

**Holy Cross College (Autonomous), Nagercoil**  
Kanyakumari District, Tamil Nadu.  
Accredited with A<sup>+</sup> by NAAC - IV cycle – CGPA 3.35

Affiliated to  
**Manonmaniam Sundaranar University, Tirunelveli**



**Semester I & II**  
**Guidelines & Syllabus**  
**DEPARTMENT OF COMPUTER SCIENCE**



**2023-2026**  
**(With effect from the academic year 2023-2024)**

**Issued from**  
**THE DEANS' OFFICE**

**Vision**

To provide a high-quality postgraduate education in computer science that prepares students for productive careers and lifelong learning.

**Mission**

1. To demonstrate proficiency in problem-solving techniques using the computer.
2. To demonstrate proficiency in at least two high-level programming languages and two operating systems
3. To show the ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.
4. To show the ability to function effectively on teams to accomplish a common goal.
5. To sensitize the students to the social realities around them with the vision of making them responsible citizen.

### **Programme Educational Objectives (PEOs)**

<b>PEO</b>	<b>Upon completion of M.Sc Computer Science Degree Programme, the graduates will be able to:</b>	<b>Mapping with Mission</b>
<b>PEO-1</b>	apply scientific and computational technology to solve socio ecological issues and pursue research.	M1, M2
<b>PEO-2</b>	continue to learn and advance their career in industry both in private and public sectors	M4 & M5
<b>PEO-3</b>	develop leadership, teamwork, and professional abilities to become a more cultured and civilized person and to tackle the challenges in serving the country.	M2, M5 & M6

### **Programme Outcomes (POs)**

<b>PO</b>	<b>Upon completion of M.Sc. Degree Programme, the graduates will be able to:</b>	<b>Mapping with PEOs</b>
PO1	apply their knowledge, analyze complex problems, think independently, formulate and perform quality research.	<b>PEO1 &amp; PEO2</b>
PO2	carry out internship programmes and research projects to develop scientific and innovative ideas through effective communication.	<b>PEO1, PEO2 &amp; PEO3</b>
PO3	develop a multidisciplinary perspective and contribute to the knowledge capital of the globe.	<b>PEO 2</b>
PO4	develop innovative initiatives to sustain ecofriendly environment	<b>PEO1, PEO 2</b>
PO5	through active career, team work and using managerial skills guide people to the right destination in a smooth and efficient way.	<b>PEO 2</b>
PO6	employ appropriate analysis tools and ICT in a range of learning scenarios, demonstrating the capacity to find, assess, and apply relevant information sources.	<b>PEO1, PEO 2 &amp; PEO3</b>
PO7	learn independently for lifelong to execute professional, social and ethical responsibilities promoting sustainable development.	<b>PEO3</b>

## Programme Specific Outcomes (PSOs)

PSO	Upon completion of M.Sc. Degree Programme, the graduates will be able to:	Mapping with POs
PSO 1	apply profound knowledge to analyze and design software and systems containing hardware and software components of varying complexity.	PO1
PSO 2	apply mathematical model, algorithmic principles, and computer science theory in the design of real-time applications	PO2
PSO 3	apply knowledge of computing to produce effective designs and solutions for specific problems.	PO4 & PO7
PSO 4	identify, analyze, design, optimize and implement system solutions using appropriate algorithms of varying complexity.	PO5 & PO 6
PSO 5	work in multidisciplinary teams in small- and large-scale projects by utilizing modern software tools and emerging technologies to develop complex products for the societal needs.	PO3

### Mapping of PO'S and PSO'S

POs	PSO1	PSO 2	PSO3	PSO4	PSO5
PO 1	S	S	M	S	S
PO 2	S	M	S	S	S
PO 3	S	M	M	S	M
PO4	S	S	M	S	S
PO5	S	S	S	M	S
PO6	M	S	S	M	S
PO7	S	S	M	S	S

#### 1. Eligibility

- (i) **For Admission:** A pass in B.Sc Computer Science as per the norms of Manonmaniam Sundaranar University, Tirunelveli

##### Passing Minimum

Minimum pass mark in each course is 50.

#### ii) Degree

The candidates shall have subsequently undergone the prescribed Programme of study in Holy Cross College (Autonomous) affiliated to the Manonmaniam Sundaranar University for a period of not less than two academic years comprising four semesters, passed the examinations prescribed and fulfilled such conditions as have been prescribed there of.

- 2. Duration:** Duration of the programme: 2 Years

#### Components

Courses	No of Courses	Maximum marks	Total Marks
Core Courses	10	100	1000
Core Lab Courses	4	100	400

Project	1	100	100
Elective courses	5	100	500
Elective Lab Course	1	100	100
		<b>Total</b>	<b>2100</b>

## Course Structure

### (i) Curricular Courses:

#### Distribution of Hours and Credits

Course	SEMESTER				Total	
	I	II	III	IV	Hours	Credits
Core Course – Theory	6(5) + 6(4) +	6(5)+ 6(5)+	6(5) + 6(5) + 6(5) +	6(5) + 6 (5)	74	58
Core Course -Lab	5(3)	6(4)	6 (4) 3 (3)			
Elective Course	5 (3) + 5 (3)	4 (3) + 4 (3)	-	4 (3) -	22	15
Elective Lab Course	3(2)				3	2
Core Project		-		10 (7)	10	7
Skill Enhancement Course		4 (2)	3 (2)	4 (2)	11	6
Internship/ Industrial Activity			(2)		-	2
Extension Activity				(1)	-	1
<b>Total</b>	<b>30 (20)</b>	<b>30 (22)</b>	<b>30 (26)</b>	<b>30 (23)</b>	<b>120</b>	<b>91</b>

### (ii) Co-curricular Courses

Course	SEMESTER				Total
	I	II	III	IV	Credits
Life Skill Training –I	-	(1)	-	-	1
Life Skill Training –II	-	-	-	(1)	1
Field Project	(1)		-		1
Specific Value-Added Courses	(1)		(1)		2
Generic Value-Added Courses		(1)		(1)	2
MOOC		(1)		(1)	2
Community Engagement Activity (UBA)		(1)			1

**Total Number of Hours =120**

**Total Number of Credits =91 + (10)**

Non-academic courses are mandatory and conducted outside the regular working hours.

**Courses Offered  
Semester I**

<b>Course Code</b>	<b>Title of the Course</b>	<b>Credits</b>	<b>Hours / Week</b>
SP231CC1	Core Course I: Analysis & Design of Algorithms	5	6
SP231CC2	Core Course II: Object Oriented Analysis and Design & C++	4	6
SP231CP1	Core Lab Course: Algorithm and OOPS Lab	3	5
SP231EC1	Elective Course I: a) Python Programming	3	5
SP231EC2	Elective Course I: b) Multimedia and its Applications		
SP231EC3	Elective Course I: c) Embedded System		
SP231EC4	Elective Course II: a) Advanced Software Engineering	3	5
SP231EC5	Elective Course II: b) Internet of Things		
SP231EC6	Elective Course II: c) Critical Thinking, Design Thinking and Problem Solving		
SP231EP1	Elective Lab Course I: Python Programming Lab	2	3
	<b>Total</b>	<b>20</b>	<b>30</b>

**Semester II**

<b>Course Code</b>	<b>Title of the Course</b>	<b>Credits</b>	<b>Hours / Week</b>
SP232CC1	Core Course III: Data Mining and Warehousing	5	6
SP232CC2	Core Course IV: Advanced Java Programming	5	6
SP232CP1	Core Lab Course II: Advanced Java Programming Lab	4	6
SP232EC1	Elective Course III: a) Advanced Operating Systems	3	4
SP232EC2	Elective Course III: b) Mobile Computing		
SP232EC3	Elective Course III: c) Block Chain Technology		
SP232EC4	Elective Course IV: a) Artificial Intelligence & Machine Learning	3	4
SP232EC5	Elective Course IV: b) Web Services		
SP232EC6	Elective Course IV: c) Robotic Process Automation for Business		
SP232SE1	Skill Enhancement Course I : Practical: Data Mining Lab using R	2	4
	<b>Total</b>	<b>22</b>	<b>30</b>

