruchengode (Tk.), Namakkal (Dt.)

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN
(AUTONOMOUS)

B.Sc (INFORMATION TECHNOLOGY)
(Candidates admitted from 2022-2023 onwards)

REGULATIONS

I. SCOPE OF THE PROGRAMME

Bachelor of Information Technology can be considered to be one of the most prominent UG level programs in our country. This program mainly deals with the development of computer applications for the purpose of updating computer programming languages. B.Sc.[IT] also aims at creating strong knowledge of theoretical Information Technology subjects who can be employed in software development and testing units of industries. The course has a time period of 3 years with 6 semesters.

II. SALIENT FEATURES

- Regular conduct of guest lectures and seminars
- Campus recruitment
- Provides facilities such as Internet Access and In-House Library
- Provides Career Guidance for Post Graduate Courses like M.Sc, and the Certifications in programming languages
- Conduct of Personality Development Program
- Visiting Faculties from Industries

III. OBJECTIVES OF THE PROGRAMME

The Course Objective of the B.Sc. Information Technology program is to provide advanced and in-depth knowledge of Information Technology and its applications to enable students pursue a professional career in Information and Communication Technology in related industry, business and research. The course designed to impact professional knowledge and practical skills to the students.

IV. ELIGIBILITY FOR ADMISSION

A Candidates seeking admission to the first year Degree course (B.Sc. Information Technology) shall be required to have passed Higher Secondary Examination with Mathematics or Business

Mathematics or Computer Science or Computer Applications or Computer Technology or Statistics (Academic Stream or Vocational Stream) as one of the subject under Higher Secondary Board of Examination, conducted by the Government of Tamilnadu or an examination accepted as equivalent thereto by the syndicate, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the B.Sc. Information Technology Degree Examination of Periyar University after a course of study of three academic years.

V. DURATION OF THE PROGRAMME

- The course shall extend over a period of three academic years consisting of six semesters. Each academic year will be divided into two semesters. The First semester will consist of the period from July to November and the Second semester from December to April.
- The subjects of the study shall be in accordance with the syllabus prescribed from time to time by the Board of Studies of Vivekanandha College of Arts and Sciences for Women with the approval of Periyar University.

VI. CONTINUOUS INTERNAL ASSESSMENT (CIA)

The performance of the students will be assessed continuously and the Internal

ASSESSMENT MARKS **FOR THEORY PAPERS** WILL BE AS UNDER:

1	Average of Two Tests	-	05
2	Model Exam	-	10
3	Assignment	-	05
4	Attendance	-	05
	To	-	25

ASSESSMENT MARKS **FOR PRACTICAL PAPERS** WILL BE AS UNDER:

1	Model Exam	-	20
2	Observation Note	-	10
3	Attendance	-	10
	To	-	40

PASSING MINIMUM - EXTERNAL

THEORY	In the End Semester Examinations, the passing minimum shall be 40% out of 75 Marks. (30 Marks)
PRACTICAL / MINI PROJECT	In the End Semester Examinations, the passing minimum shall be 40% out of 60 Marks. (24 Marks)

VII. ELIGIBILITY FOR EXAMINATION

A candidate will be permitted to appear for the University Examination only on learning 75 % of attendance and only when her conduct has been satisfactory. It shall be open to grant exemption to a candidate for valid reasons subject to conditions prescribed.

DISTRIBUTION OF MARKS FOR ATTENDANCE:

ATTENDANCE PERCENTAGE	MARKS	
	THEORY	PRACTICAL
75-80	1	2
81-85	2	4
86-90	3	6
91-95	4	8
96-100	5	10

VIII. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Successful candidates passing the Examination of Core Courses (Main & Allied Subjects) & Securing Marks.

a) 75 % and above shall be declared to have passed the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at first appearance itself.
b) 60% and above but below 75 % shall be declared to have passed the Examinations in First Class..
c) 50% & above but below 60% shall be declared to have passed the examinations in Second Class.
d) All the remaining successful candidates shall be declared to have passed the examinations in Third Class.
e) Candidates who pass all the examinations prescribed for the course at the First appearance itself and within a period of three Consecutive Academic years from the year of admission only will be eligible for University Rank.

IX. ELIGIBILITY FOR AWARD OF THE DEGREE

A candidate shall be eligible for the award of the Degree only if she has undergone the above Degree for a period of not less than Three Academic years comprising of six semesters and passed the Examinations prescribed and fulfilled such conditions has have been prescribed therefore.

X. PROCEDURE IN THE EVENT OF FAILURE

If a candidate fails in a particular subject, she may reappear for the university examination in the concerned subject in subsequent semesters and shall pass the examination.

XI. COMMENCEMENT OF THESE REGULATIONS

These regulations shall take effect from the academic year 2021-2022 (i.e.,) for the students who are to be admitted to the First year of the course during the Academic year 2021-22 and thereafter.

XII. TRANSITORY PROVISIONS

Candidates who were admitted to the UG course of study before 2018-2019 shall be permitted to appear for the examinations under those regulations for the period of Three years ie., upto and inclusive of the Examinations of 2021-2022. Thereafter, they will be permitted to appear for the examinations only under the regulations then in force.

EVALUATION OF EXTERNAL EXAMINATIONS (EE)

QUESTION PAPER PATTERN – Theory	
Time duration: 3 Hours	**Max. Marks: 75**
PART- A: **(20 x 1= 20)**	Answer all the Questions Four Questions from each Unit
PART- B: **(5 x 5 = 25)**	Answer all the questions One Question from each Unit (Either or Type)
PART- C: **(3 x 10 = 30)**	Answer any **THREE** of the questions One Question from each Unit (3 Out of 5)
IN THE END SEMESTER EXAMINATIONS, THE PASSING MINIMUM SHALL BE 40% OUT OF 75 MARKS. (30 MARKS)	

QUESTION PAPER PATTERN – Practical	
Time duration: 3 Hours	**Max. Marks: 60**
1. One compulsory question from the given list of objectives	**30 Marks**
2. One either/or type question from the given list of objectives	**30 Marks**
IN THE END SEMESTER EXAMINATIONS, THE PASSING MINIMUM SHALL BE 40% OUT OF 60 MARKS. (24 MARKS)	

B.Sc IT CURRICULUM FOR ACADEMIC YEAR 2021 – 2022

COURSE PATTERN AND SCHEME OF EXAMINATIONS UNDER AUTONOMOUS, CBCS & OBE PATTERN

FOR THE CANDIDATES ADMITTED FROM THE YEAR 2021 – 2022

SEMESTER: I & II

SEM	PART	COURSE CODE	COURSE TITLE	Hrs	CREDIT	MARKS		
						CIA	EE	TOT
I	I	18U1LT01	Tamil – I	6	3	25	75	100
	II	17U1LE01B	English – I	6	3	25	75	100
	III	18U1MAA03	Allied – I: Numerical Methods	4	4	25	75	100
	III	21U1ITC01	Core: I Programming in C	4	4	25	75	100
	III	21U1ITCP01	Practical – I: Programming in C Lab	4	4	40	60	100
	III	21U1ITCP02	Practical –II: Office Automation Lab	4	3	40	60	100
	IV	18U1VE01	Value Education	2	2	25	75	100
			Total	**30**	**23**	**205**	**495**	**700**
II	I	18U2LT02	Tamil – II	6	3	25	75	100
	II	18U2LE02B	English – II	6	3	25	75	100
	III	18U2MAA06	Allied – II: Discrete Mathematics	4	4	25	75	100
	III	21U2ITC02	Core: II Programming in C++	4	4	25	75	100
	III	21U2ITCP03	Practical – III: Programming in C++ Lab	4	3	40	60	100
	III	21U2ITC03	Core: III Data Structures and Algorithms	4	4	25	75	100
	IV	18U2ES01	Environmental Studies	2	2	25	75	100
			Total	**30**	**23**	**190**	**510**	**700**

SEMESTER: III & IV

SEM	Part	Course Code	COURSE TITLE	Hrs	CREDIT	MARKS		
						CIA	EE	TOT
III	III	18U3CMA03	Allied – III: Financial Accounting	4	4	25	75	100
	III	21U3ITC04	Core: IV Java Programming	5	4	25	75	100
	III	21U3ITC05	Core: V Operating Systems	5	4	25	75	100
	III	21U3ITC06	Core: VI Computer Networks	4	4	25	75	100
	III	21U3ITCP04	Practical- IV: Java Programming Lab	4	3	40	60	100
	III	21U3ITCP05	Practical: V HTML & Web Designing Lab	2	2	40	60	100
	IV	21U3ITS01	SBEC:I HTML & Web Designing	2	2	25	75	100
	IV		NMEC – I:	2	2	25	75	100
			Library & Sports	2	0	-	-	-
	Total			**30**	**25**	**230**	**570**	**800**
IV	III	18U4CMA04	Allied – IV: Cost & Management Accounting	4	4	25	75	100
	III	21U4ITC07	Core: VII Relational Database Management System	5	4	25	75	100
	III	21U4ITC08	Core: VIII Software Engineering	4	3	25	75	100
	III	21U4ITC09	Core: IX R Programming	4	3	25	75	100
	III	21U4ITCP06	Practical: VI Relational Database Management System Lab	4	3	40	60	100
	III	21U4ITCP07	Practical: VII R Programming Lab	3	3	40	60	100
	III	21U4ITS02	SBEC:II Internet of Things	2	2	25	75	100
	IV		NMEC – II	2	2	25	75	100
			Library & Sports	2	0	-	-	-
	Total			**30**	**24**	**230**	**570**	**800**

SEMESTER: V & VI

SEM	Part	COURSE CODE	COURSE TITLE	Hrs	CREDIT	MARKS		
						CIA	EE	TOT
V	III	21U5ITC10	Core: X .Net Programming	5	4	25	75	100
	III	21U5ITC11	Core: XI PHP Programming	5	4	25	75	100
	III	21U5ITE_	Elective – I	5	3	25	75	100
	III	21U5ITCP08	Practical: VIII . Net Programming Lab	4	3	40	60	100
	III	21U5ITCP09	Practical: IX PHP Programming Lab	5	3	40	60	100
	III	21U5ITCPR01	PROJECT – I: Project Work-I (In - House Project)	4	3	40	60	100
	IV	21U5ITS03	SBEC: III Data Analysis using Excel	2	2	25	75	100
	Total			**30**	**22**	**220**	**480**	**700**
VI	III	21U6ITC12	Core: XII Python Programming	5	4	25	75	100
	III	21U6ITC13	Core: XIII Mobile Application Development	5	4	25	75	100
	III	21U6ITE_	Elective – II	5	3	25	75	100
	III	21U6ITCP10	Practical – X Mobile Application Development Lab	5	3	40	60	100
	III	21U6ITCP11	Practical: XI Python Programming Lab	4	3	40	60	100
	III	21U6ITCPR02	PROJECT – II: Project Work	4	3	40	60	100
	IV	21U6ITS04	SBEC: IV: Desktop Publishing	2	2	25	75	100
	V	21U6EX01	Extension Activities	-	1	-	-	-
	Total			**30**	**23**	**220**	**480**	**700**
Grand Total				**180**	**140**	**1295**	**3105**	**4400**

ELECTIVE – I			ELECTIVE – II		
Semester	**Course Code**	**Title**	**Semester**	**Course Code**	**Title**
V	21U5ITE01	Information security	VI	21U6ITE04	Machine Learning
	21U5ITE02	Cloud Computing		21U6ITE05	Block Chain Technologies
	21U5ITE03	Web Technology		21U6ITE06	Big Data Analytics

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U1ITC01	Programming in C	4	0	0	4	25	75	100

COURSE OBJECTIVES	This subject is to provide the students a strong foundation on programming concepts and its application. It also enables the students to solve problems using programmable logic
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	To interpret the basic elements like variables, data types and operators in C Language
CO 2	To implement the C Program Decision making and Branching Statements
CO 3	Execute Character Arrays and Strings by using String handling functions and User defined functions in C Language
CO 4	Organize Structures, Unions and Pointers in C Language
CO 5	Generate Array of Pointers and Files in C Language
Pre-requisites	Basic Computer Knowledge

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	1
		PO 2	2
		PO 3	6
CO 2	3	PO 4	5
		PO 5	3
		PO 6	5
CO 3	3	PO 7	4
		PO 8	6
		PO 9	6
CO 4	4	PO 10	6
		PO 11	6
		PO 12	5
CO 5	6	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO2	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO3	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO4	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO5	1	1	3	2	1	2	1	3	3	3	3	2	3	3	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Overview of C	Periods	10
	History - Importance - Basic structure of C programs. Constants, variables and data types - Operators and -Type conversions in expressions - Operator precedence and associativity.		
Unit - II	Branching and Looping	Periods	10
	Decision making and branching - Decision making and looping- Arrays: Definition & Declaration - Types - Dynamic arrays.		
Unit - III	Arrays and Strings	Periods	10
	Character arrays and strings- User - Defined functions- Elements - Definition of functions - Return values and their types - Function calls - Function declaration - Categories of Functions.		
Unit - IV	Structures and Unions	Periods	10
	Understanding pointers - Accessing the address of a variable - Initializing of pointer variables. Chain of Pointers - Arrays of pointers - Pointers as function arguments - Pointer and structures.		
Unit - V	File Management	Periods	10
	I/O operation on files - Error handling during I/O operations -Dynamic Memory Allocation and Linked List - Malloc - Calloc - Free - Realloc -Linked list: Concept - Types- Advantages- Creating a linked list - Applications		
Total Periods			50

Text Books	
1	"Programming in ANSI C", E. Balgurusamy Tata McGraw Hill, New Delhi, 4th Edition
References	
1	"C: The Complete Reference", Herbert Schildt, Mc Graw Hill, New Delhi, 4th Edition
2	"Programming In C", B.L.JUNEJA, Cengage Learning India
3	"Programming In ANSI C", E. Balagurusamy TMG Hill, New Delhi, 5th Edition.
E-References	
1	https://www.programiz.com/c-programming
2	https://www.tutorialspoint.com/cprogramming/index.htm
3	https://en.wikipedia.org/wiki/C_(programming_language)
4	https://www.geeksforgeeks.org/c-programming-language/

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	Programme Code	**UIT**		Regulations		**2021-2022**
Department	**Information Technology**		Semester				**1**
Course Code	Course Name		Periods per Week		Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U1ITCP01	Programming in C Lab		0	0	4	3	40	60	100

List of Experiments

1	Write a c program to Swap two numbers without using third Number.
2	Write a c program to print multiplication of 2 matrices.
3	Write a c program to convert decimal number to binary.
4	Write a c program to reverse given number using for loop.
5	C program to find sum of array elements using Dynamic Memory Allocation.
6	Write a program for accessing union members.
7	Write a program for access data members of a structure using a struct variable.
8	C Program to create, initialize, assign and access a pointer variable.
9	Write a c program for copy one file to another file.
10	Write a c program to Employee record system using file.

Signature of BOS Chairman

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Programme	**B.Sc**	Programme Code	**UIT**			Regulations	**2021-2022**	
Department	**Information Technology**		Semester				**1**	
Course Code	Course Name		Periods per Week			Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U1ITCP02	Office Automation lab		0	0	2	2	40	60	100

List of Experiments

MS Word

1	Creating a Document using MS Word: • Enter a text about your Institution with two Titles. • Set the paper size A4 and orientation of the paper to Portrait. • Make the titles to Center, Bold, Font size 20 and style in Arial. • Justify the entire Text. Set the margin left 1 . 5, Right 1 . 5, Top and Bottom5 • Use Drop Cap in 1st paragraph 1st character for 3 lines. • Change the font size of the text to 12 size. • Use bulleted list and Highlight the important sentences. • Insert a picture, word art, Header and Footer. • Save the file.
2	Enhance the documents using Header, Footer, Page Setup, Border, Page number, watermarking, Orientation and Print Preview.
3	Prepare a student bio – data.
4	Create letters using Mail Merge in MS – Word

MS. Excel

5	Create a Statement in MS. Excel regarding particulars of 10 students of I Year MOP of your College using Ms. **Excel** (Fields : Roll No. , Name, Community, DOB, Age, Address, & 10th Mark. (Things to be Covered) • Enter Two Titles • Enter the 1st and 2ndTitles in first and second rows with different font size and styles. • Enter Roll No., Name, etc as Field names. • Enter the Roll Number using Fill Handle. • Enter 10 students particulars. • Centre the Titles. • Insert a New Row between 5th and 6thRow . • Enter a New Student's particulars in the new Row. • Delete the Last row. • Insert a New Column between 3rdt and 4th Column for Sex. • In the Sex column enter Sex = "M" or "F" • Align all the Data in Centre. • Save the File.

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Programme	**B.Sc**	Programme Code	**UIT**				Regulations	**2021-2022**		
Department	**Information Technology**		Semester					**1**		
Course Code	Course Name		Periods per Week			Credit	Maximum Marks			
			L	T	P	C	CA	ESE	Total	
21U1ITCP02	Office Automation lab		0	0	2	2	40	60	100	

6	• Create a worksheet, moving/ copying/ inserting/ deleting rows and columns (usage of cut, paste, commands, copying a single cell, copying a range of data, filling up a cell. Undo command, inserting a row, column, deleting rows and columns). • Formatting worksheets Bold, Italic, Font size changing, Auto fill, date format, Currency format.
7	Open an excel and create fields as follows S. No | Name of the student | M1 | M2 | M3 | M4 | M5 | Total | Avg | Result | Grade i. Enter S.No, Name, marks for 10 students ii. Find total and average using formula. iii. Find Result whether the student is pass or fail and also assign grade as per our university norms. iv. Insert a column chart showing the comparison of marks in different subjects of different students.
8	i. Creating and running a macro. ii. Assigning button to a defined macro. iii. Editing a macro.
	MS. Powerpoint Presentation
9	Create a power-point presentation with minimum 5 slides. a. The first slide must contain the topic of the presentation and name of the presentation. b. Must contain at least one table. c. Must contain at least 5 bullets, 5 numbers. d. The heading must be, font size:32, font-face: Arial Rounded MT Bold, font-color: blue. e. The body must be, font size: 24, font-face: Comic Sans MS, font-color: green. f. Last slide must contain „thank you“.
10	Create a presentation with apply background/Themes, apply custom animation on text, insert images/word art and animate the images with effects.
11	Create a presentation with minimum 5 slides a. Use custom animation option to animate the text; the text must move left to right one line at a time. b. Use proper transition for the slides.

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Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**1**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U1ITCP02	Office Automation lab	0	0	2	2	40	60	100

Ms Access

12.	Create a database “Student” with, a. At least one table named “mark sheet” with field name “student name, roll number, mark1, mark2, mark3, mark4, total” b. The data types are, student name: text, roll number: number, mark1 to mark4: number, total: number. Roll number must be the primary key. c. Enter data in the table. The total must be calculated using update query. d. Use query for sorting the table according to the descending/ascending order of the total marks.
13.	With addition to the table above, a. Add an additional field “result” to the “mark sheet” table. b. Enter data for at least 10 students c. Calculate the result for all the students using update queries, if total>=200, then pass, else fail. d. Search the students, whose name starts with “sh”. e. Show the names and total marks of the students who have passed the examination.
14.	Create a employee personal information using MS – Access

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**2**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U2ITC02	Programming in C++	5	0	0		25	75	100

COURSE OBJECTIVES	To learn the basic concepts of object oriented programming & the syntax of C++ language. To impart the programming skills C++ and the concepts of Object Oriented Software Development Life Cycle and about Unified Modeling Language.
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	Distinguish between Structured and Object Oriented problem solving approaches and apply them based on the problem given
CO 2	Identify classes and objects from the given problem description and able to create classes and objects using C++
CO 3	Achieve code reusability and extensibility by means of Inheritance and Polymorphism.
CO 4	Understand the complexity of Industrial Strength Software and the application of Unified Process Model.
CO 5	
Pre-requisites	

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	2
		PO 3	6
CO 2	2	PO 4	5
		PO 5	3
		PO 6	5
CO 3	4	PO 7	4
		PO 8	6
		PO 9	6
CO 4	4	PO 10	6
		PO 11	6
		PO 12	5
CO 5	5	PO 13	6
		PO 14	6
		PO 15	1

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	3
CO2	2	3	1	1	2	1	1	1	1	1	1	1	1	1	2
CO3	1	1	1	2	2	2	1	1	1	1	1	2	1	1	1
CO4	1	1	1	2	2	2	1	1	1	1	1	2	1	1	1
CO5	1	1	2	3	1	3	2	2	2	2	2	3	2	2	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Basic Concepts of OOP	Periods	12
	Basic Concepts of OOP - Benefits of OOP - Applications of OOP -Structure of C++ - Simple programs in C++ -Applications of C++ -Tokens- Keywords- Identifiers and Constant-Data types - Variables - Operators-Manipulators-Expressions- Control Structures. Functions -The main function- Prototype- Call by Reference- Return by reference- Inline Functions- Default Arguments- Function Overloading.		
Unit - II	Classes and Objects	Periods	12
	Classes and Objects - Introduction- Specifying a class - defining a Member Functions - Array with in a class- Memory Allocation for Objects- Static data members - Static member function- Array of Objects- Objects as Function Arguments - Friendly Functions- Returning Objects-const Member Functions- Constructors and Destructors. Operator Overloading and type conversions		
Unit - III	Inheritance:	Periods	12
	Inheritance: defining a derived class - Derived Classes- single inheritance- Multilevel Inheritance- Multiple Inheritance- Hierarchical Inheritance- Hybrid Inheritance- Virtual Base Classes- Abstract Classes, Pointers, virtual Functions and Polymorphism: Pointers - Pointers to Objects - these Pointers Virtual Functions - Pure Virtual Functions.		
Unit - IV	Managing I/O Operations:	Periods	12
	Managing I/O Operations: Streams in C++ - C++ Stream Classes - unformatted I/O operation- Formatted Consol I/O Operations - Managing Output with Manipulators		
Unit - V	Templates:	Periods	12
	Templates: Class templates- Class templates with Multiple Parameters- Function templates- Function Templates with Multiple Parameters- Member Function Templates.		
	Total Periods		60

Text Books	
1	1. E.Balagurusamy, "Object-Oriented Programming with C++", Tata McGraw Hill Publishing Company Limited, New Delhi ,Second Edition, 2001.
2	2. Bahrami "Object Oriented Systems", McGraw Hill International Edition, 1999.
References	
1	1. Robert Lafore, " Object Oriented Programming in Turbo C++", Galgotia ,2001.
2	2. Herbert Schildt, "Teach Yourself C++", Third Edition. Tata McGraw Hill, 5th Reprint, 2000
3	3. K.R Venu Gopal , Rajkumar, T.Ravishankar, "Mastering C++",TMG Ltd, New Delhi
E-References	
1	1. https://bookstore.github.io/cse/secondyear/Balaguruswamy%20Object%20Oriented%20Programming%20With%20C++%20Fourth%20Edition.pdf
2	2. http://www.ddegjust.ac.in/studymaterial/mca-3/ms-17.pdf
3	3. https://www.scribd.com/doc/272353233/Object-Oriented-Programming-in-C-Balaguruswamy-pdf

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	Programme Code	**UIT**		Regulations	**2021-2022**	
Department	**Information Technology**		Semester			**2**	
Course Code	Course Name		Periods per Week		Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U2ITCP03	Programming in C++ Lab		0	0	4	3	40	60	100

List of Experiments	
1	Classes and Objects
2	constructors & destructors
3	Inline Functions
4	Function overloading
5	Operator overloading
6	Inheritance (Any Two Types)
7	Dynamic Polymorphism – Virtual Functions.
8	Friend Function
9	Pointers
10	Templates

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**2**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U2ITC03	Data Structures and Algorithms	4	0	0	4	25	75	100

COURSE OBJECTIVES	â€¢ Understand and remember algorithms and its analysis procedure. â€¢ Introduce the concept of data structures through ADT including List, Stack, and Queues.â€¢ To design and implement various data structure algorithms.â€¢ To introduce various techniques
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	Explain the organization and operations of data structures Stack, Queues, Trees, Graphs, Heaps.
CO 2	Compare and contrast the functionalities and applications of different data structures
CO 3	Demonstrate specific search and sort algorithms using data structures given specific user requirements
CO 4	Apply the operations of data structures in designing software procedures based on specific requirements
CO 5	Assess the applicability of given data structures and associated operations to real time
Pre-requisites	Know about algorithms

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	5	PO 1	1
		PO 2	2
		PO 3	6
CO 2	2	PO 4	5
		PO 5	3
		PO 6	5
CO 3	1	PO 7	4
		PO 8	6
		PO 9	6
CO 4	3	PO 10	6
		PO 11	6
		PO 12	5
CO 5	2	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	2	3	1	3	2	2	2	2	2	3	2	2	3
CO2	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO4	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO5	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	An Introduction to Data Structure:	Periods	12
	Algorithms - Modular Programming - Top-Down Algorithm Design Bottom - Up Algorithm Design - Structured Programming - Analysis of Algorithm - Classification of Data Structure - Arrays - Lists.		
Unit - II	Stack:	Periods	12
	Operations Performed on Stack - Stack Implementation - Stack Using Arrays - Applications of Stacks - Evaluating Postfix Expression. Queue: Algorithms for Queue Operations - Circular Queue - Deques - Applications of stacks.		
Unit - III	Linked List:	Periods	12
	Representation - Advantages and Disadvantages - Operations - Types of linked list - Singly - Doubly - circular. Sorting Techniques: Complexity of Sorting Algorithms - Bubble Sort - Insertion Sort - Shell Sort - Quick Sort - Merge Sort - Radix Sort - Heap Sort - External Sorting.		
Unit - IV	Trees:	Periods	12
	Basic Terminologies - Binary Trees - Representation of Binary tree - Operations - Types of Binary Trees: Binary Search Tree - Expression tree - Balanced Binary Tree - AVL Tree - Applications. Case study: Heap Tree.		
Unit - V	Graphs:	Periods	12
	Introduction-Graph Terminologies-Representation of Graphs-Operations on Graphs - Breadth first search - Depth first search - Applications of Graph: Minimum Spanning Tree - Shortest path. Searching Techniques: Sequential - Binary and Fibonacci search.		
Total Periods			60