## Co-curricular Courses

Semester	Code	Title of the Course	Credit
I & II	PG23LST1	Life Skill Training	1
II & IV	-	MOOC	1+1
II	PG232CE1	Community Engagement Course (CEC)	1
III & IV	PG23LST2	Life Skill Training	1
I	SP231FP1	Field Project	1
I & III	SP231V01 / SP233V01	Specific Value-added Course	1+1
II & IV	PG232V01- PG232V12/ PG234V01- PG234V12	Generic Value-added Course	1+1
		<b>Total</b>	<b>10</b>

## Specific Value added Course

S. No.	Course code	Title of the course	Total hours
I	SP231V01	Website Creation	30

## Examination Pattern

### i) Core Course / Elective Course

Internal: External–25:75

Continuous Internal Assessment (CIA)

Internal Components and Distribution of Marks

Components	Marks
Internal test (2) (40 marks)	10
Quiz (2) (20 marks)	5
Seminar (10 marks)	5
Assignment: (Model Making, Exhibition, Role Play, Group Discussion, Problem Solving, Class Test, Open Book Test (Minimum three items per course) (30 marks)	5
<b>Total</b>	<b>25</b>

### Question Pattern

Internal Test	Marks	External Exam	Marks
Part A 4 x 1 (No choice)	4	Part A 10 x 1 (No choice)	10
Part B 3 x 4 (Internal choice)	12	Part B 5 x 6 (Internal choice)	30
Part C 3 x 8 (Internal choice)	24	Part C 5 x 12 (Internal choice)	60
<b>Total</b>	<b>40</b>	<b>Total</b>	<b>100</b>

### ii) Lab Course:

Ratio of Internal and External= 25:75

Total: 100 marks

**Internal Components and Distribution of Marks**

<b>Internal Components</b>	<b>Marks</b>
Performance of the Experiments	10
Regularity in attending practical and submission of records	5
Record	5
Model exam	5
<b>Total</b>	<b>25</b>

**Question pattern**

<b>External Exam</b>	<b>Marks</b>
Major Practical	75
Minor Practical / Spotters /Record	
<b>Total</b>	<b>75</b>

**iii) Skill Enhancement Course**

Ratio of Internal and External = **25: 75**

**Internal Components and Distribution of Marks**

<b>Components</b>	<b>Marks</b>
Internal test (2)	10
Quiz (2)	5
Assignment: (Model Making, Exhibition, Role Play, Album, Group Activity (Mime, Skit, Song) (Minimum three items per course)	10
<b>Total</b>	<b>25</b>

**Question Pattern**

<b>Internal Test</b>	<b>Marks</b>	<b>External Exam</b>	<b>Marks</b>
Part A 2 x 2(No Choice)	4	Part A 5 x 2(No Choice)	10
Part B 3 x 4 (Open choice <b>Three</b> out of <b>Five</b> )	12	Part B 5 x 5 (Open choice any <b>Five</b> out of <b>Eight</b> )	25
Part C 1 x 9 (Open choice <b>One</b> out of <b>Three</b> )	9	Part C 5 x 8 (Open choice any <b>Five</b> out of <b>Eight</b> )	40
<b>Total</b>	<b>25</b>	<b>Total</b>	<b>75</b>

**iv) Internship/ Industrial Activity**

<b>Components</b>	<b>Marks</b>
Industry Contribution	50
Report & Viva-voce	50

**v) Core Project:**

Ratio of Internal and External 25 : 75

<b>Internal (Supervisor)</b>	<b>Marks</b>
I Review	5

II Review	5
Report	15
<b>External (External Examiner)</b>	
Report	40
Viva-voce (individual, open viva-voce)	35
<b>Total</b>	<b>100</b>

**Co-Curricular Courses:**

**(i) Life Skill Training  
Internal Component**

Components		Marks
<b>Life Skill Training -I</b>	Album (20 pages)	30
	Group Song, Mime, Skit (Group of 5 students)	20
	<b>Total</b>	<b>50</b>
<b>Life Skill Training -II</b>	Case Study (30 pages)	50
	<b>Total</b>	<b>50</b>

**External Component**

<b>Written Test</b>	Five out of Seven (5 x 10)	50
	<b>Total</b>	<b>50</b>

**(ii) Field Project:**

Components	Marks
Field Work	50
Report & Viva-voce	50

**(iii) Specific Value-Added Courses & Generic Value-Added Courses:**

Components	Marks
Internal	25
External	75

**(iv) Community Engagement Activity-UBA**

Internal Component	
Component	Marks
Attendance (Field Work)	30
Participation	20
<b>Total</b>	<b>50</b>

**External Component**

Component	Marks
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Group Project Report/ Case Study (10-15 pages in print)	50
<b>Total</b>	<b>50</b>

### Outcome Based Education

#### (i) Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No	Level	Parameter	Description
1	K1	Knowledge/Remembering	It is the ability to remember the previously learned
2	K2	Comprehension/Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analysing	The learner distinguishes among different parts
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis /Creating	The learner creates a new product or point of view

#### (ii) Weightage of K – levels in Question Paper

##### Number of questions for each cognitive level:

Assessment	Cognitive Level	K1			K2			K3			K4, K5, K6			Total
		A	B	C	A	B	C	A	B	C	A	B	C	
Internal Test	Part	A	B	C	A	B	C	A	B	C	A	B	C	
	No. Of Questions	1	1			1		1		1	2	1	2	10
External Examination	Part	A	B	C	A	B	C	A	B	C	A	B	C	
	No. Of Questions	3	-	1	3	1	1	1	2	1	3	2	2	20

### Evaluation

- The performance of a student in each Course is evaluated in terms of percentage of marks with a provision for conversion to grade points.
- Evaluation for each Course shall be done by a Continuous Internal Assessment (CIA) by the Course teacher as well as by an end semester examination and will be consolidated at the end of the semester.
- There shall be examinations at the end of each semester, for odd semesters in October/November; for even semesters in April / May.
- A candidate who does not pass the examination in any course (s) shall be permitted to re-appear in such failed course (s) in the subsequent examination to be held in October / November or April / May. However, candidates who have arrears in Practical Examination(s) shall be permitted to re-appear for their arrears only along with Regular Practical examinations in the respective semester.
- Viva- voce: Each candidate shall be required to appear for Viva-voce Examination in defense of the Project.
- The results of all the examinations will be published in the College website.

### Conferment of the Master's Degree

A candidate shall be eligible for the conferment of the Degree of Master of Arts / Science / Commerce only if the minimum required credits for the programme thereof (91 +10 credits) is earned.

### Grading System

**For a semester examination:**

#### Calculation of Grade Point Average for End Semester Examination:

$$\text{GPA} = \frac{\text{Sum of the multiplication of grade points by the credits of the course}}{\text{Sum of the credits of the courses (passed) in a semester}}$$

**For the entire programme:**

Cumulative Grade Point Average (CGPA)  $\frac{\sum_n \sum_i C_{ni} G_{ni}}{\sum_n \sum_i C_{ni}}$

$$\text{CGPA} = \frac{\text{Sum of the multiplication of grade points by the credits of the entire programme}}{\text{Sum of the credits of the courses of the entire programme}}$$

Where

$C_i$  - Credits earned for course  $i$  in any semester

$G_i$  - Grade point obtained for course  $i$  in any semester

$n$  - semester in which such courses were credited

### Final Result

#### Conversion of Marks to Grade Points and Letter Grade

Range of Marks	Grade Points	Letter Grade	Description
90-100	9.0-10.0	O	Outstanding
80-89	8.0-8.9	D+	Excellent
75-79	7.5-7.9	D	Distinction
70-74	7.0-7.4	A+	Very Good
60-69	6.0-6.9	A	Good
50-59	5.0-5.9	B	Average
00-49	0.0	U	Re-Appear
ABSENT	0.0	AAA	ABSENT

#### Overall Performance

CGPA	Grade	Classification of Final Results
9.5-10.0	O+	First Class – Exemplary*
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction*
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	First Class
7.0 and above but below 7.5	A++	
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
0.0 and above but below 5.0	U	Re-appear

\*The candidates who have passed in the first appearance and within the prescribed semester are eligible.

**SEMESTER I**  
**CORE COURSE I: ANALYSIS & DESIGN OF ALGORITHMS**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP231CC1	6		-	-	5	6	90	25	75	100

**Pre-requisite:**

Understand the concepts of Basic Data Structures & Algorithms

**Learning Objectives:**

1. Enable the students to learn the Elementary Data Structures and algorithms.
2. Presents an introduction to the algorithms their analysis and design
3. Discuss various methods like Basic Traversal and Search Techniques, divide and conquer method, Dynamic programming, backtracking.
4. Understood the various design and analysis of the algorithms.