Text Books	
1	1. Vinu V Das "Principles of Data Structures using C and C++", New Age International Pvt Ltd Publishers, New Delhi, 2011.
References	
1	1. Chitra A &Rajan PT, "Data Structures", 2nd Edition, Vijay Nicole Publications, 2016
2	2. Reema Thareja "Data Structures using C" Oxford University Press Second Edition, New Delh, 2014.
3	3. Debasis Samanta "Classical Data structure" 2nd Edition, PHI Learning Private Limited, New Delhi, 2011.
4	4. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd edition, Pearson Education Asia, 2009
E-References	
1	1. www.freetechbooks.com/algorithms-and-data-structures-f11.html
2	2. https://sonucgn.files.wordpress.com/2018/01/data-structures-by-d-samantha.pdf

Signature of BOS Chairman

Programme

Department	**Information Technology**	Semester	**2**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U2ITC03	Data Structures and Algorithms	4	0	0	4	25	75	100
COURSE OBJECTIVES	â€¢ Understand and remember algorithms and its analysis procedure. â€¢ Introduce the concept of data structures through ADT including List, Stack, and Queues.â€¢ To design and implement various data structure algorithms.â€¢ To introduce various techniques							
POs	PROGRAMME OUTCOME							
PO 1	Apply the knowledge of mathematics, science and com uting in the core information technolo ies							
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.							
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.							
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.							
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.							
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.							
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.							
PO 8	Apply ethical principles and responsibilities during professional practice.							
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.							
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.							
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.							
PO 12	Engage in independent and life-long learning for continued professional development.							
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.							
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.							
PO 15	Updating themselves through e-learning and self-study courses.							

COs	COURSE OUTCOME
CO 1	Explain the organization and operations of data structures Stack, Queues, Trees, Graphs, Heaps.
CO 2	Compare and contrast the functionalities and applications of different data structures
CO 3	Demonstrate specific search and sort algorithms using data structures given specific user requirements
CO 4	Apply the operations of data structures in designing software procedures based on specific requirements
CO 5	Assess the applicability of given data structures and associated operations to real time
Pre-requisites	Know about algorithms

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	5	PO 1	1
		PO 2	2
		PO 3	6
CO 2	2	PO 4	5
		PO 5	3
		PO 6	5
CO 3	1	PO 7	4
		PO 8	6
		PO 9	6
CO 4	3	PO 10	6
		PO 11	6
		PO 12	5
CO 5	2	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	2	3	1	3	2	2	2	2	2	3	2	2	3
CO2	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO4	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO5	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	An Introduction to Data Structure:	Periods	12
	Algorithms - Modular Programming - Top-Down Algorithm Design Bottom - Up Algorithm Design - Structured Programming - Analysis of Algorithm - Classification of Data Structure - Arrays - Lists.		
Unit - II	Stack:	Periods	12
	Operations Performed on Stack - Stack Implementation - Stack Using Arrays - Applications of Stacks - Evaluating Postfix Expression. Queue: Algorithms for Queue Operations - Circular Queue - Deques - Applications of stacks.		
Unit - III	Linked List:	Periods	12
	Representation - Advantages and Disadvantages - Operations - Types of linked list - Singly - Doubly - circular. Sorting Techniques: Complexity of Sorting Algorithms - Bubble Sort - Insertion Sort - Shell Sort - Quick Sort - Merge Sort - Radix Sort - Heap Sort - External Sorting.		
Unit - IV	Trees:	Periods	12
	Basic Terminologies - Binary Trees - Representation of Binary tree - Operations - Types of Binary Trees: Binary Search Tree - Expression tree - Balanced Binary Tree - AVL Tree - Applications. Case study: Heap Tree.		
Unit - V	Graphs:	Periods	12
	Introduction-Graph Terminologies-Representation of Graphs-Operations on Graphs - Breadth first search - Depth first search - Applications of Graph: Minimum Spanning Tree - Shortest path. Searching Techniques: Sequential - Binary and Fibonacci search.		
Total Periods			60

Text Books	
1	1. Vinu V Das "Principles of Data Structures using C and C++", New Age International Pvt Ltd Publishers, New Delhi, 2011.
References	
1	1. Chitra A &Rajan PT, "Data Structures", 2nd Edition, Vijay Nicole Publications, 2016
2	2. Reema Thareja "Data Structures using C" Oxford University Press Second Edition, New Delh, 2014.
3	3. Debasis Samanta "Classical Data structure" 2nd Edition, PHI Learning Private Limited, New Delhi, 2011.
4	4. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd edition, Pearson Education Asia, 2009
E-References	
1	1. www.freetechbooks.com/algorithms-and-data-structures-f11.html
2	2. https://sonucgn.files.wordpress.com/2018/01/data-structures-by-d-samantha.pdf

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	Programme Code	**UIT**		Regulations		**2021-2022**
Department	**Information Technology**		Semester				**3**
Course Code	Course Name		Periods per Week		Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U3ITC04	Java Programming		4	0	0	4	25	75	100
COURSE OBJECTIVES	To know how to program in the Java programming languageTo develop knowledge of object-oriented paradigm in the Java programming language.Apply and use of Java in a variety of technologies and on different platforms.								
POs	PROGRAMME OUTCOME								
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies								
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.								
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.								
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.								
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively								
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.								
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.								
PO 8	Apply ethical principles and responsibilities during professional practice.								
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team								
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.								
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.								
PO 12	Engage in independent and life-long learning for continued professional development.								
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.								
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.								
PO 15	Updating themselves through e-learning and self-study courses.								

COs	COURSE OUTCOME
CO 1	Understand and write the program in Java with basic input and output functions
CO 2	To understand the functions, Class and Objects, Inheritance and Packages in Java
CO 3	To understand and apply the exception handling mechanisms in Java
CO 4	To know the concept of JDBC and apply in the program to connect with the Java Program
CO 5	To know and develop Applets and know its use
Pre-requisites	Have an idea on Object Oriented languages such as C++

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	1
		PO 2	2
		PO 3	6
CO 2	3	PO 4	5
		PO 5	3
		PO 6	5
CO 3	3	PO 7	4
		PO 8	6
		PO 9	6
CO 4	4	PO 10	6
		PO 11	6
		PO 12	5
CO 5	3	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO2	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO3	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO4	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO5	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Overview of Java Language	Periods	12
	Introduction - simple java program-Java program structure-Java Tokens-Implementing a Java program Constants, variables, Data Types and Operators: Constants-variables-Data Types-Declaration of variables-Operators and Expression.		
Unit - II	Classes, objects and Methods	Periods	12
	Defining a classes-Field and method declaration-creating objects-constructors-methods overloading-static members-Abstract class. Array: Introduction - One Dimensional Array-Creating Array-Two dimensional Array		
Unit - III	Inheritance and Packages	Periods	12
	Extending a class -Overriding methods. Interfaces: Defining Interface-Extending Interface. Packages: Java API package-creating package-Accessing Package. Java String.		
	Exception Handling	Periods	12
Unit - IV	Hierarchy, Advantage, Types, Keywords. Multithreading: Advantage, Multitasking. I/O Streams.		
	Applet Programming	Periods	12
Unit - V	Building Applet Code-Applet Life Cycle-Designing a web page-Applet Tag-Running the Applet.AWT Event Handling: Introduction to AWT package-Swing Package-JDBC.		
	Total Periods		60

Text Books	
1	Balagurusamy, "Programming in Java", 4th Edition 2010, TMH, New Delhi. Unitâ€“I (Chapter â€“ 3.1,3.2,3.5,3.6,3.9,4.1 â€“ 4.5, 5) Unit â€“II(Chapter â€“ 8.2 -8.5,8.7 -8.9,8.16,9.1-9.4) Unit â€“ III (Chapter â€“ 8.11, 8.12,10.2,10.311.2,11.5,11.6) Unit â€“ IV (Chapter â€“14.4,14.5,14.7,14.814.10) Unit â€“V (Chapter â€“ 15.2,15.3,15.5-15.7,15.9-15.11,16.1-16.12)
References	
1	Herbert Scheldt, "Java2 The complete Reference" -McGraw Hill Publication
2	John R. Hubbard, "Programming With Java", 2nd Edition, TMH
E-References	
1	www.learnjavaonline.org
2	www.javaworld.com
3	www.onjava.com
4	www.java.sun.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U3ITC05	Operating Systems	4	0	0	3	25	75	100

COURSE OBJECTIVES	To introduce students with basic concepts of Operating System, its functions and services. To familiarize the students with various views and management policies adopted by O.S. as pertaining with processes,Deadlock, memory,File and I/O operations
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	Analyze the structure of OS and basic architectural components involved in OS design
CO 2	Analyze and design the applications to run in parallel either using process or thread models of different OS
CO 3	Organize the various device and resource management techniques for time sharing and distributed systems
CO 4	Explain the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system
CO 5	Interpret the mechanisms adopted for file sharing in distributed Applications
Pre-requisites	Knowledge of data structures and algorithms for an Operating Systems and Systems Programming

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	4	PO 1	1
		PO 2	2
		PO 3	6
CO 2	6	PO 4	5
		PO 5	3
		PO 6	5
CO 3	5	PO 7	4
		PO 8	6
		PO 9	6
CO 4	4	PO 10	6
		PO 11	6
		PO 12	5
CO 5	2	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO2	1	1	3	2	1	2	1	3	3	3	3	2	3	3	2
CO3	1	1	2	3	1	3	2	2	2	2	2	3	2	2	3
CO4	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO5	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Operating System Overview	Periods	12
	Operating System Objectives and Functions. History of Operating System: First, Second, Third & Fourth Generation Operating System. Types of Operating System: Main Frame - Server - Multiprocessor - Personal Computer - Embedded - Real-Time Operating System. The Evolution of Operating System		
Unit - II	Mutual Exclusion and Synchronization	Periods	12
	Threads: Process and Threads - Multithreading - Thread Functionality -Mutual Exclusion and Synchronization: Principles of Concurrency - Mutual Exclusion - Semaphores. Deadlock and Starvation: Resources - Principles of Deadlock - Deadlock Detection and Recovery - Deadlock Avoidance and Prevention.		
Unit - III	Memory Management	Periods	12
	Memory Management Requirements - Memory Partitioning - Paging - Segmentation. Virtual Memory: Hardware and Control Structures. Operating System Software: Fetch Policy - Placement Policy - Replacement Policy - Basic Algorithms - Page Buffering.		
Unit - IV	Scheduling	Periods	12
	Types of Scheduling: Long Term Scheduling - Medium Term Scheduling - Short-Term Scheduling. Scheduling Algorithm: Short Term Scheduling Criteria - The Use of Priorities - Alternative Scheduling Policies. File Management: Overview - File Organization and Access - File Sharing - Record Blocking - Secondary Storage Management.		
Unit - V	I/O Devices-Organization of the I/O Functions	Periods	12
	The Evolution of the I/O function-Direct Memory Access. I/O Buffering: Single Buffer-Double Buffer-Circular Buffer-The Utilities of Buffering. Disk Scheduling: Disk Performance Parameters-Disk Scheduling Polices-RAID. Case Study: Windows OS, Linux OS, and MAC OS		
	Total Periods		60

Text Books	
1	"Operating Systems Internals and Design Principles" by William Stallings, Second Edition, PHI Learning Private Limited, New Delhi, 2012.
References	
1	"Modern Operating Systems" by Andrew S. Tanenbaum, Third Edition, PHI Learning Private Limited, NewDelhi, 2011.
2	"Operating Systems", by Achyut S Godbole, Second Edition, TMH Publishing Company Limited, New Delhi, 2008.
3	"Operating System Concepts", by Silberschatz, Galvin and Gagne, Sixth Edition, John Wiley & Sons Inc 2002.
E-References	
1	http://faculty.salina.k-state.edu/tim/ossg/Introduction/OSrole.html
2	www.tutorialspoint.com/operating_system/

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U3ITC06	Computer Networks	4	0	0	4	25	75	100

COURSE OBJECTIVES	To understand the basics of Computer Networks.To understand the important OSI layers of computer Networks.Become familiar with the basics of computer network architectures and protocols
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	To know about the security model
CO 2	To know and understand about the various security attacks and ethics in Information Security
CO 3	To know and mange the risk management
CO 4	To understand the Information security policy, standards, and practices
CO 5	Demonstrate the Physical Security in the organization and in workplace
Pre-requisites	A basic knowledge about Data Structure and Algorithm