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	get knowledge about algorithms and determines their time complexity.	<b>K1, K2</b>
2	gain good understanding of Greedy method and its algorithm.	<b>K2, K3</b>
3	able to describe about graphs using dynamic programming technique.	<b>K3, K4</b>
4	demonstrate the concept of backtracking & branch and bound technique.	<b>K5, K6</b>
5	explore the traversal and searching technique and apply it for trees and graphs.	<b>K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Units	Contents	No. of Hours
<b>I</b>	<b>Introduction:</b> - Algorithm Definition and Specification – Space complexity- Time Complexity- Asymptotic Notations - Elementary Data Structure: Stacks and Queues – Binary Tree - Binary Search Tree - Heap – Heapsort- Graph.	<b>18</b>
<b>II</b>	<b>Basic Traversal And Search Techniques:</b> Techniques for Binary Trees- Techniques for Graphs -Divide and Conquer: - General Method – Binary Search – Merge Sort – Quick Sort.	<b>18</b>
<b>III</b>	<b>The Greedy Method:</b> - General Method–Knapsack Problem Minimum Cost Spanning Tree– Single Source Shortest Path	<b>18</b>
<b>IV</b>	<b>Dynamic Programming-</b> General Method–Multistage Graphs–All Pair Shortest Path–Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling.	<b>18</b>
<b>V</b>	<b>Back tracking:</b> -General Method–8-Queens Problem–Sum of Subsets–Graph Coloring – Hamiltonian Cycles – Branch and Bound: - The Method – Traveling Salesperson.	<b>18</b>

<b>Self Study</b>	Stacks and Queues, Quick Sort, Traveling Salesperson
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**Text book**

1. Ellis Horowitz. "Computer Algorithms", Galgotia Publications
2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms".

### Reference Book

1. Goodrich, *Data Structures & Algorithms in Java*, (Third edition). Published by Wiley
2. Skiena, 2008. *The Algorithm Design Manual* (Second Edition), Springer.
3. Anany Levith, 2003. *Introduction to the Design and Analysis of algorithm*, Pearson Education Asia.
4. Robert Sedgewick, Phillipe Flajolet. 1996. *An Introduction to the Analysis of Algorithms*, Addison-Wesley Publishing Company

### Web Resources

1. <https://nptel.ac.in/courses/106/106/106106131/>
2. [https://www.tutorialspoint.com/design\\_and\\_analysis\\_of\\_algorithms/index.htm](https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm)
3. <https://www.javatpoint.com/daa-tutorial>

### MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	2	3	1	3	3	3	3
CO4	3	3	2	3	3	3	3	3	3	2	3	2
CO5	3	2	2	2	2	2	2	2	2	1	2	1
Total	15	14	13	15	15	13	15	12	14	12	14	12
Average	3	2.8	2.6	3	3	2.6	3	2.4	2.8	2.4	2.8	2.4

S-Strong (3) M-Medium (2) L-Low(1)

## SEMESTER I

### CORE COURSE II: OBJECT ORIENTED ANALYSIS AND DESIGN & C++

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP231CC2	6		-	-	4	6	90	25	75	100

**Pre-requisite:**

Basics of C++ and Object-Oriented Concepts.

**Learning Objectives:**

1. Present the object model, classes and objects, object orientation, machine view and model management view.
2. Enable the students to learn the basic function, principles and concepts of object-oriented analysis and design.
3. Enable the students to understand C++ language with respect to OOAD

#### Course Outcomes

On the successful completion of the course, student will be able to:		
1	understand the concept of object-oriented development and modelling techniques	K1, K2
2	gain knowledge about the various steps performed during object design	K2, K3
3	abstract object-based views for generic software systems	K3
4	link OOAD with C++ language	K4, K5
5	apply the basic concept of OOPs and familiarize to write C++ program	K5, K6

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Units	Contents	No. of Hours
<b>I</b>	<b>The Object Model:</b> The Evolution of the Object Model – Elements of the Object Model – Applying the Object Model. Classes and Objects: The Nature of an Object – Relationship among Objects.	<b>18</b>
<b>II</b>	<b>Classes and Object:</b> Nature of Class – Relationship Among classes – The Interplay of classes and Objects. Classification: The importance of Proper Classification –identifying classes and objects –Key Abstractions and Mechanism.	<b>18</b>
<b>III</b>	<b>Introduction to C++:</b> Input and output statements in C++-Declarations-control structures– Functions in C++.	<b>18</b>
<b>IV</b>	<b>Inheritance and overloading:</b> Classes an Objects–Constructors and Destructors–operators overloading–Type Conversion- Inheritance – Pointers and Arrays.	<b>18</b>
<b>V</b>	<b>Memory Management Operators</b> -Polymorphism–Virtual functions–Files–Exception Handling – String Handling -Templates.	<b>18</b>

<b>Self Study</b>	Relationship among Objects, Key Abstractions and Mechanism, Exception Handling
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**Text books**

1. Grady Booch. *Object Oriented Analysis and Design with Applications*. (Second Edition) Pearson Education.
2. Ashok N. Kamthane. 2003. *Object Oriented Programming with ANSI & Turbo C++*. First Indian Print, Pearson Education.

**Reference Books**

Balagurusamy. 2003.*Object Oriented Programming with C++*. (Second Edition). TMH.

### Web Resources

1. [https://onlinecourses.nptel.ac.in/noc19\\_cs48/preview](https://onlinecourses.nptel.ac.in/noc19_cs48/preview)
2. <https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/>
3. [https://www.tutorialspoint.com/object\\_oriented\\_analysis\\_design/ooad\\_object\\_oriented\\_analysis.htm](https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.htm)

### MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	2	3	3	3
CO2	2	3	2	3	3	3	2	3	2	3	1	3
CO3	3	3	2	3	3	3	3	2	2	3	2	3
CO4	3	3	3	1	2	2	3	3	1	2	1	3
CO5	3	3	3	3	3	3	13	2	3	2	3	2
<b>Total</b>	14	15	13	13	14	14	2.6	13	10	13	10	14
<b>Average</b>	2.8	3	2.6	2.6	2.8	2.8	3	2.6	2	2.6	2	2.8

**S-Strong (3) M-Medium (2) L-Low(1)**

**SEMESTER I**  
**CORE LAB COURSE– I: ALGORITHM AND OOPS LAB**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP231CP1	-		5	-	3	5	75	25	75	100

**Prerequisite:**

Basic Programming of C++language

**Learning Objectives:**

1. This course covers the basic data structures like Stack, Queue, Tree, List.
2. This course enables the students to learn the applications of the data structures using various techniques
3. It also enables the students to understand C++language with respect to OOAD concepts

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	understand the concepts of object oriented with respect to C++	<b>K1, K2</b>
2	able to understand and implement OOPS concepts	<b>K3, K4</b>
3	implementation of data structures like Stack, Queue, Tree, List using C++	<b>K4, K5</b>
4	application of the data structures for Sorting, Searching using different techniques.	<b>K5, K6</b>
5	create an application using inheritance	<b>K5, K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

<b>Contents</b>
<ol style="list-style-type: none"> <li>1. Write a program to solve the tower of Hanoi using recursion.</li> <li>2. Write a program to traverse through binary search tree using traversals.</li> <li>3. Write a program to perform various operations on stack using linked list.</li> <li>4. Write a program to perform various operation in circular queue.</li> <li>5. Write a program to sort an array of an elements using quick sort.</li> <li>6. Write a program to solve number of elements in ascending order using heap sort.</li> <li>7. Write a program to solve the knapsack problem using greedy method</li> <li>8. Write a program to search for an element in a tree using divide&amp; conquer strategy.</li> <li>9. Write a program to place the 8 queens on an 8X8 matrix so that no two queens Attack.</li> <li>10. Write a C++ program to perform Virtual Function</li> <li>11. Write a C++ program to perform Parameterized constructor</li> <li>12. Write a C++ program to perform Friend Function</li> <li>13. Write a C++ program to perform Function Overloading</li> </ol>

- |   |
|---|
| 14. Write a C++program to perform Single Inheritance<br>15. Write a C++program to perform Employee Details using files. |
|---|

**Text Books**

1. Goodrich. *Data Structures & Algorithms in Java*. Wiley 3rd edition.
2. Skiena. 2008. *The Algorithm Design Manual* (Second Edition), Springer.

**Reference Books**

1. Anany Levith. 2003. *Introduction to the Design and Analysis of algorithm*, Pearson Education Asia.
2. Robert Sedgewick, Phillippe Flajolet,. 1996. *An Introduction to the Analysis of Algorithms*, Addison-Wesley Publishing Company.

**Web Resources**

1. [https://onlinecourses.nptel.ac.in/noc19\\_cs48/preview](https://onlinecourses.nptel.ac.in/noc19_cs48/preview)
2. <https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/>
3. [https://www.tutorialspoint.com/object\\_oriented\\_analysis\\_design/ooad\\_object\\_oriented\\_analysis.htm](https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.htm)

**MAPPING WITH PROGRAMME OUTCOMES  
AND PROGRAMME SPECIFIC OUTCOMES**

COs	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	2	3	2	3	3	2	2	2	3	2
<b>CO2</b>	3	3	2	2	3	3	3	3	2	3	2	3
<b>CO3</b>	2	2	3	3	3	3	3	2	3	3	3	3
<b>CO4</b>	3	3	3	3	3	2	2	2	3	3	3	1
<b>CO5</b>	3	3	2	3	2	2	2	3	1	2	3	2
<b>Total</b>	14	14	11	14	11	13	13	11	9	13	14	9
<b>Average</b>	2.8	2.8	2.3	2.8	2.2	2.6	2.6	2.3	2.1	2.6	2.8	7.5

**S-Strong (3)**

**M-Medium (2)**

**L-Low(1)**



**SEMESTER I**  
**ELECTIVE COURSE I: a) PYTHON PROGRAMMING**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP231EC1	5	-	-	-	3	5	75	25	75	100

**Pre-requisite:**

Basics of any OO Programming Language

**Learning Objectives:**

1. Presents an introduction to Python, creation of web applications, network applications and working in the clouds
2. Use functions for structuring Python programs
3. Understand different Data Structures of Python
4. Represent compound data using Python lists, tuples and dictionaries

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	understand the basic concepts of Python Programming	<b>K1, K2</b>
2	understand File operations, Classes and Objects	<b>K2, K3</b>
3	acquire Object Oriented Skills in Python	<b>K3, K4</b>
4	develop web applications using Python	<b>K5</b>
5	develop Client Server Networking applications	<b>K5, K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Units	Contents	No. of Hours
<b>I</b>	<b>Python:</b> Introduction – Numbers – Strings – Variables – Lists – Tuples – Dictionaries–Sets– Comparison.	<b>15</b>
<b>II</b>	<b>Code Structures:</b> if, else if, and else – Repeat with while – Iterate with for – Comprehensions – Functions – Generators – Decorators – Namespaces and Scope – Handle Errors with try and except – User Exceptions.	<b>15</b>
<b>III</b>	<b>Modules, Packages, and Programs:</b> Standalone Programs – Command-Line Arguments – Modules and the import Statement – The Python Standard Library. <b>Objects and Classes:</b> Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Parent with super–Inself Defense –Get and Set Attribute Values with Properties –Name Mangling for Privacy – Method Types – Duck Typing – Special Methods –Composition.	<b>15</b>
<b>IV</b>	<b>Data Types:</b> Text Strings Binary Data. <b>Storing and Retrieving Data:</b> File Input/Output– Structured Text Files – Structured Binary Files - Relational Databases – No SQL Data Stores. <b>Web:</b> Web Clients –Web Servers–Web Services and Automation	<b>15</b>
<b>V</b>	<b>Systems:</b> Files–Directories–Programs and Processes– Calendars and Clocks. <b>Concurrency:</b> Queues– Processes–Threads–Green Threads and event–twisted–Redis. <b>Networks:</b> Patterns – The Publish-Subscribe Model – TCP/IP – Sockets – ZeroMQ –Internet Services – Web Services and APIs – Remote Processing – Big Fat Data and Map Reduce – Working in the Clouds.	<b>15</b>

### Text books

1. Bill Lubanovic. 2014. *Introducing Python* (First Edition). O'Reilly, Second Release, 2014.
2. Mark Lutz, 2013. *Learning Python* (Fifth Edition). O'Reilly.

### Reference Books

1. David M. Beazley. 2009. *Python Essential Reference* (Fourth Edition). Developer's Library
2. Sheetal Taneja, Naveen Kumar, *Python Programming – A Modular Approach*. Pearson Publications.

### Web Resources

1. <https://www.programiz.com/python-programming/>
2. <https://www.tutorialspoint.com/python/index.htm>
3. [https://onlinecourses.swayam2.ac.in/aic20\\_sp33/preview](https://onlinecourses.swayam2.ac.in/aic20_sp33/preview)

### MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	1	3	3	3	3
CO4	3	3	2	3	3	2	3	3	3	2	3	2
CO5	3	2	2	2	2	2	2	2	2	1	2	1
<b>Total</b>	15	14	13	15	15	13	15	12	14	12	14	12
<b>Average</b>	3	2.8	2.6	3	3	2.6	3	2.4	2.8	2.4	2.8	2.4

**S-Strong (3) M-Medium (2) L-Low(1)**

## SEMESTER I

### ELECTIVE COURSE I: b) MULTIMEDIA AND ITS APPLICATIONS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP231EC2	5	-	-	-	3	5	75	25	75	100

**Pre-requisite:**

Basics of Multimedia

**Learning Objectives:**

1. To introduce the students the concepts of Multimedia, Images & Animation.
2. To introduce Multimedia authoring tools
3. To understand the role of Multimedia on Internet
4. To know about High Definition Television and Desktop Computing–Knowledge based Multimedia systems

#### Course Outcomes

On the successful completion of the course, student will be able to:		
1	understand the basic concepts of Multimedia	<b>K1, K2</b>
2	demonstrate multimedia authoring tools	<b>K2, K3</b>
3	analyze the concepts of Sound, Images, Video & Animation	<b>K3, K4</b>
4	apply and analyze the role of Multimedia in Internet and real time applications	<b>K5</b>
5	analyze multimedia applications using HDTV	<b>K5, K6</b>

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6– Create

Units	Contents	No. of Hours
<b>I</b>	What is Multimedia? –Introduction to making Multimedia–Macintosh and Windows Production platforms – Basic Software tools.	<b>15</b>
<b>II</b>	Making Instant Multimedia –Multimedia authoring tools–Multimedia building blocks –Text– Sound.	<b>15</b>
<b>III</b>	Images–how to create image, Text coloring Animation: Animating the images–motion- Video: Create videos of images.	<b>15</b>
<b>IV</b>	Multimedia and the Internet –The Internet and how it works–Tools for World Wide Web– Designing for the World Wide Web.	<b>15</b>
<b>V</b>	High Definition Television and Desktop Computing –Knowledge based Multimedia systems.	<b>15</b>

**Text books**

1. Tay Vaughan, “*Multimedia making it work*”, Fifth Edition, Tata McGraw Hill.
2. John F. Koegel Bufford, “*Multimedia Systems*”, Pearson Education.

**Reference Books**

1. Judith Jeffloate, 2003, “Multimedia in Practice (Technology and Applications)”, PHI.

**Web Resources**

1. <https://www.tutorialspoint.com/multimedia/index.htm>
2. [https://www.tutorialspoint.com/basics\\_of\\_computer\\_science/basics\\_of\\_computer\\_science\\_multimedia.htm](https://www.tutorialspoint.com/basics_of_computer_science/basics_of_computer_science_multimedia.htm)
3. <https://nptel.ac.in/courses/117/105/117105083/>

**MAPPING WITH PROGRAMME OUTCOMES  
AND PROGRAMME SPECIFIC OUTCOMES**

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3	3	3	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3	3	3	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3	3	3	1	3	3	3	3
<b>CO4</b>	3	3	2	3	3	2	3	3	3	2	3	2
<b>CO5</b>	3	2	2	2	2	2	2	2	2	1	2	1
<b>Total</b>	15	14	13	15	15	13	15	12	14	12	14	12
<b>Average</b>	3	2.8	2.6	3	3	2.6	3	2.4	2.8	2.4	2.8	2.4

**S-Strong (3) M-Medium (2) L-Low(1)**

**SEMESTER I**  
**ELECTIVE COURSE I: c) EMBEDDED SYSTEM**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP231EC3	5	-	-	-	3	5	75	25	75	100

**Pre-requisite:**

Basics of Micro Controller

**Learning Objectives:**

1. Present the introduction to 8051 Microcontroller Instruction Set, concepts on RTOS & Software tools.
2. Gain knowledge about the embedded software development.
3. Learn about Microcontroller and software tools in the embedded systems.