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	3	PO 1	1
		PO 2	2
		PO 3	6
CO 2	2	PO 4	5
		PO 5	3
		PO 6	5
CO 3	1	PO 7	4
		PO 8	6
		PO 9	6
CO 4	2	PO 10	6
		PO 11	6
		PO 12	5
CO 5	2	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO4	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO5	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Uses of Computer Network- LAN - WAN- MAN- Protocol Hierarchies - Protocols and Standards-Connection Oriented and Connection less Services - OSI Reference Model.		
	Physical Layer	Periods	12
Unit - II	Transmission Media: Guided Transmission media - Wireless Transmission - Communication Satellites - Public Switched Telephone Network.		
	Data Link Layer	Periods	12
Unit - III	Data Link Layer Design Issues - Error Detection and Correction - Elementary data link protocols - Sliding Window Protocols.		
Unit - IV	Network Layer	Periods	12
	Network Layer Design Issues. Routing Algorithms: Shortest Path- Link State - Distance Vector. Congestion Control Algorithms: Principles. Inter networking: - Fragmentation - IP Addresses -OSPF.		
	Transport Layer	Periods	12
Unit - V	Transport Services - Elements of Transport protocols - Application layer: DNS- Electronic mail-World Wide Web.		
Total Periods			60

Text Books	
1	"Computer Networks" Andrew S. Tanenbaum, 5th Ed, PHI private Ltd, 2009.
References	
1	Behrouz A. Forouzan, "Data Communication and Networking", TMH, 2009.
E-References	
1	https://stevessmarthomeguide.com/basic-networking-course/
2	https://www.studytonight.com/computer-networks/

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**				
Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U3ITCP04	Java Programming Lab	0	0	4	3	40	60	100

List of Experiments

1	Create a Simple Program Using Array in Java.
2	Create a Simple Program Using Java String.
3	Write a Java Program to Create Multi threading.
4	Write a Java Program to handle Exception Handling.
5	Write a Java Program for File Operation Using IO Stream.
6	Create Event Handling using Mouse.
7	Create Event Handling using Keyboard.
8	AWT Package Using Student Information.
9	Swing Package Using Telephone Bill System.
10	JDBC Using Employee Details.

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**				
Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U3ITCP05	HTML & Web Designing Lab	0	0	2	2	40	60	100

List of Experiments

1	Create a web page illustrating text formatting tags , font variations , paragraph alignment and headings in marquee.
2	Create a web page using hypertext link and image as hyperlink.
3	Design a catalog for a restaurant using lists.
4	Using Nested tables create your Mark sheet.
5	Create a class time table using tables.
6	Design a login form.
7	Prepare a student registration form.
8	Design an application for pay slip through HTML forms.
9	Create a HTML page to demonstrate the usage of Frames. Choose the content of the page on your own.
10	Design a simple college website.

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**3**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U3ITS01	HTML & Web Designing	2	0	0	2	25	75	100

COURSE OBJECTIVES	To inculcate knowledge on HTML concepts and Programming knowledge.To understand basic concepts of style sheets and graphics.Students will understand the basic structure of web page creation and to know the impact of HTML tags.
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	Understand the basic concepts of HTML
CO 2	Discuss about cascading style sheet
CO 3	Applying graphics for web use
CO 4	Creation of table
CO 5	Creation of frames
Pre-requisites	A basic knowledge of Computer

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	2
		PO 3	6
CO 2	1	PO 4	5
		PO 5	3
		PO 6	5
CO 3	2	PO 7	4
		PO 8	6
		PO 9	6
CO 4	2	PO 10	6
		PO 11	6
		PO 12	5
CO 5	2	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO3	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO4	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO5	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	HTML Basics	Periods	4
	Getting Started with web designing - Creating a Simple Page - Marking Up Text.		
Unit - II	Hyperlinks	Periods	4
	Adding Links -Adding Images.		
Unit - III	Tables & Forms	Periods	4
	Tables Markup - Forms - Embedded Media		
Unit - IV	Cascading Style Sheet	Periods	4
	Introducing Cascading Style Sheet - Formatting Text - Colors and Backgrounds.		
Unit - V	Padding and Margins	Periods	4
	Thinking Inside the Box - CSS Layout with Flex Box and Grid.		
	Total Periods		20

Text Books	
1	"Learning Web Designing" - A Beginnerâ€™s Guide to HTML , CSS , JavaScript and Web Graphics - Jennifer Niederst Robbins ,5th Edition , Oâ€™Reilly Media.
References	
1	"Web design with HTML", C. Xavier, TMH Publisher, 2000
E-References	
1	www.w3schools.com/html/
2	www.w3schools.com/html/html_responsive.a636sp
3	www.how - to - build - websites.com/

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**4**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U4ITC07	Relational Database Management Systems	5	0	0	4	25	75	100

COURSE OBJECTIVES	â€¢To inculcate knowledge on RDBMS concepts and Programming with Oracle.â€¢To understand a role of database management system in an organization.â€¢To understand basic database concept including the structure and operation of the relational data model
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
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PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	Understand the database concepts, different database models, and database management systems and design database schema.
CO 2	Develop the ER structures for real world examples using the concept of Entity Relationship models with constraints and cardinalities.
CO 3	Apply the concepts of Normalization and design database which possess no anomalies.
CO 4	Apply the concepts of relational database theory to manage relational database management system.
CO 5	Exhibit database programming skills in SQL
Pre-requisites	Know about files , tables and database

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	2
		PO 3	6
CO 2	1	PO 4	5
		PO 5	3
		PO 6	5
CO 3	2	PO 7	4
		PO 8	6
		PO 9	6
CO 4	2	PO 10	6
		PO 11	6
		PO 12	5
CO 5	3	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO3	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO4	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO5	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction to DBMS:	Periods	12
	Introduction-Database System Applications - Purpose of Database Systems - View of Data - Database Languages and its types - Database Design - Database Engine - Database Architecture - Database Users and Administrators - History of Database Systems.		
Unit - II	Database Design Using ER Model:	Periods	12
	Overview - The Entity- Relationship Model - Mapping Cardinalities - Primary Key - Reducing ER Diagrams to Relational Schemas - ER Features -Symbols used in ER Notation.		
Unit - III	Relational Database Design:	Periods	12
	Relational Database Design- Features - Decomposition using Functional Dependency - Normal Forms - 1NF,2NF,3NF and BCNF- Relational Algebra: Introduction- Relational Algebra Operations.		
Unit - IV	SQL:	Periods	12
	Overview-Structure of SQL-Set Operations-Aggregate Functions- Modification of the Database - Joins-Transactions - Integrity Constraints .		
Unit - V	PL/SQL:	Periods	12
	History- Fundamentals - Block structure - comments -Â– Data types - Declaration - Assignment operation- cursor and exceptions. PL/SQL Named blocks: Procedure -Â– Function- Package- Triggers.		
	Total Periods		60

Text Books	
1	1. A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", 7th Edition McGraw-Hill, 2019.(Unit I to IV)
2	2.Database system using ORACLEÂ", Nilesh Shah, PHI publication, 2nd Edition, 2010 (Unit V)
References	
1	1. Fundamentals of Data base management SystemÂ", Alexix Leon and Mathew Leon, TMH Publications, 2010.
2	2. E-Book : Bill Pribyl, Steven Feuerstein, "Oracle PL/SQL Programming", Oâ€™Reilly Media, Inc., 6th Edition, February 2014.
E-References	
1	â€¢ www.javatpoint.com
2	â€¢ www.w3schools.com
3	â€¢ www.geeksforgeeks.org
4	â€¢ www.oracletutorial.com

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**4**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U4ITC08	Software Engineering	4	0	0	3	25	75	100

COURSE OBJECTIVES	To provide technological view of Software Engineering.To enhance Software related issues.To improve the design and modularization ideology.To provide guidance about documentation.To recognize testing methodologies, implementation and maintenance.
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	Recall about the software evolution and software engineering practice.
CO 2	Illustrate on various Phases of software Project and its life cycle models.
CO 3	Classify the various building models in software development.
CO 4	Apply the various software testing tactics and its Methodologies.
CO 5	Identify the System, Acceptance and Performance Testingâ€™s criteria and its best practice.
Pre-requisites	Basic knowledge of Software industries and IT Sector

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	2
		PO 3	6
CO 2	2	PO 4	5
		PO 5	3
		PO 6	5
CO 3	2	PO 7	4
		PO 8	6
		PO 9	6
CO 4	3	PO 10	6
		PO 11	6
		PO 12	5
CO 5	3	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO3	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO4	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO5	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction to Software Engineering	Periods	12
	The Evolving role of Software - Software - Changing nature of Software - Legacy Software - Software myths. Software Engineering Practice: Software engineering practice - Communication practices - Planning practices - Modeling practices - Construction practice- Deployment.		
Unit - II	Software Development Life Cycle models	Periods	12
	Phases of Software project-Quality, Quality Assurance, Quality control - Testing, Verification and Validation - Process Model to represent Different Phases - Life Cycle models. System Engineering: Computer based systems - The system Engineering Hierarchy.		
Unit - III	Building the Analysis Model	Periods	12
	Requirement Analysis - Analysis Modeling Approaches - Data Modeling concepts - Object Oriented Analysis -Flow Oriented Modeling-Design Engineering - Design concepts - The design model-Modeling component-Level Design: Designing class Based components.		
Unit - IV	Testing Tactics	Periods	12
	Software Testing Fundamentals -Types of Testing: White Box Testing - Static Testing-Structural Testing-Black Box Testing- Challenges in White Box and Black Box Testing. Integration Testing: Integration Testing- Integration Testing as Type of Testing.		
Unit - V	System and Acceptance Testing	Periods	12
	System Testing Overview- Functional testing versus Nonfunctional Testing-Functional testing - Non-functional Testing - Acceptance Testing and its criteria -Performance Testing: Factors governing Performance testing-What is Regression testing- Best Practices in Regression Testing.		
	Total Periods		60

Text Books	
1	Roger S. Pressman Software Engineering: A Practitioners Approach, McGraw-Hill Education, 2010.
2	Srinivasan Desikan, Gopalaswamy Ramesh- Software Testing Principles and Practices, Pearson Education, 2012.
References	
1	Rajib Mall Fundamentals of Software Engineering Prentice Hall of India Pvt Ltd, 3 rd Edition 2010.
2	Sandeep Desai, Abhishek Srivastava Software Testing: A Practical Approach PHI Learning Pvt. Ltd, 2012.
3	David Burns Selenium 2 Testing Tools: Beginners Guide Tata MCGraw Hill Edition, 2012.
E-References	
1	www.softwareengineerinsider.com/articles/what-is-software-engineering.html.
2	https://www.udemy.com/courses/development/software-engineering.
3	https://www.tutorialspoint.com/software_testing/index.htm.