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	understand the concept of 8051 microcontroller	<b>K1, K2</b>
2	understand the Instruction Set and Programming	<b>K2, K3</b>
3	analyze the concepts of RTOS	<b>K3, K4</b>
4	analyze and design various real time embedded systems using RTOS	<b>K5</b>
5	debug the malfunctioning system using various debugging techniques	<b>K5, K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Units	Contents	No. of Hours
<b>I</b>	8051 Microcontroller: Introduction- 8051 Architecture-Input/Output Pins, Ports and Circuits- External Memory - Counters / Timers - Serial Data Input / Output -Interrupts	<b>15</b>
<b>II</b>	Instruction Set and Programming Moving Data-Addressing Modes-Logical operations- Arithmetic Operation-Jump and Call Instructions-Simple Program. Applications: Keyboard Interface- Display Interface-Pulse Measurements-DIA and AID Conversions-Multiple Interrupts.	<b>15</b>
<b>III</b>	CONCEPTS ON RTOS: Introduction to RTOS-Selecting an RTOS-Task and Task states - Tasks and data- Semaphores and shared data. MORE operating systems services: Interrupt Process communication - Message Queues, Mailboxes and pipes- Timer Functions-Events - Memory Management-Interrupt Routines in an RTOS Environment.	<b>15</b>
<b>IV</b>	Basic Design using a RTOS: Principles - Encapsulating semaphores and Queues-Hard real time scheduling considerations-Saving memory space and power- introductions to RTL & QNX.	<b>15</b>
<b>V</b>	SOFTWARE TOOLS: software Development Tools: Hosts and Target Machines- Linker/Locators for Embedded software-getting Embedded software into the Target systems. Debugging Techniques: Testing on your Host machine -Instruction set simulators- The assert macro- using laboratory tools.	<b>15</b>

**Text books**

1. David E.Simon, 2003.“*An Embedded Software primer*”Pearson Education Asia.
2. Kenneth J Ayala, “*The 8051 Microcontroller and Architecture programming and application*”, Second Edition, Penram International.

### Reference Books

1.RajKamal, 2003, “*Embedded Systems – Architecture, programming and design*”, Tata McGraw– Hill

### Web Resources

1. <https://www.javatpoint.com/embedded-system-tutorial>
2. [https://onlinecourses.nptel.ac.in/noc20\\_cs14/preview](https://onlinecourses.nptel.ac.in/noc20_cs14/preview)
3. [https://www.tutorialspoint.com/embedded\\_systems/index.htm](https://www.tutorialspoint.com/embedded_systems/index.htm)

### MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3	3	3	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3	3	3	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3	3	3	1	3	3	3	3
<b>CO4</b>	3	3	2	3	3	2	3	3	3	2	3	2
<b>CO5</b>	3	2	2	2	2	2	2	2	2	1	2	1
<b>Total</b>	15	14	13	15	15	13	15	12	14	12	14	12
<b>Average</b>	3	2.8	2.6	3	3	2.6	3	2.4	2.8	2.4	2.8	2.4

**S-Strong (3) M-Medium (2) L-Low(1)**

## SEMESTER I

### ELECTIVE COURSE II: a) ADVANCED SOFTWARE ENGINEERING

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP231EC4	5	-	-	-	3	5	75	25	75	100

**Pre-requisite:**

Basics of Software Engineering &SPM

**Learning Objectives:**

1. To introduce Software Engineering, Design, Testing and Maintenance.
2. Enable the students to learn the concepts of Software Engineering.

#### Course Outcomes

On the successful completion of the course, student will be able to:		
1	understand about Software Engineering process	<b>K1, K2</b>
2	understand about Software project management skills, design and quality management	<b>K2, K3</b>
3	analyze on Software Requirements and Specification	<b>K3, K4</b>
4	analyze on Software Testing, Maintenance and Software Re-Engineering	<b>K4, K5</b>
5	design and conduct various types and levels of software quality for a software project	<b>K5, K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Units	Contents	No. of Hours
<b>I</b>	<b>Introduction:</b> The Problem Domain – Software Engineering Challenges - Software Engineering Approach – Software Processes: Software Process – Characteristics of a Software Process – Software Development Process Models – Other software processes.	<b>15</b>
<b>II</b>	<b>Software Requirements Analysis and Specification:</b> Requirement engineering – Type of Requirements – Feasibility Studies – Requirements Elicitation – Requirement Analysis – Requirement Documentation – Requirement Validation – Requirement Management – SRS - Formal System Specification – Axiomatic Specification – Algebraic Specification - Case study: Student Result management system. Software Quality Management –Software Quality, Software Quality Management System, ISO 9000, SEI CMM.	<b>15</b>
<b>III</b>	<b>Software Project Management:</b> Responsibilities of a software project manager – Project planning – Metrics for Project size estimation – Project Estimation Techniques – Empirical Estimation Techniques – COCOMO – Halstead’s software science – Staffing level estimation – Scheduling– Organization and Team Structures – Staffing – Risk management – Software Configuration Management – Miscellaneous Plan.	<b>15</b>
<b>IV</b>	<b>Software Design:</b> Outcome of a Design process – Characteristics of a good software design – Cohesion and coupling - Strategy of Design – Function Oriented Design – Object Oriented Design - Detailed Design - IEEE Recommended Practice for Software Design Descriptions.	<b>15</b>

<b>V</b>	<b>Software Testing:</b> A Strategic approach to software testing – Terminologies – Functional testing– Structural testing – Levels of testing – Validation testing - Regression testing – Art of Debugging–Testingtools-Metrics-ReliabilityEstimation.SoftwareMaintenance -Maintenance Process - Reverse Engineering – Software Re-engineering - Configuration Management Activities	<b>15</b>
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**Text books**

1. Pankaj Jalote, Narosa, *An Integrated Approach to Software Engineering*(Third Edition)Publishing House, Delhi.
2. Fundamentals of Software Engineering (Third Edition)–Rajib Mall, PHI Publication,

**Reference Books**

1. K.K.Agarwal and Yogesh Singh. *Software Engineering* (Third Edition)–,New Age International Publishers.
2. R.S.Pressman.*A Practitioners Approach-Software Engineering*, McGraw Hill.
3. Carlo Ghezzi, M.Jarayeri, D. Manodrioli, *Fundamentals of Software Engineering*, PHI Publication.

**Web Resources**

1. <https://www.javatpoint.com/software-engineering-tutorial>
2. [https://onlinecourses.swayam2.ac.in/cec20\\_cs07/preview](https://onlinecourses.swayam2.ac.in/cec20_cs07/preview)
3. [https://onlinecourses.nptel.ac.in/noc19\\_cs69/preview](https://onlinecourses.nptel.ac.in/noc19_cs69/preview)

**MAPPING WITH PROGRAMME OUTCOMES  
AND PROGRAMME SPECIFIC OUTCOMES**

COs	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	2	3	3	3	3	3	3	3	3	3
<b>CO2</b>	3	3	2	3	3	3	3	3	2	3	2	3
<b>CO3</b>	2	3	3	3	3	3	3	2	2	3	2	3
<b>CO4</b>	3	3	3	2	2	2	3	3	2	2	2	3
<b>CO5</b>	3	3	3	3	3	2	2	3	3	2	3	2
<b>Total</b>	14	15	13	13	14	13	15	14	10	13	10	14
<b>Average</b>	2.8	3	2.6	2.6	2.8	2.6	3	2.8	2	2.6	2	2.8

**S-Strong (3)**

**M-Medium (2)**

**L-Low(1)**



**SEMESTER I**  
**ELECTIVE COURSE II: b) INTERNET OF THINGS**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP231EC5	5	-	-	-	3	5	75	25	75	100

**Pre-requisite:**

Basics of Sensors & its Applications

**Learning Objectives:**

1. About Internet of Things where various communicating entities are controlled and managed for decision making in the application domain.
2. Enable students to learn the Architecture of IoT and IoT Technologies
3. Developing IoT applications and Security in IoT, Basic Electronics for IoT, Arduino IDE, Sensors and Actuators Programming NODEMCU using Arduino IDE.