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**4**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U4ITC09	R Programming	4	0	0	3	25	75	100

COURSE OBJECTIVES	Understand the basics in R programming in terms of constructs, control statements, string functionsUnderstand the use of R for Big Data analyticsLearn to apply R programming for Text processing.
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	To understand the History and Overview of R
CO 2	To gain knowledge in Getting Data In and Out of R
CO 3	Able to understand various Vectorized Operations
CO 4	Able to understand various Control Structures in R
CO 5	Scoping Rules of R.
Pre-requisites	Basic knowledge of mathematics and programming language

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	1
		PO 2	1
		PO 3	1
CO 2	1	PO 4	1
		PO 5	1
		PO 6	1
CO 3	4	PO 7	1
		PO 8	1
		PO 9	1
CO 4	5	PO 10	1
		PO 11	1
		PO 12	1
CO 5	6	PO 13	1
		PO 14	1
		PO 15	1

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CO2	3	3	3	3	3	3	1	3	3	3	3	3	3	3	3
CO3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CO5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	History and Overview of R	Periods	12
	What is R? What is S? The S Philosophy - Back to R - Basic Features of R - Free Software - Design of the R System - Limitation of R - R Resources Getting Started with R: Installation - Getting started with the R interface. R Nuts and Bolts: Entering Input - Evaluation - R Objects - Numbers - Attributes - Creating Vectors - Mixing Objects - Explicit Coercion - Matrices - Lists - Factors - Missing Values - Data Frames - Names.		
Unit - II	Getting Data In and Out of R	Periods	12
	Reading and Writing Data - Reading Data Files with read.table() - Reading in Larger Datasets with read.table - Calculating Memory - Requirements for R Objects - Using the readr Package - Using Textual and Binary Formats for Storing Data - Using dput() and dump() - Binary Formats - Interfaces to the Outside World - File Connections - Reading Lines of a Text File - Reading From a URL Connection		
Unit - III	Subsetting R Objects	Periods	12
	Subsetting R Objects - Subsetting a Vector - Subsetting a Matrix - Subsetting Lists - Subsetting Nested Elements of a List - Extracting Multiple Elements of a List - Partial Matching - Removing NA Values. Vectorized Operations - Vectorized Matrix Operations - Dates and Times - Dates in R Times in R - Operations on Dates and Times - Summary		
Unit - IV	Managing Data Frames	Periods	12
	Managing Data Frames with the dplyr package - Data Frames - The dplyr Package - dplyr Grammar - Installing the dplyr package - select() - filter() - arrange() - rename() - mutate() - group_by(). Control Structures - if-else - for Loops - Nested for loops - while Loops - repeat Loops - next, break - Summary.		
Unit - V	Functions and Standards	Periods	12
	Functions - Functions in R - Your First Function - Argument Matching - Lazy Evaluation The ... Argument - Arguments Coming After the ... Argument.Coding Standards for R - Loop Functions - Looping on the Command Line - lapply() - sapply() - split() - Splitting a Data Frame - tapply - apply() - Col/Row Sums and Means - Other Ways to Apply - mapply()		
Total Periods			60

Text Books	
1	Roger D. Peng, "R Programming for Data Science", LeanPub, 2015. (e-Book).
References	
1	Tony Fischetti, "Data Analysis with R", Paperback, PACKT Publications, 2015
2	Grolemund, Garrett, "Hands on Programming with R", Oâ€™ Reilly Inc., 2015
3	Paal Teetor, "R Cook Book", Oâ€™ Reilly, Paperback Edition, 2011
4	Joris Meys Andrie de Vries , "R Programming Dummies", Paperback Edition, 2016 (eBook).
E-References	
1	https://www.youtube.com/watch?v=_V8eKsto3Ug
2	https://www.youtube.com/watch?v=7NLPPFU0O3w
3	https://www.javatpoint.com/r-tutorial

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**4**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U4ITCP06	Relational Database Management System Lab	0	0	4	4	40	60	100

List of Experiments

1	Data Definition Language (DDL) commands in RDBMS
2	Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS
3	Execute the following queries i) Display employee whose salary greater than 8000. ii) Display employee whose salary between 6000 and 15000. iii) Create a view employee with Ename, Phone and Department.
4	Write a program to implement Built in Functions in SQL.
5	Write a program to implement Set Operations.
6	Write PL/SQL Function to find factorial.
7	Write PL/SQL Program for Electricity Bill Calculation using Cursor.
8	Write a PL/SQL procedure to insert a number.
9	Write a Database Trigger for displaying Grade of the Student
10	Database Design and Implementation Pay Roll Processing.

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**4**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U4ITCP07	R Programming Lab	0	0	3	3	40	60	100

List of Experiments

1	Installing R and R Studio
2	Applying Simple Commands in R
3	R as aCalculator application
4	Execution of Loops and Functions via R - Control Structures
5	Basic Descriptive Statistics using *summary()* – *sapply()* – *describe()* – *stat.desc()* – by group using *aggregate()* in R
6	Reading and writing different types of Datasets in R
7	Visualizations: Visualize various Plotting and Graphics in R
8	Regression: Perform Simple Regression using R Package
9	Clustering: Apply k-means by using R Package
10	Classification: Use Random Forest / Naïve Bayes / NN by using R Package

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**4**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U4ITS02	Internet of Things	2	0	0	2	25	75	100

COURSE OBJECTIVES	â€¢Obtain an overview of IoT applications.â€¢Comprehend the architecture, design principles and standards of IoT.â€¢Understand M2M and IoT technology fundamentals.â€¢Knowing about Python language.
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
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PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	To know about the evolution for mobile, home and embedded applications that is connected to the internet, to integrate communication.
CO 2	To gather knowledge about how the devices share the data on the cloud and analyze it in a secure manner on the network.
CO 3	To know how the industries are adopting internet-of-things-solutions to improve their existing systems.
CO 4	To get knowledge about how the things to be connected with various devices.
CO 5	To get familiar about python data types.
Pre-requisites	Knowing about Programming Language to build the Internet and different elements

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	1
		PO 2	2
		PO 3	6
CO 2	1	PO 4	5
		PO 5	3
		PO 6	5
CO 3	4	PO 7	4
		PO 8	6
		PO 9	6
CO 4	5	PO 10	6
		PO 11	6
		PO 12	5
CO 5	6	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO3	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO4	1	1	2	3	1	3	2	2	2	2	2	3	2	2	3
CO5	1	1	3	2	1	2	1	3	3	3	3	2	3	3	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction TO Internet OF Things:	Periods	5
	Introduction - Physical Design of IoT - Things in IoT, IoT Protocols.		
Unit - II	IoT Enabled Technologies:	Periods	5
	Wireless Sensor Networks - Cloud Computing - Big data analytics - Communication protocols - Embedded Systems.		
Unit - III	Domain Specific IoTs:	Periods	
	Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.		
Unit - IV	IoT Platforms Design Methodology:	Periods	5
	Introduction - IoT Design Methodology.		
Unit - V	Logical Design Using Python:	Periods	5
	IoT Systems - Logical Design Using Python: Introduction - Installing Python - Python Data Types & Data Structures: Numbers - Strings - Lists.		
	Total Periods		20

Text Books	
1	1. Arshdeep Bahga and Vijay Madisetti, "Internet of Things - A Hands-on Approach", Universities Press, 2015.
References	
1	1. Samuel Greengard, "The Internet of Things".
2	2. Cuno Pfister, "Getting started with Internet of Things".
E-References	
1	1. https://wwkw.tutorialspoint.com/internet_of_things/
2	2. https://www.guru99.com/iot-tutorial.html
3	3. http://www.steves-internet-guide.com/internet-of-things/

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	Programme Code	**UIT**		Regulations	**2021-2022**	
Department	**Information Technology**		Semester			**5**	
Course Code	Course Name	Periods per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
21U5ITC10	.NET Programming	5	0	0	4	25	75	100
COURSE OBJECTIVES	The course is designed for the beginners as a guide to develop applications using VB.Net and ASP.Net. This course is developed to provide the understanding of Dot Net framework, VB.Net,ASP.Net and XML						
POs	PROGRAMME OUTCOME						
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies						
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.						
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.						
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.						
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.						
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.						
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.						
PO 8	Apply ethical principles and responsibilities during professional practice.						
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.						
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.						
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.						
PO 12	Engage in independent and life-long learning for continued professional development.						
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.						
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.						
PO 15	Updating themselves through e-learning and self-study courses.						

COs	COURSE OUTCOME
CO 1	Impart knowledge in fundamental concepts of .Net
CO 2	Use .NET components in a windows and web application.
CO 3	Implement the concepts of Operators, Conditional Logics etc.,
CO 4	Inculcate ability in creativity & design of computer support systems and skills for analyze various software applications
CO 5	Understand & apply Data binding
Pre-requisites	Basic Knowledge of Programming Language and HTML

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	4
		PO 3	2
CO 2	2	PO 4	6
		PO 5	3
		PO 6	5
CO 3	2	PO 7	4
		PO 8	6
		PO 9	5
CO 4	3	PO 10	5
		PO 11	4
		PO 12	6
CO 5	3	PO 13	6
		PO 14	5
		PO 15	6

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	2	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	1	3	1	2	1	1	1	1	1	1	1	1	1	1
CO3	2	1	3	1	2	1	1	1	1	1	1	1	1	1	1
CO4	1	2	2	1	3	1	2	1	1	1	2	1	1	1	1
CO5	1	2	2	1	3	1	2	1	1	1	2	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction to .Net	Periods	12
	.Net Framework - Visual Basic .Net - Creating windows forms applications - creating a web forms application - Data types and variables - Operators -Conditional Logic.		
Unit - II	Procedures	Periods	12
	Procedures - Dialog Boxes - Dictionary Object - Namespaces - Visual Basic .Net IDE - Controls - Specific controls.		
Unit - III	Data Access	Periods	12
	Introduction to Data Access in .Net - Overview of ADO.Net - ADO .Net -Visual Studio .Net Database Tools.		
Unit - IV	Introduction to XML	Periods	12
	Introduction to XML in .Net - Introduction to Web Development - Introduction to ASP.Net - Page framework.		
Unit - V	Web Controls	Periods	12
	Web Controls - Validation Control - Events - Cascading Style sheets - ASP.Net applications.		
	Total Periods		60

Text Books	
1	Bill Evjen &Jason Beres, Visual Basic .Net Programming Bible, Wiley Publishing, 2006
References	
1	David Chappell ,Understanding .NET ,Pearson education ,2002
2	Steven Holzner, VB.Net Programming Black book, Dreamtech ,2005
3	Matt J. Couch, ASP. NET and VB. NET Web programming, Pearson Education. 2002
E-References	
1	www.slideshare.net/
2	www.powershow.com/

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**5**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U5ITC11	PHP Programming	5	0	0	4	25	75	100

COURSE OBJECTIVES POs	PROGRAMME OUTCOME
COURSE	To highlight all features of PHP Programming and apply it to develop various websites & applications
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
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PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	Understand the concepts of PHP programming language with Basics & Control Structures
CO 2	Working PHP With MySQL
CO 3	Understand the concepts of Functions & Arrays
CO 4	Applying the concepts of Object Oriented PHP, Error and Exception Handling in PHP Programming
CO 5	Explore the concepts Strings and Regular Expression, Design the Web Form
Pre-requisites	A basic knowledge of HTML and Web Designing

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	3	PO 1	1
		PO 2	2
		PO 3	6
CO 2	3	PO 4	5
		PO 5	3
		PO 6	5
CO 3	4	PO 7	4
		PO 8	6
		PO 9	6
CO 4	4	PO 10	6
		PO 11	6
		PO 12	5
CO 5	4	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO2	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO3	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO4	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO5	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction to PHP	Periods	12
	History - General Language Features - PHP Basics: Embedding PHP Code in your Web Pages - Commanding Your Code - Output Data to the Browser. PHPâ€™s Supported Data Types- Identifiers - Variables - Constants - Expressions -String - Interpolation. Control Structures: Conditional Statements - Looping Statements - File Inclusion Statements		
Unit - II	Introduction to MySQL	Periods	12
	Naming Database Elements-Choosing Your Column Types- Choosing other Column Properties-Accessing MySQL. Using PHP With MySQL Modifying The Template - Connecting To MySQL - Executing Simple Queries - Retrieving Query Results -Ensuring Secure SQL-Counting Returned Records- Updating Records With PHP.		
Unit - III	Functions	Periods	12
	Invoking Function - Creating a Function - Function Libraries. Arrays: Creating an Array - Adding and Removing Array Elements - Locating Array Elements - Traversing Array - Merging - Slicing - Splicing and Dissecting Array.		
Unit - IV	Object Oriented PHP	Periods	12
	Benefits of OOP - Key OOPs Concepts- Constructors and Destructors- Static Class Members -The instance of Keyword- Error and Exception Handling- Configuration Directives- Error Logging-Exception Handling		
	Strings and Regular Expression	Periods	12
Unit - V	Other String Specific Function - Alternatives for Regular Expression Functions. Forms: PHP and Web Forms-Taking Advantage of Pear: HTML_QuickForm-Installimg HTML_QuickForm-Creating a Simple Form- Using Auto-Completion		
Total Periods			60

Text Books	
1	"Beginning PHP and Oracle From Novoice to professional" W.Jason Gilmore and Bob Brylr edition â€“ 2008
2	"PHP 6 and my SQL 5 " Larry Ullman -2008(chapter 4 & 8)
References	
1	"Spring into PH5 the Small Professional choice" Steven Holzner, Pearson education, Edition: First Impression 2006.
2	"PHP and my SQL for dynamic websites" â€“ Larry Ullam-fourth edition 2015
3	"PHP 6 and my SQL ": bible â€“ Steve Suehring, Tim converse, Joy Park -2009
E-References	
1	www.w3schools.com/php/

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**5**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U5ITCP08	.Net Programming Lab	0	0	4	3	40	60	100

List of Experiments

1	Implementing.Net controls and creation of menus.
2	Mouse Events Using VB.Net
3	Implementing dialog controls
4	Validation control in ASP.Net
5	Implementing Data grid.
6	Web page creation using ASP.Net.
7	Implementation with connectivity of database.
8	Feedback form creation using ASP.Net.
9	Employee Database maintenance using ASP.Net.
10	Create a user control that displays the current date and time. Include it in a Web Form and refresh it each time a button is clicked.