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	understand about IoT, its Architecture and its Applications	<b>K1, K2</b>
2	understand basic electronics used in IoT & its role	<b>K2, K3</b>
3	develop applications with C using Arduino IDE	<b>K4</b>
4	analyze about sensors and actuators	<b>K5, K6</b>
5	design IoT in real time applications using today's internet & wireless technologies	<b>K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Units	Contents	No. of Hours
<b>I</b>	Introduction to IoT: Evolution of IoT – Definition & Characteristics of IoT - Architecture of IoT– Technologies for IoT – Developing IoT Applications – Applications of IoT – Industrial IoT – Security in IoT	<b>15</b>
<b>II</b>	Basic Electronics for IoT: Electric Charge, Resistance, Current and Voltage – Binary Calculations – Logic Chips – Microcontrollers – Multipurpose Computers – Electronic Signals – A/D and D/A Conversion – Pulse Width Modulation	<b>15</b>
<b>III</b>	Programming Fundamentals with C using Arduino IDE: Installing and Setting up the Arduino IDE – Basic Syntax – Data Types/ Variables/ Constant – Operators – Conditional Statements and Loops – Using Arduino C Library Functions for Serial, delay and other invoking Functions – Strings and Mathematics Library Functions.	<b>15</b>
<b>IV</b>	Sensors and Actuators: Analog and Digital Sensors–Interfacing temperature sensor, ultrasound sensor and infrared (IR) sensor with Arduino– Interfacing LED and Buzzer with Arduino	<b>15</b>
<b>V</b>	Sending Sensor Data Over Internet: Introduction to ESP8266 NODEMCU WiFi Module – Programming NODEMCU using Arduino IDE – Using WiFi and NODEMCU to transmit data from temperature sensor to Open Source IoT cloud platform (Thing Speak).	<b>15</b>

### Text books

1. Arshdeep Bahga, Vijay Madiseti, 2014 “Internet of Things: A Hands-On Approach”. ISBN: 978-0996025515
2. Boris Adryan, Dominik Obermaier, Paul Fremantle, “The Technical Foundations of IoT”, Artech Houser Publishers, 2017

### Reference Books

1. Michael Margolis, 2011, “*Arduino Cook book*”, O’Reilly.
2. Marco Schwartz, 2016, “*Internet of Things with ESP 8266*”, Packt Publishing.
3. Dhivya Bala, 2018, “*ESP 8266: Step by Step Tutorial for ESP 8266 IoT, Arduino NODE MCU Dev. Kit*”, 2018.

### Web Resources

1. [https://onlinecourses.nptel.ac.in/noc20\\_cs66/preview](https://onlinecourses.nptel.ac.in/noc20_cs66/preview)
2. <https://www.javatpoint.com/iot-internet-of-things>
3. [https://www.tutorialspoint.com/internet\\_of\\_things/index.htm](https://www.tutorialspoint.com/internet_of_things/index.htm)

### MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	3	3	3	3	3	3	3	3
CO2	3	3	2	3	3	3	3	3	2	3	2	3
CO3	2	3	3	3	3	3	3	2	2	3	2	3
CO4	3	3	3	2	2	2	3	3	2	2	2	3
CO5	3	3	3	3	3	2	2	3	3	2	3	2
Total	14	15	13	13	14	13	15	14	10	13	10	14
Average	2.8	3	2.6	2.6	2.8	2.6	3	2.8	2	2.6	2	2.8

S-Strong (3)

M-Medium (2)

L-Low(1)

**SEMESTER I**  
**ELECTIVE COURSE II: c) CRITICAL THINKING, DESIGN THINKING AND**  
**PROBLEM SOLVING**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP231EC6	5	-	-	-	3	5	75	25	75	100

**Pre-requisite:**

Basics of Logical & Reasoning Skills

**Learning Objectives:**

1. Learn critical thinking and its related concepts
2. Learn design thinking and its related concepts
3. Develop Thinking patterns, Problem solving & Reasoning.

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	understand the concepts of Critical thinking and its related technology	<b>K1, K2</b>
2	focus on the explicit development of critical thinking and problem solving skills	<b>K2, K3</b>
3	apply design thinking in problems	<b>K3, K4</b>
4	make a decision and take actions based on analysis	<b>K4, K5</b>
5	analyze the concepts of Thinking patterns, Problem solving & Reasoning in real time applications	<b>K5, K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Units	Contents	No. of Hours
<b>I</b>	<b>Critical Thinking:</b> Definition, Conclusions and Decisions, Beliefs and Claims, Evidence –finding, evaluation, Inferences, Facts – opinion, probable truth, probably false, Venn diagram. Applied critical thinking: Inference, Explanation, Evidence, Credibility, Two Case Studies, critical thinking and science, critical evaluation, self assessment.	<b>15</b>
<b>II</b>	<b>Design Thinking:</b> Introduction, Need of Design Thinking, problem to question - design thinking process, Traditional Problem Solving versus Design Thinking, phases of Design Thinking, problem exploration, Stake holder assessment, design thinking for manufacturers, smart Idea to implementation.	<b>15</b>
<b>III</b>	<b>CASE STUDY:</b> Thinking to confidence, fear management, duty Vs passion, Team management, Tools for Thinking, prototype design, Relevance of Design and Design Thinking in engineering, human centered design, case study: apply design thinking in problem.	<b>15</b>
<b>IV</b>	<b>Problem solving:</b> problem definition, problem solving methods, selecting and using information, data processing, solution methods, solving problems by searching, recognizing patterns, spatial reasoning necessity and sufficiency, closing and using models, making choice and decisions	<b>15</b>

<b>V</b>	<b>Reasoning:</b> Deductive and hypothetical reasoning, computational problem solving; generating, implementing, and evaluating solutions, interpersonal problem solving. Advanced problem solving: Combining skills – using imagination, developing models, Carrying out investigations, Data analysis and inference. Graphical methods of solution, Probability, tree diagrams and decision trees	<b>15</b>
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**Text books**

1. John Butterworth and Geoff Thwaites, 2013, *Thinking skills: Critical Thinking and Problem Solving*, Cambridge University Press.
2. H.S.Fogler and S.E.LeBlanc, 2008, *Strategies for Creative Problem Solving*, 2nd edition, Pearson, Upper Saddle River, NJ.

**Reference Books**

- 1 A. Whimbey and J. Lochhead, Lawrence Erlbaum, Mahwah, N. 1999, *Problem Solving & Comprehension*, 6th edition, Lawrence Erlbaum, Mahwah, N..
- 2 M. Levine, 1994, *Effective Problem Solving*, 2nd edition, Prentice Hall, Upper Saddle River, NJ.
- 3 Michael Baker, 2015, *The Basic of Critical Thinking*, The Critical Thinking Co press.
- 4 David Kelley and Tom Kelley, 2013, *Creative Confidence*.

**Web Resources**

1. [https://www.tutorialspoint.com/critical\\_thinking/index.htm](https://www.tutorialspoint.com/critical_thinking/index.htm)
2. [https://www.tutorialspoint.com/design\\_thinking/design\\_thinking\\_quick\\_guide.htm](https://www.tutorialspoint.com/design_thinking/design_thinking_quick_guide.htm)
3. <https://nptel.ac.in/courses/109/104/109104109/>

**MAPPING WITH PROGRAMME OUTCOMES  
AND PROGRAMME SPECIFIC OUTCOMES**

COs	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	2	3	3	3	3	3	3	3	3	3
<b>CO2</b>	3	3	2	3	3	3	3	3	2	3	2	3
<b>CO3</b>	2	3	3	3	3	3	3	2	2	3	2	3
<b>CO4</b>	3	3	3	2	2	2	3	3	2	2	2	3
<b>CO5</b>	3	3	3	3	3	2	2	3	3	2	3	2
<b>Total</b>	14	15	13	13	14	13	15	14	10	13	10	14
<b>Average</b>	2.8	3	2.6	2.6	2.8	2.6	3	2.8	2	2.6	2	2.8

**S-Strong (3)**

**M-Medium (2)**

**L-Low(1)**

**SEMESTER I**  
**ELECTIVE LAB COURSE I: PYTHON PROGRAMMING LAB**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP231EP1	-		3	-	2	3	45	25	75	100

**Prerequisite:**

Basics of any OO Programming Language.

**Learning Objectives:**

1. Presents an overview of elementary data items, lists, dictionaries, sets and tuples
2. To understand and write simple Python programs.