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**5**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U5ITCP09	PHP Programming Lab	0	0	5	3	40	60	100

List of Experiments

1	Develop PHP program using the following Use of conditional statements in PHP Use of looping statements in PHP Use of different types of arrays
2	Write a PHP program to prepare the student marks list.
3	Create a PHP Program to find odd or even number from given numbers.
4	Write a PHP Program to demonstrate the variable function Gettype() b) Settype() c) Isset() d)Unset()
5	Give the example of String function Substr(); b) Strcmp() c) Strcasecmp() d) Strpos()
6	Write a PHP Program that demonstrates Form element input elements.
7	Database connectivity in PHP with MySQL
8	To Create a table using PHP Programming.
9	To create a table and do all the DDL commands using PHP Programming
10	Develop a PHP program to display student information using MYSQL table.
11	Creating simple webpage using PHP
12	Create a College Web site using PHP Program.

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**5**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U5ITCPR01	**Project Work-I (In-House Mini Project)**	0	0	4	3	40	60	100

Project Work Pattern

FIRST REVIEW: **(20 Marks)**

1. Project Title
2. Project Platform (Language / Package Selected)
3. Confirmation Letter (from Company / Industry)
4. Details of Internal Guide with Designation & Qualification (in the company / Industry)
5. Presentation

SECOND REVIEW: **(20 Marks)**

1. Work Observation
2. Modules in Project (Design Screens Sample)
3. DFD / ERD / System Flow Diagram (Whichever Applicable)
4. Estimated Time of Completion
5. Completed Work in the form of Percentage Analysis
6. PowerPoint Presentation.

FINAL REVIEW: **(60 Marks)**

1. Documentation
2. Screens Shots
3. DFD / ERD / System Flow Diagram (Whichever Applicable)
4. Final Project Report (with executable format including complete source code)

The Passing minimum shall be 40% out of 60 marks (24 Marks)

Signature of BOS Chairman

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Department	**Information Technology**		Semester		**5**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U5ITS03	Data Analysis using Excel	2	0	0	2	25	75	100

COURSE OBJECTIVES	To emulate students to the current needs of data analysis and business intelligence fundamental applications through advance excel.
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	To understand the basics of Excel
CO 2	To explore the working of Data
CO 3	To acquire knowledge in creating & working with various charts
CO 4	To analyze data using Histograms & Distribution statistics.
CO 5	To apply Data using Pivot Tables
Pre-requisites	Basic knowledge of MS Office Package

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	3	PO 1	1
		PO 2	2
		PO 3	6
CO 2	1	PO 4	5
		PO 5	3
		PO 6	5
CO 3	2	PO 7	4
		PO 8	6
		PO 9	6
CO 4	4	PO 10	6
		PO 11	6
		PO 12	5
CO 5	6	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO3	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO4	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO5	1	1	3	2	1	2	1	3	3	3	3	2	3	3	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Getting started With Excel	Periods	4
	Excel & Spreadsheets-Excel workbooks & worksheets-Printing from Excel-Saving your work-Excel Add-Ins.		
Unit - II	Working with Data	Periods	4
	Data Entry-Data Formats-Formulas and Functions-Cell Reference-Range Names-Sorting Data-Querying in Data-Importing Data from Files-Importing Data from databases.		
	Working with Charts	Periods	4
Unit - III	Introducing Excel charts-Introducing scatter plots-Editing a chart-Identifying data points-Creating bubble plots-Breaking a Scatter plot into categories-Plotting several variables.		
	Describing your data	Periods	4
Unit - IV	Variables and Descriptive Statistics-Frequency Tables-Working with Histograms-Working with Stem and Leafplots-Distribution statistics.		
	Tables	Periods	4
Unit - V	PivotTables-Two-way Tables-Computing Expected counts-Tables with Ordinal Variables.		
	Total Periods		20

Text Books	
1	Data Analysis with Microsoft Excel â€“Berk & Carey, Cengage Learning, Third Edition , 2010
References	
1	Microsoft Excel 2016 step by step â€“Curtis Fyre, Microsoft Press, 2015
2	Microsoft Excel â€“Essential Hints & Tips-Diane Griffiths, 2015
E-References	
3	https://www.javatpoint.com/r-tutorial

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**5**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U5ITE01	Information Security	5	0	0	3	25	75	100

COURSE OBJECTIVES	To understand the fundamentals of Cryptography To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.To understand the various key distribution and management schemes.
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	To know about the security model.
CO 2	To know and understand about the various security attacks and ethics in Information Security.
CO 3	To understand the Information security policy, standards, and practices.
CO 4	To know and mange the risk management.
CO 5	Demonstrate the Physical Security in the organization and in workplace.
Pre-requisites	Basics of Networks

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	3	PO 1	1
		PO 2	2
		PO 3	6
CO 2	2	PO 4	5
		PO 5	3
		PO 6	5
CO 3	1	PO 7	4
		PO 8	6
		PO 9	6
CO 4	2	PO 10	6
		PO 11	6
		PO 12	5
CO 5	2	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO4	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO5	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	What is Security? Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Securing Components - Balancing information security and access - Approaches to information security implementation - SDLC - Securing the SDLC - Sec SDLC - security professional and the organization.		
Unit - II	Security Investigation	Periods	12
	Need for security - Threats - Attacks - Legal, Ethical, and professional issues in information security: Law and ethics in information security -Ethics and information security.		
Unit - III	Security Analysis	Periods	12
	Introduction to Risk Management - Risk Identification: Asset identification and valuation and prioritization - Data classification and Management - Threat Identification - Vulnerability Identification. Risk Assessment - Risk control strategies - Selecting a risk control strategy.		
Unit - IV	Logical Design	Periods	12
	Information security policy, standards, and practices - Design of security architecture - Continuity strategies: Business Impact Analysis - Incident Response plan - Disaster Recovery plan - Business Continuity plan.		
Unit - V	Physical Design	Periods	12
	Security Technologies: Firewalls - Intrusion Detection and Prevention Systems. Cryptography: RSA, DES Algorithms -Encryption Methodologies - cryptography tools. Physical security: physical access controls - Interception of Data - Mobile and portable systems -Special considerations for physical security professionals.		
Total Periods			60

Text Books	
1	1.A. Angel Freedaraja, K. Benitlin subha "Information Security" Sams Publishers, Chennai. 2013.
References	
1	1.Timothy J. Shimell, Jonathan M Spring "Introduction to Information Security" Syngress Elsevier, 2014.
2	2.Mark Stamp, "Information Security", A John wiley & sons, Inc Publication, New Jersey. 2nd Edition.
E-References	
1	1.www.infosec.gov.hk/english/information/what.html
2	2.www.uniassignment.com

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	Programme Code	**UIT**		Regulations		**2021-2022**
Department	**Information Technology**		Semester				**5**
Course Code	Course Name	Periods per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
21U5ITE02	Cloud Computing	5	0	0	3	25	75	100
COURSE OBJECTIVES	To provide understanding on concepts & technologies associated with Cloud Computing							
POs	PROGRAMME OUTCOME							
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies							
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.							
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.							
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.							
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.							
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.							
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.							
PO 8	Apply ethical principles and responsibilities during professional practice.							
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.							
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.							
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.							
PO 12	Engage in independent and life-long learning for continued professional development.							
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.							
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.							
PO 15	Updating themselves through e-learning and self-study courses.							

COs	COURSE OUTCOME
CO 1	Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure.
CO 2	Compare the advantages and disadvantages of various cloud computing platforms.
CO 3	Program data intensive parallel applications in the cloud.
CO 4	Analyze the performance, scalability, and availability of the underlying cloud technologies and software.
CO 5	Solve a real-world problem using cloud computing through group collaboration.
Pre-requisites	Basic Knowledge of Network

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	1
		PO 2	2
		PO 3	6
CO 2	1	PO 4	5
		PO 5	3
		PO 6	5
CO 3	3	PO 7	4
		PO 8	6
		PO 9	6
CO 4	4	PO 10	6
		PO 11	6
		PO 12	5
CO 5	5	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO2	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO3	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO4	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO5	1	1	2	3	1	3	2	2	2	2	2	3	2	2	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Cloud Computing Foundation	Periods	12
	Introduction to Cloud Computing - Move to Cloud Computing - Types of Cloud - Working of Cloud Computing		
Unit - II	Cloud Computing Architecture	Periods	12
	Cloud Computing Technology - Cloud Architecture - Cloud Modeling and Design - Virtualization : Foundation - Grid,Cloud and Virtualization - Virtualization and Cloud Computing		
Unit - III	Data Storage and Cloud Computing	Periods	12
	Data Storage - Cloud Storage - Cloud Storage from LANs to WANs - Cloud Computing Services : Cloud Services - Cloud Computing Elements- Understanding Services and Applications by type-Cloud Services- Cloud Computing at Work		
Unit - IV	Cloud Computing and Security	Periods	12
	Risks in Cloud Computing - Data Security in Cloud - Cloud Security Services - Cloud Computing Tools : Tools and Technologies for Cloud - Cloud Mashups - Apache Hadoop - Cloud Tools		
Unit - V	Cloud Applications	Periods	12
	Moving Applications to the Cloud - Microsoft Cloud Services - Google Cloud Applications - Amazon Cloud Services - Cloud Applications		
	Total Periods		60

Text Books	
1	Cloud Computing â€“ A Practical Approach for Learning and Implementation, A.Srinivasan and J.Suresh, Pearson India Publications, 2014
References	
1	Cloud Computing web â€“ based applications at change the way you work & collaborate online", Michael miller,pearson.
2	Cloud Computing, 2nd edition, Dr.Kumarsaurabh,wiley India.
3	Cloud Computing a practical approach, McGraw Hills.
4	Cloud Computing Implementation , Management, & Security , John W. Rittinghouse, James F . Ransome , Special Indian Edition.
E-References	
1	webobjects.cdw.com
2	www.forbes.com
3	cloudcomputinglegal.weebly.com

Signature of BOS Chairman

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Programme	**B.Sc**	Programme Code	**UIT**		Regulations		**2021-2022**
Department	**Information Technology**		Semester				**5**
Course Code	Course Name		Periods per Week		Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U5ITE03	WEB TECHNOLOGY		5	0	0	3	25	75	100

COURSE OBJECTIVES	To develop dynamic web page using scripting languages and various styles with CSS and HTML5 where scripting codes are embedded into HTML document for interactive presentation effect.
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
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PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
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PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	Define the knowledge about HTML document with element types,hyperlinks, images, list, tables and forms
CO 2	Understand the concept of CSS for dynamic presentation effect in HTML and XML documents.
CO 3	Describe the mark-up languages for processing, identifying and presenting information in web pages.
CO 4	Apply scripting languages in HTML document to add interactive components to web pages.
CO 5	Illustrate the web technology concept to create schemas and dynamic web pages.
Pre-requisites	Basic Knowledge of web page

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	1	PO 1	1
		PO 2	4
		PO 3	2
CO 2	2	PO 4	6
		PO 5	3
		PO 6	5
CO 3	2	PO 7	4
		PO 8	6
		PO 9	5
CO 4	3	PO 10	5
		PO 11	4
		PO 12	6
CO 5	3	PO 13	6
		PO 14	5
		PO 15	6

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	2	1	1	1	1	1	1	1	1	1	1	1	1
CO2	2	1	3	1	2	1	1	1	1	1	1	1	1	1	1
CO3	2	1	3	1	2	1	1	1	1	1	1	1	1	1	1
CO4	1	2	2	1	3	1	2	1	1	1	2	1	1	1	1
CO5	1	2	2	1	3	1	2	1	1	1	2	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Fundamentals of HTML	Periods	12
	Understanding Elements: Root Elements-Metadata Elements Section Elements-Heading Elements. Describing data types		
Unit - II	HTML5 and its essentials	Periods	
	HTML5 and its essentials-Exploring New Features of HTML5-Next Generation of Web Development-Structuring an HTML Document-Exploring Editors and Browsers Supported by HTML5-Creating and Saving an HTML Document-Validating an HTML Document-Viewing an HTML Document-Hosting Web Pages.		
Unit - III	DHTML	Periods	12
	Introduction - Cascading Style sheets - DHTML Document Object Model and collections - Event Handling - Filters and Transitions - Data Binding.		
	JAVA & VB SCRIPT	Periods	12
Unit - IV	Introduction- Language Elements - Objects of JavaScript- Other Objects. VBSCRIPT: Introduction-Embedding VBScript Code in an HTML Document- CommentsVariables- Operators-Procedures-Conditional Statements- Looping Constructs - Objects and VBScript - Cookies.		
	EXTENSIBLE MARK-UP LANGUAGE	Periods	12
Unit - V	Introduction- HTML vs. XML- Syntax of the XML Document- XML Attributes- XML Validation- XML DTD- The Building Blocks of XML Documents-DTD Elements - DTD Attributes- DTD Entities- DTD Validation -XSL - XSL Transformation- XML Namespaces- XML Schema		
	Total Periods		60

Text Books	
1	N.P.Gopalan, J.Akilandeswari, Web Technology A Developerâ€™s Perspective(Unit III, IV, V), PHI Learning Pvt.Ltd, 4th Edition,2011.
2	Kogent Learning Solutions Inc Kogent Learning Solutions Inc Dreamtech Press 2011
References	
1	AkankshaRastogi Web Technology K.Nath & Co Educational Publishers, 1st Edition 2012.
2	AnuranjanMisra, Arjun Kumar Singh Intoduction to Web Technology Laxmi Publication 2011.
3	C.Xavier World Wide Web Design with HTML TMH Publishers 2008.
E-References	
1	https://w3schools.sinsixx.com/dhtml/dhtml_intro.asp.htm
2	https://www.tutorialspoint.com/adobe_robohelp/adobe_robohelp_adding_dhtml_effects.htm

Signature of BOS Chairman

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Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2017-2018**
Department	**Information Technology**		Semester		**6**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U6ITC12	Python Programming	5	0	0	4	25	75	100

COURSE OBJECTIVES	â€¢To learn a dynamic, interpreted (Byte code-Compiled) and high level programming language.â€¢To know the basics of algorithmic problem solving â€¢To use Python data structures -- lists, tuples, dictionaries.
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
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PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	To read and write simple Python programs.
CO 2	To define Python functions and call them.
CO 3	To develop Python programs with conditionals and loops.
CO 4	To do input/output with files in Python and develop GUI based programs
CO 5	
Pre-requisites	Know about Programming Languages

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	1
		PO 2	2
		PO 3	6
CO 2	1	PO 4	5
		PO 5	3
		PO 6	5
CO 3	3	PO 7	4
		PO 8	6
		PO 9	6
CO 4	4	PO 10	6
		PO 11	6
		PO 12	1
CO 5	5	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	1	1	2	1	1	1	1	1	1	2	1	1	1
CO2	3	2	1	1	1	1	1	1	1	1	1	3	1	1	1
CO3	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO4	1	1	1	2	2	2	1	1	1	1	1	1	1	1	2
CO5	1	1	2	3	1	3	2	2	2	2	2	1	2	2	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Python Overview, Data Types, Expressions:	Periods	10
	Python programming - variable, Datatype, Keywords, Literals, Operator, Expression, type conversion, Comments, input and output, Strings, Assignment and Comments - Numeric Data Types and Character Sets, Expressions.		
Unit - II	Functions, Modules and Control Statements	Periods	14
	Functions and Modules- Calling Functions, The math Module, The Main Module, Program Format and Structure and Running a Script from a Terminal Command Prompt - Iteration - for loop - Selection - Boolean Type, Comparisons, and Boolean Expressions, if-else Statements, One-Way Selection Statements, Multi-way if Statements, Logical Operators and Compound Boolean Expressions, Short- Circuit Evaluation and Testing Selection Statements - Conditional Iteration - while loop.		
Unit - III	Strings and Text Files	Periods	12
	Strings-Accessing Characters and Substrings in Strings - Data Encryption - Strings and Number Systems and String Methods- Text Files-Text Files and Format - Writing Text to a File - Writing Numbers to a File - Reading Text from a File - Reading Numbers from a File and Accessing and Manipulating Files and Directories on Disk.		
Unit - IV	Lists and Dictionaries	Periods	12
	Lists- List Literals and Basic Operators, Replacing an Element in a List, List Methods for Inserting and Removing Elements, Searching and Sorting a List, Mutator Methods and the Value None, Aliasing and Side Effects, Equality and Tuples - Defining Simple Functions - Syntax, Parameters and Arguments, return Statement, Boolean Functions and main function, Dictionaries-Dictionary Literals - Adding Keys and Replacing Values - Accessing Values, Removing Keys and Traversing a Dictionary.		
	Design with Functions and Classes, Graphical User Interface	Periods	12
Unit - V	Design with Functions and Design with Classes - Functions as Abstraction Mechanisms - Design with Recursive Functions and Managing a Programâ€™s Namespace - Data Modeling and Structuring Classes with Inheritance and Polymorphism - Behavior of terminal based programs and GUI based programs- Coding simple GUI based programs- Other useful GUI resources- Case Study: GUI based ATM.		
	Total Periods		60

Text Books	
1	Kenneth A. Lambert, Martin Osborne, "Fundamentals of Python: First Programs, Cengage Learning", second edition, 2018
References	
1	1. Dr. S. Suresh kumar, "Problem Solving and Python Programming" Charulatha Publications, 2018.
2	2. Python Essential Reference (4th Edition): David Beazley.
3	3. Michal Jaworski, TarekZiade, "Expert Python Programming ", Packt Publishing, Second Revised edition 2016.
4	. Sam Washington, Dr. M. O. FaruqueSarker, "Learning Python Network Programming", Packt Publishing Limited, 2015.
E-References	
1	https://www.w3schools.com/python/1.
2	www.python.org/about/gettingstarted/

3	www.tutorialspoint.com/python/index.htm
4	. www.realpython.com/python-beginner-tips/

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**6**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U6ITC13	Mobile Application Development	5	0	0	4	25	75	100

COURSE OBJECTIVES	â€¢To understand the concept of Android Technology.â€¢To understand applications of android.â€¢To understand android web apps.
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	Learning Basics and History of Mobile Software Development
CO 2	Applying Application Design Essentials
CO 3	Analyzing tools using to develop Android Apps
CO 4	Linking Database with Apps
CO 5	
Pre-requisites	Know about designing tools

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	1
		PO 2	2
		PO 3	6
CO 2	3	PO 4	5
		PO 5	3
		PO 6	5
CO 3	4	PO 7	4
		PO 8	6
		PO 9	6
CO 4	4	PO 10	6
		PO 11	6
		PO 12	5
CO 5	1	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO2	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO3	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO4	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO5	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction to Android:	Periods	10
	Introducing Android- Open Handset Alliance - The Android Platform - Layers of Android-Android SDK - Kinds of Android Components.		
	Android Application Design Essentials:	Periods	10
Unit - II	Anatomy of an Android Applications - Android Terminology - Application Context - Actives - Services - Intents - Receiving andBroadcasting Intents-Interaction with server side applications-Using Google maps, GPS ,WIFI-Integrating with Social Media Applications.		
	Android Application Design Essentials:	Periods	10
Unit - III	User Interface Screen Elements - Designing User Interfaces with Layouts - Drawingand Working with Animation.		
Unit - IV	Using Common Android APIs:	Periods	10
	Using Android Data and Storage APIs- Managing data using SQLite - Sharing Databetween Applications with Content ProvidersIOS-Integrating Calendar and address book with social media applications.		
	DDMS	Periods	10
Unit - V	Debug and Other View: DDMS - Dalvik DebugMonitor Server - LogCat View.		
	Total Periods		50

Text Books	
1	1.Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012(Unit 2,4)
2	2. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012.(Unit 5)
3	3.Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd Ed, 2011.(Unit 1,3,5)
4	4.W. Frank Ableson, Robi Sen, Chris King, "Android in Action", 2nd Ed, Manning Publications Co., 2011.
References	
1	1. James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012
2	2. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS 6 Development: Exploring the iOS SDK", Apress, 2013
3	3.Chris Haseman, "Android Essentials", Apress Publications, 2008.
4	4.James Steele, Nelson To, "The Android Developerâ€™s Cookbook-Building Applications with the Android SDK", Addison-Wesley Publications, 2011.
E-References	
1	1. https://www.cs.cmu.edu/~bam/uicourse/830spring09/BFeiginMobileApplication
2	2. http://developer.android.com/develop/index.html

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**				
Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**6**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U6ITCP10	Mobile Application Development Lab	0	0	5	3	40	60	100

List of Experiments

1	How to make " Hello World "application in android studio..
2	How to add two numbers in Android Application
3	Create a simple calculator layout in android studio.
4	Develop an application that uses event listeners.
5	Create an Android Application in java using animations.
6	How to build basic games in Android.
7	How to create a simple Alarm Clock using Android.
8	Develop an application that makes use of database.
9	Implement an application that creates an alert when receiving a message.
10	Create a simple project using Android Application for internal mark Calculations.
11	Create a android application of a. Registration with SQLite database b. Login with SQLite database.
12	Create an android application to connect with MySQL through PHP

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**6**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U6ITCP11	Python Programming Lab	0	0	5	3	40	60	100

List of Experiments

1	Write a python program using Control statements
2	Write a python program using Functions and String Operations
3	Write a python program using List, Tuples and List comprehensions
4	Write a python program using Inheritance
5	Write a python program using Synchronization
6	Write a python program using Text Files
7	Write a python program using Graphical user Interfaces
8	Write a python program using Exceptional Handling
9	Write a python program using Classes and Objects
10	Write a python program using Chat Applications

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**6**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U6ITCPR02	**Project Work-II**	0	0	4	3	40	60	100

Project Work Pattern

FIRST REVIEW: **(20 Marks)**

1. Project Title
2. Project Platform (Language / Package Selected)
3. Confirmation Letter (from Company / Industry)
4. Details of Internal Guide with Designation & Qualification (in the company / Industry)
5. Presentation

SECOND REVIEW: **(20 Marks)**

1. Work Observation
2. Modules in Project (Design Screens Sample)
3. DFD / ERD / System Flow Diagram (Whichever Applicable)
4. Estimated Time of Completion
5. Completed Work in the form of Percentage Analysis
6. PowerPoint Presentation.

FINAL REVIEW: **(60 Marks)**

1. Documentation
2. Screens Shots
3. DFD / ERD / System Flow Diagram (Whichever Applicable)
4. Final Project Report (with executable format including complete source code)

The Passing minimum shall be 40% out of 60 marks (24 Marks)

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	Programme Code	**UIT**		Regulations		**2021-2022**
Department	**Information Technology**		Semester				**6**
Course Code	Course Name		Periods per Week		Credit	Maximum Marks	
			L	T P	C	CA	ESE Total
21U6ITS04	DESKTOP PUBLISHING		2	0 0	2	25	75 100
COURSE	â€¢ To provide a hands on experience in the Desktop Publishing Packages.						
OBJECTIVES POs	PROGRAMME OUTCOME						
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies						
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.						
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.						
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.						
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.						
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.						
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.						
PO 8	Apply ethical principles and responsibilities during professional practice.						
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.						
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.						
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.						
PO 12	Engage in independent and life-long learning for continued professional development.						
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.						
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.						
PO 15	Updating themselves through e-learning and self-study courses.						

COs	COURSE OUTCOME
CO 1	To know about hardware requirements
CO 2	To know about Photoshop workspace
CO 3	Implementing Image basics and colors
CO 4	Implementing Corel DRAW like lines ,shapes and outlines
CO 5	Working with shapes and filling the objects
Pre-requisites	Know about some basic designing tools

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	1
		PO 2	2
		PO 3	6
CO 2	2	PO 4	5
		PO 5	3
		PO 6	5
CO 3	4	PO 7	4
		PO 8	6
		PO 9	6
CO 4	5	PO 10	6
		PO 11	6
		PO 12	5
CO 5	5	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO3	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO4	1	1	2	3	1	3	2	2	2	2	2	3	2	2	3
CO5	1	1	2	3	1	3	2	2	2	2	2	3	2	2	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	INTRODUCTION:	Periods	5
	Hardware Requirement for DTP - Font Types - Text Organization - Design Common Media Publication.		
Unit - II	Introducing Adobe Photoshop CS6:	Periods	5
	Knowing when to use Photoshop - Looking at Whatâ€™s New in Photoshop CS6. Exploring the Photoshop Workspace: Understanding the Toolbox and tool options bar - Exploring the Photoshop Menu Bar - Exploring Panels - Configuring Presets.		
Unit - III	Performing Image Basics:	Periods	5
	Exploring File Types - Resizing Files and Adjusting Resolution - Cropping and Straightening Images. Understanding Colors: Knowing Color Basics - Working in Different Color Modes. Learning All About Layers: Introducing Layers - Manipulating Layer Masks. Working with Selections: Using the Selection Tools.		
Unit - IV	CorelDraw X7:	Periods	5
	Starting and Setting up - CorelDRAW basics - CorelDRAW workspace tour. Lines, Shapes and outlines: Working with lines, outlines, and brushstrokes: Drawing Lines - Formatting lines and outlines Adding arrowheads to lines and curves. Drawing Shapes: Drawing rectangles, and Squares - Drawing ellipses, circles, arcs, and pie Shapes.		
Unit - V	Shaping objects:	Periods	5
	Using curve objects - Selecting and moving nodes. Text: Artistic Text - Paragraph Text - Applying color to Text - Fitting text to a path. FILLING OBJECTS: Applying Uniform fills - Applying fountain fills - Applying pattern fills - Applying texture fills.		
Total Periods			20

Text Books	
1	â€¢ Lisa DaNae Dayley, Brad Dayley, "Adobe Photoshop CS6 BIBLE The Comprehensive, Tutorial Resource", John Weley & Sons, Inc, 2012.
2	â€¢ CorelDRAW X7 User Guide, 2014 Coral Corporation.
References	
1	â€¢ Shirish Chavan, "Rapidex DTP Course Book", Desktop Publishing.
E-References	
1	â€¢ https://www.javatpoint.com/photoshop
2	â€¢ https://www.photoshopessentials.com/basics/
3	â€¢ https://www.javatpoint.com/coreldraw
4	â€¢ https://learn.corel.com/graphics-tutorials/

Signature of BOS Chairman

VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS)

Elayampalayam, Tiruchengode-637 205.