**Course Outcomes**

On the successful completion of the course, student will be able to:		
<b>1</b>	write programs in Python using OOPS concepts	<b>K1, K2</b>
<b>2</b>	to understand the concepts of File operations and Modules in Python	<b>K3, K4</b>
<b>3</b>	implementation of lists, dictionaries, sets and tuples as programs	<b>K4, K5</b>
<b>4</b>	to develop web applications using Python	<b>K5, K6</b>
<b>5</b>	develop the programs using polymorphism	<b>K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

<b>Contents</b>	
	<ol style="list-style-type: none"> <li>1) Programs using elementary data items, lists, dictionaries and tuples</li> <li>2) Programs using conditional branches,</li> <li>3) Programs using loops.</li> <li>4) Programs using functions</li> <li>5) Programs using exception handling</li> <li>6) Programs using inheritance</li> <li>7) Programs using polymorphism</li> <li>8) Programs to implement file operations.</li> <li>9) Programs using modules.</li> <li>10) Programs for creating dynamic and interactive web pages using forms.</li> </ol>

**Text Books**

1. Bill Lubanovic. 2014. *Introducing Python* (First Edition). O'Reilly, Second Release, 2014
2. Mark Lutz, 2013. *Learning Python* (Fifth Edition). O'Reilly

**Reference Books**

1. David M. Beazley. 2009. *Python Essential Reference* (Fourth Edition) Developer's Library
2. Sheetal Taneja, Naveen Kumar, *Python Programming –A Modular Approach*. Pearson Publications.

**Web Resources**

1. <https://www.programiz.com/python-programming/>
2. <https://www.tutorialspoint.com/python/index.htm>
3. [https://onlinecourses.swayam2.ac.in/aic20\\_sp33/preview](https://onlinecourses.swayam2.ac.in/aic20_sp33/preview)

**MAPPING WITH PROGRAMME OUTCOMES  
AND PROGRAMME SPECIFIC OUTCOMES**

<b>COs</b>	<b>PO 1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PSO1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	3	3	2	3	2	3	3	2	2	2	3	2
<b>CO2</b>	3	3	2	2	3	3	3	3	2	3	2	3
<b>CO3</b>	2	2	3	3	3	3	3	2	3	3	3	3
<b>CO4</b>	3	3	3	3	3	2	3	2	3	3	3	1
<b>CO5</b>	3	3	2	3	2	2	2	3	1	2	3	2
<b>Total</b>	14	14	11	14	11	13	15	11	9	13	14	9
<b>Average</b>	2.8	2.8	2.3	2.8	2.2	2.6	3	2.3	2.1	4.3	2.8	7.5

**S-Strong (3)**

**M-Medium (2)**

**L-Low (1)**

**SEMESTER I**  
**SPECIFIC VALUE ADDED COURSE I: WEBSITE CREATION**

Course Code	Credits	Total Hours	Total Marks
SP231V01	1	30	100

**Pre-requisite:**

1. Basic knowledge in HTML tags & skill of creating web pages should be known
2. Knowledge of basic Computer hardware & software is also necessary.

**Learning Objectives:**

1. Define the principle of Web page design.
2. Visualize the basic concept of HTML.
3. Introduce basics concept of CSS.

**Course Outcomes**

<b>On the successful completion of the course, student will be able to:</b>		
1	develop the skill & knowledge of Web page design.	<b>K1,K3</b>
2	understand and can function either as an entrepreneur or can take up jobs in the multimedia	<b>K2,K4</b>
3	create a Web site development studio.	<b>K5,K6</b>
4	develop the concept of web publishing	<b>K5,K6</b>
5	create attractive web pages	<b>K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Units	Contents	No. of Hours
<b>I</b>	<b>Web Design Principles:</b> Basic principles involved in developing a web site - Planning process -Five Golden rules of web designing -Designing navigation bar - Page design - Home Page Layout -Design Concept.	<b>6</b>
<b>II</b>	<b>Basics in Web Design:</b> Brief History of Internet -What is World Wide Web -Why create a web site- Web Standards	<b>6</b>
<b>III</b>	<b>Introduction to HTML:</b> What is HTML - HTML Documents -Basic structure of an HTML document - Creating an HTML document-Mark up Tags -Heading- Paragraphs- Line Breaks -HTML Tags.	<b>6</b>
<b>IV</b>	<b>Elements of HTML:</b> Introduction to elements of HTML-Working with Text - Working with Lists, Tables and Frames - Working with Hyperlinks, Images and Multimedia -Working with Forms and controls.	<b>6</b>
<b>V</b>	<b>Introduction to Cascading Style Sheets:</b> Concept of CSS -Creating Style Sheet - CSS Properties -CSS Styling (Background, Text Format, Controlling Fonts) Working with block elements and objects -Working with Lists and Tables -CSS Id and Class-Box Model (Introduction, Border properties, Padding Properties, Margin properties)	<b>6</b>

**Text Books**

1. Kogent. *HTML 5 in simple steps* . published by Dreamtech Press, Learning Solutions Inc.
2. Murray, Tom/Lynchburg. 2002. *Creating a Web Page and Web Site*.

**Reference Books**

1. Steven M. Schafer. *HTML, XHTML, and CSS Bible* (Fifth Edition) published by Wiley India.
2. Ian Pouncey, Richard York. *Beginning CSS: Cascading Style Sheets for Web Design* published by Wiley India

### **Web Resources**

1. <https://egyankosh.ac.in/bitstream/123456789/72091/1/Unit-7.pdf>
2. <https://www.bdu.ac.in/cde/SLM/B.Com%20C.A%20III%20Year%20/Web%20Designing/WEB%20DESIGNING.pdf>
3. <https://dribbble.com/stories/2021/09/29/ethical-web-design-rules>



**SEMESTER II**  
**CORE COURSE III: DATA MINING AND WAREHOUSING**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232CC1	6	-	-	-	5	6	90	25	75	100

**Pre-requisite:**

Basics of RDBMS & Algorithms.

**Learning Objectives:**

1. To enable the students to learn the concepts of Mining tasks, classification, clustering and Data Warehousing.
2. To develop skills of using recent data mining software for solving practical problems.

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	understand the basic data mining techniques and algorithms	<b>K1,K2</b>
2	understand the Association rules, Clustering techniques and Data warehousing contents	<b>K2,K3</b>
3	compare and evaluate different data mining techniques like classification, prediction, Clustering and association rule mining	<b>K4,K5</b>
4	design data warehouse with dimensional modeling and apply OLAP operations	<b>K5,K6</b>
5	identify appropriate data mining algorithms to solve real world problems	<b>K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Units	Contents	No. of Hours
<b>I</b>	<b>BASICS AND TECHNIQUES:</b> Basic data mining tasks – data mining versus knowledge discovery in databases – data mining issues – data mining metrics – social implications of data mining – data mining from a database perspective. Data mining techniques: Introduction – a statistical perspective on data mining – similarity measures – decision trees – neural networks – genetic algorithms.	<b>18</b>
<b>II</b>	<b>ALGORITHMS:</b> Classification: Introduction –Statistical –based algorithms-Regression and Bayesian -distance–based algorithms-Hamming distance - Euclidean Distance- decision tree-based algorithms- Use of A Decision Tree-Decision Tree Induction- neural network–based algorithms -	<b>18</b>

	Neural Network Architecture-Neural Network Method in Data Mining – rule-based algorithms–Combining Techniques.	
<b>III</b>	<b>CLUSTERING AND ASSOCIATION:</b> Clustering: Introduction– Similarity and Distance Measures–Outliers–Hierarchical Algorithms - Partitional Algorithms. Association rules: Introduction - large item sets - basic algorithms – parallel & distributed algorithms – comparing approaches- incremental rules.Advanced Association rules and Techniques -Measuring the quality of Rules.	<b>18</b>
<b>IV</b>	<b>DATA WAREHOUSING AND MODELING</b> Data warehousing: Introduction-characteristics of a data warehouse–data marts– other aspects of data mart. Online analytical processing: introduction –OLTP & OLAP systems Data modeling –star schema for multidimensional view –data modeling – multifact star schema or snow flake schema – OLAP TOOLS – State of the market – OLAP TOOLS and the internet.	<b>18</b>
<b>V</b>	<b>APPLICATIONS OF DATA WAREHOUSE:</b> Developing a data Warehouse: why and how to build a data warehouse –data warehouse architectural strategies and organization issues - design consideration – data content – metadata distribution of data – tools for data warehousing – performance considerations – crucial decisions in designing a data warehouse. Applications of data warehousing and data mining in government: Introduction - national data warehouses – other areas for data warehousing and data mining	<b>18</b>

<b>Self Study</b>	<b>Decision Trees OLAP Tools</b>
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**Textbooks**

1. Margaret H.Dunham, (2003). *Data Mining: Introductory and Advanced Topics* . Pearson education.
2. C.S.R. Prabhu. *Data Warehousing Concepts, Techniques, Products and Applications*. PHI, (2<sup>nd</sup> edition).