Programme	**B.Sc**	Programme Code	**UIT**	Regulations	**2021-2022**
Department	**Information Technology**		Semester		**6**

Course Code	Course Name	Periods per Week			Credit	Maximum Marks		
		L	T	P	C	CA	ESE	Total
21U6ITE04	Machine Learning	5	0	0	3	25	75	100

COURSE OBJECTIVES	To understand the need for machine learning for various problem solving To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learningTo understand the latest trends in machine learning
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	Understand Learning Problems
CO 2	To know and understand about Neural Networks and Genetic Algorithms
CO 3	Understand about various theorems
CO 4	To understand and know about Instant Learning
CO 5	To know about set rules
Pre-requisites	Basic Knowledge of Soft Computing

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	3	PO 1	1
		PO 2	2
		PO 3	6
CO 2	3	PO 4	5
		PO 5	3
		PO 6	5
CO 3	4	PO 7	4
		PO 8	6
		PO 9	6
CO 4	3	PO 10	6
		PO 11	6
		PO 12	5
CO 5	4	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO2	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO3	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2
CO4	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO5	1	1	1	2	2	2	1	1	1	1	1	2	1	1	2

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Learning Problems - Perspectives and Issues - Concept Learning - Version Spaces and Candidate Eliminations - Inductive bias - Decision Tree learning - Representation - Algorithm Heuristic Space Search.		
	NEURAL NETWORKS AND GENETIC ALGORITHMS	Periods	12
Unit - II	Neural Network Representation - Problems - Perceptrons - Multilayer Networks and Back Propagation Algorithms - Advanced Topics - Genetic Algorithms - Hypothesis Space Search - Genetic Programming - Models of Evaluation and Learning.		
Unit - III	BAYESIAN AND COMPUTATIONAL LEARNING	Periods	12
	Bayes Theorem - Concept Learning - Maximum Likelihood - Minimum Description Length Principle - Bayes Optimal Classifier - Gibbs Algorithm - NaÃ¯ve Bayes Classifier - Bayesian Belief Network - EM Algorithm - Probability Learning - Sample Complexity - Finite and Infinite Hypothesis Spaces - Mistake Bound Model.		
Unit - IV	INSTANT BASED LEARNING	Periods	12
	K- Nearest Neighbour Learning - Locally weighted Regression - Radial Basis Functions - Case Based Learning.		
Unit - V	ADVANCED LEARNING	Periods	12
	Learning Sets of Rules - Sequential Covering Algorithm - Learning Rule Set - First Order Rules - Sets of First Order Rules - Induction on Inverted Deduction - Inverting Resolution - Analytical Learning - Perfect Domain Theories - Explanation Base Learning - FOCL Algorithm- Reinforcement Learning - Task - Q-Learning - Temporal Difference Learning		
Total Periods			60

Text Books	
1	Tom M. Mitchell, â€•Machine Learning, McGraw-Hill Education (India) Private Limited, 2013
References	
1	Ethem Alpaydin, â€•Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2	Stephen Marsland, â€•Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
E-References	
1	www.tutorialspoint.com

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	Programme Code	**UIT**		Regulations		**2021-2022**
Department	**Information Technology**		Semester				**6**
Course Code	Course Name		Periods per Week		Credit	Maximum Marks	
			L	T	P	C	CA	ESE	Total
21U6ITE05	Blockchain Technology		5	0	0	3	25	75	100
COURSE OBJECTIVES	Understand how blockchain systems (mainly Bitcoin and Ethereum) work, â€¢ To securely interact with them,â€¢ Design, build, and deploy smart contracts and distributed applications,								
POs	PROGRAMME OUTCOME								
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies								
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.								
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.								
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.								
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.								
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.								
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.								
PO 8	Apply ethical principles and responsibilities during professional practice.								
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.								
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.								
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.								
PO 12	Engage in independent and life-long learning for continued professional development.								
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.								
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.								
PO 15	Updating themselves through e-learning and self-study courses.								

COs	COURSE OUTCOME
CO 1	Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure.
CO 2	Compare the advantages and disadvantages of various cloud computing platforms.
CO 3	Program data intensive parallel applications in the cloud.
CO 4	Analyze the performance, scalability, and availability of the underlying cloud technologies and software.
CO 5	Solve a real-world problem using cloud computing through group collaboration.
Pre-requisites	Basic Knowledge of Cryptography

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	3	PO 1	1
		PO 2	2
		PO 3	6
CO 2	2	PO 4	5
		PO 5	3
		PO 6	5
CO 3	3	PO 7	4
		PO 8	6
		PO 9	6
CO 4	1	PO 10	6
		PO 11	6
		PO 12	5
CO 5	5	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO3	1	2	1	1	3	1	2	1	1	1	1	1	1	1	1
CO4	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1
CO5	1	1	2	3	1	3	2	2	2	2	2	3	2	2	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Basics	Periods	12
	Distributed Database-Two General Problem-Byzantine General problem and Fault Tolerance-Hadoop Distributed File System- Distributed Hash Table- ASIC resistance- Turing Complete. â€¢ Cryptography: Hash function- Digital Signature - ECDSA- Memory Hard Algorithm- Zero Knowledge Proof.		
	Blockchain	Periods	12
Unit - II	Introduction- Advantage over conventional distributed database-Blockchain Network- Mining Mechanism- Distributed Consensus-Merkle Patricia Tree- Gas Limit- Transactions and Fee- Anonymity- Reward- Chain Policy- Life of Blockchain application- Soft & Hard Fork- Private and Public blockchain.		
	Distributed Consensus	Periods	12
Unit - III	Nakamoto consensus- Proof of Work- Proof of Stake- Proof of Burn- Difficulty Level- Sybil Attack-Energy utilization and alternate.		
	Cryptocurrency	Periods	12
Unit - IV	History- Distributed Ledger-Bitcoin protocols - Mining strategy and rewards-Ethereum - Construction-DAO- Smart Contract- GHOST- Vulnerability- Attacks-Sidechain-Namecoin		
	Cryptocurrency Regulation	Periods	12
Unit - V	Stakeholders- Roots of Bit coin- Legal Aspects-Crypto currency Exchange- Black Market and Global Economy.		
	Total Periods		60

Text Books	
1	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
References	
1	Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
2	Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
3	DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.
4	Nicola Atzei, Massimo Bartoletti, and TizianaCimoli, A survey of attacks on Ethereum smart contracts
E-References	

Signature of BOS Chairman

	VIVEKANANDHA COLLEGE OF ARTS AND SCIENCES FOR WOMEN (AUTONOMOUS) **Elayampalayam, Tiruchengode-637 205.**						
Programme	**B.Sc**	Programme Code	**UIT**		Regulations		**2021-2022**
Department	**Information Technology**		Semester				**6**
Course Code	Course Name	Periods per Week			Credit	Maximum Marks	
		L	T	P	C	CA	ESE	Total
21U6ITE06	Big Data Analytics	5	0	0	3	25	75	100

COURSE OBJECTIVES	To provide an overview of an exciting growing field of big data analytics.To introduce the tools required to manage and analyze big data like Hadoop, NoSql MapReduce.
POs	PROGRAMME OUTCOME
PO 1	Apply the knowledge of mathematics, science and computing in the core information technologies
PO 2	Build software systems and apply the technologies in various fields of Computer Technology, including hardware problems, Web site development and management, databases, and software engineering techniques.
PO 3	Design, implement and evaluate a computer-based system to meet the desired needs within the realistic constraints.
PO 4	Review literature and indulge in research using research based knowledge and methods to design new experiments, analyze, and interpret data to draw valid conclusions.
PO 5	Select and apply current techniques, skills, and tools necessary for computing practice and integrate IT-based solutions into the user environment effectively.
PO 6	Apply contextual knowledge to assess professional, legal, health, social and cultural issues during profession practice.
PO 7	Analyze the local and global impact of computing on individuals, organizations, and society.
PO 8	Apply ethical principles and responsibilities during professional practice.
PO 9	Function effectively as a team member or a leader to accomplish a common goal in a multidisciplinary team.
PO 10	Communicate effectively with a range of audiences using a range of modalities including written, oral and graphical.
PO 11	Apply the knowledge of technology and management principles to manage projects effectively in diverse environments as a member or a leader in the team.
PO 12	Engage in independent and life-long learning for continued professional development.
PO 13	Ability to understand and analyze a given real-time problems and propose feasible computing solutions.
PO 14	Evaluate and use appropriate tools and techniques in developing application activities.
PO 15	Updating themselves through e-learning and self-study courses.

COs	COURSE OUTCOME
CO 1	Understanding the basic concepts of data science and its functions
CO 2	Exploring cluster analysis methods
CO 3	Exploring big data from different perspective
CO 4	Understanding hadoop framework with HDFS concepts
CO 5	Process Data with MapReduce
Pre-requisites	Prior experience with any programming language.

Knowledge Levels

1.Remembering, 2.Understanding, 3.Applying, 4.Analyzing, 5.Evaluating, 6.Synthesizing

CO / PO / KL Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	KLs	POs	KLs
CO 1	2	PO 1	1
		PO 2	2
		PO 3	6
CO 2	2	PO 4	5
		PO 5	3
		PO 6	5
CO 3	5	PO 7	4
		PO 8	6
		PO 9	6
CO 4	2	PO 10	6
		PO 11	6
		PO 12	5
CO 5	5	PO 13	6
		PO 14	6
		PO 15	5

CO / PO Mapping

(3/2/1 indicates the strength of correlation, 3-strong, 2-medium, 1-weak)

COs	Programme Outcome (POs)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO2	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO3	1	1	2	3	1	3	2	2	2	2	2	3	2	2	3
CO4	2	3	1	1	2	1	1	1	1	1	1	1	1	1	1
CO5	1	1	2	3	1	3	2	2	2	2	2	3	2	2	3

Course Assessment Methods
Direct
1. Continuous Assessment Test I, II & Model 2. Assignment 3. End Semester Examinations
Indirect
1. Course End Delivery

Content of the Syllabus			
Unit - I	Introduction	Periods	12
	Types of Digital Data: Classification of Digital Data. Introduction to Big Data: Characteristics of Data-Evolution of Big Data- Definition of Big Data- Challenges with Big Data-What is big Data? Why big Data? Traditional Business Intelligence versus Big Data-A Typical Data Warehouse Environment- A Typical Hadoop Environment.		
Unit - II	Big Data Analytics	Periods	12
	Where do we Begin? What is Big Data Analytics? What is Big Data Analytics Isnâ€™t? Classification of Analytics-Why Big Data Analytics Important? Challenges Facing Big Data-Data Science-Terminologies used in Big Data Environment-Basically Available Soft State Eventual consistency (BASE).		
	The Big Data Technology Landscape: NoSQL: Hadoop	Periods	12
Unit - III	Where it is used? What is it? Types of NoSQL Databases- Why NoSQL - Advantages of NoSQL- What we miss with NoSQL? -Use of NoSQL in Industry- NoSQL Vendors- SQL vs NoSQL-NewSQL-comparision of SQL, NoSQL and NewSQL.Hadoop:Feature of Hadoop-Key Advantage of Hadoop-versions of Hadoop- Overview of Hadoop Ecosystem- Hadoop Distribution- Hadoop versus SQL- cloud Based Hadoop solution		
Unit - IV	Introduction to Hadoop	Periods	12
	Introducing Hadoop-Why Hadoop?-why not RDBMS?- RDBMS vs Hadoop=Distributed Computing Challenges- History of Hadoop-Overview of Hadoop- Use Case of Hadoop- Hadoop Distribution-HDFS-Processing Data with Hadoop- Managing resources and Applications with Hadoop YARN-Interacting with Hadoop Ecosystem.		
Unit - V	Introduction to MongoDB	Periods	12
	What is MongoDB? -Why MongoDB-Terms Used in RBDMS and MongoDB- Data Types in MongoDB-MongoDB Query Language.		
	Total Periods		60

Text Books	
1	Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", Wiley Publication, 2015.
References	
1	Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, "Big Data for Dummies", John Wiley & Sons, Inc., 2013.
2	Tom White, "Hadoop: The Definitive Guide", Oâ€™Reilly Publications, 2011.
3	Kyle Banker, "Mongo DB in Action", Manning Publications Company, 2012.
4	Russell Bradberry, Eric Blow, "Practical Cassandra A developers Approach", Pearson Education, 2014.
E-References	
1	https://www.webopedia.com/TERM/B/Big_data_analytics.html
2	https://www.simplilearn.com/data-science-vs-big-data-vs-data-analytics-article

Signature of BOS Chairman