**Reference Books**

1. Arun K. Pujari.(2003). *Data Mining Techniques*. Universities Press (India)Pvt. Ltd.
2. Alex Berson, Stephen J.Smith, (2001). *Data Warehousing, Data Mining and OLAP*, TMCH, Jiawei Han & MichelineKamber, Academic press.

3. Jiawei Han, Micheline Kamber ,2011 “*Data Mining: Concepts and Techniques*”
4. David L. Olson, Dursun Delen , 2008, “*Advanced Data Mining Techniques*”
5. Parteek Bhatia, 2019. “*Data Mining and Data Warehousing Principles and Practical Techniques*”

### Web Resources

1. <https://www.javatpoint.com/data-warehouse>
2. <https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/>
3. <https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26-151.html>
4. [https://www.google.co.in/books/edition/Data\\_Mining\\_and\\_Data\\_Warehousing/bF6NDwAAQBAJ?hl=en&gbpv=0](https://www.google.co.in/books/edition/Data_Mining_and_Data_Warehousing/bF6NDwAAQBAJ?hl=en&gbpv=0)
5. [https://www.google.co.in/books/edition/DATA\\_WAREHOUSING/rv-Xb6EgO6AC?hl=en&gbpv=1&dq=data+warehousing++techniques&printsec=frontcover](https://www.google.co.in/books/edition/DATA_WAREHOUSING/rv-Xb6EgO6AC?hl=en&gbpv=1&dq=data+warehousing++techniques&printsec=frontcover)

### MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	2	3	3	3	3	2	2	2	2
<b>CO2</b>	3	3	3	3	3	3	3	2	3	3
<b>CO3</b>	3	3	3	3	3	3	3	2	3	3
<b>CO4</b>	3	3	3	3	3	3	3	2	3	3
<b>CO5</b>	3	3	3	3	3	3	3	2	3	3
<b>Total</b>	15	14	15	15	15	15	14	10	14	14
<b>Average</b>	3	2.8	3	3	3	3	2.8	2	2.8	2.8

**3-Strong; 2-Medium; 1-Low**

**SEMESTER II**  
**CORE COURSE IV: ADVANCED JAVA PROGRAMMING**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232CC2	6	-	-	-	5	6	90	25	75	100

**Pre-requisite:**

Basics of Java and its usage.

**Learning Objectives:**

1. Enable the students to learn the basic functions, principles and concepts of advanced java programming.
2. Learn JDBC, Servlet packages, JQuery, Java Server Pages and JAR file format.

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	understand the advanced concepts of Java Programming	<b>K1,K2</b>
2	understand JDBC and RMI concepts	<b>K2,K3</b>
3	apply and analyze Java in Database	<b>K3,K4</b>
4	handle different event in java using the delegation event model, event listener and class	<b>K5</b>
5	design interactive applications using Java Servlet, JSP and JDBC	<b>K5,K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** – Create

Units	Contents	No. of Hours
<b>I</b>	<b>BASICS OF JAVA:</b> Java Basics Review: Components and event handling-Types of Exceptions–Threading – Concurrency-Synchronization–Networking features- java.net Package, Client and Server Programs, Content and Protocol Handlers-Network Class Overview-Java Security and the Network classes-Java Socket Programming-Media Techniques-Applet-Java Graphics-Basic Animation	<b>18</b>
<b>II</b>	<b>REMOTE METHOD INVOCATION:</b> Remote Method Invocation-Working of RMI- Distributed Application Architecture- Creating stubs and skeletons-Defining Remote objects- Remote Object Activation-Object Serialization-Java Spaces- Benefits and Limitations of Java Spaces	<b>18</b>

<b>III</b>	<b>DATABASE:</b> Java in Databases- java. sql package -JDBC Driver- JDBC principles–JDBC API-database access-Interacting-database search–Meta Data Interfaces-Stored Procedures-Extending JDBC-Creating multimedia databases – Database support in web applications- Components of Web Based Database Applications	<b>18</b>
<b>IV</b>	<b>SERVLETS:</b> Java Servlets: Java Servlet and CGI programming- A simple java Servlet- Anatomy of a java Servlet - Reading data from a client-Reading http request header-sending data to a client and writing the http response header-working with cookies  Java Server Pages: JSP Overview- Installation- JSP tags-Components of a JSP page-Expressions- Script lets -Directives-Declarations-A complete example	<b>18</b>
<b>V</b>	<b>ADVANCED TECHNIQUES:</b> JAR file format creation– Internationalization–Locales-Resource Bundles-MVC Architecture-Swing Programming–Swing Components: Text Fields, Buttons, Toggle Buttons, Check Boxes and Radio Buttons-Advanced java Techniques	<b>18</b>
<b>Self Study</b>	<b>Java Spaces Internationalization</b>	

#### Textbooks

3. Jamie Jaworski, (1999). *Java Unleashed*. SAMS Techmedia Publications.
4. Campione, Walrath and Huml, (1999). *The Java Tutorial*, Addison Wesley.

#### Reference Books

3. Jim Keogh, (2010). *The Complete Reference J2EE*. Tata McGraw Hill Publishing Company Ltd.
4. David Sawyer McFarland, (2011). *JavaScript And JQuery- The Missing Manual*, O'Reilly Publications, (3<sup>rd</sup> edition).
5. Deitel and Deitel, *Java How to Program* .(3<sup>rd</sup> edition) ,PHI/Pearson Education Asia.
6. Dr. R. Nageswara Rao, 2008, "Core and Advanced Java (Black Book)"
7. George Reese, 2000, "Database Programming with JDBC & Java", Second Edition published by O'Reilly Media, Inc.

#### Web Resources

1. <https://www.javatpoint.com/servlet-tutorial>
2. <https://www.tutorialspoint.com/java/index.htm>
3. [https://onlinecourses.nptel.ac.in/noc19\\_cs84/preview](https://onlinecourses.nptel.ac.in/noc19_cs84/preview)
4. <https://www.javatpoint.com/multithreading-in-java>
5. <https://www.javatpoint.com/java-jdbc>

**MAPPING WITH PROGRAMME OUTCOMES  
AND PROGRAMME SPECIFIC OUTCOMES**

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3	3	2	2	2	3
<b>CO2</b>	3	3	3	3	3	3	3	2	3	3
<b>CO3</b>	3	3	3	3	3	3	3	2	3	3
<b>CO4</b>	3	3	3	3	3	3	3	2	3	3
<b>CO5</b>	3	3	3	3	3	3	3	2	3	3
<b>Total</b>	15	15	15	15	15	15	14	10	14	15
<b>Average</b>	3	3	3	3	3	3	2.8	2	2.8	3

**3 – Strong, 2- Medium, 1- Low**

**SEMESTER II**  
**CORE LAB COURSE II: ADVANCED JAVA PROGRAMMING LAB**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232CP1	-	-	6	-	4	6	90	25	75	100

**Pre- requisite:**

Basics in Java Programming.

**Learning Objectives:**

1. To enable the students to implement the simple programs using JSP,JAR
2. To provide knowledge on using Servlets, Applets.

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	understand the implement concepts of Java using HTML forms, JSP&JAR	<b>K1,K2</b>
2	must be capable of implementing JDBC and RMI concepts	<b>K3,K4</b>
3	able to write Applets with Event handling mechanism	<b>K4,K5</b>
4	create interactive web based applications using servlets and jsp	<b>K5,K6</b>
5	able to do Socket programming	<b>K2, K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Units	List of Exercises	No. of Hours
	<p><b>Implement the following problems</b></p> <ol style="list-style-type: none"> <li>1. Display a welcome message using Servlet.</li> <li>2. Design a Purchase Order form using Html form and Servlet.</li> <li>3. Develop a program for calculating the percentage of marks of a student using JSP.</li> <li>4. Design a Purchase Order form using Html form and JSP.</li> <li>5. Prepare a Employee payslip using JSP.</li> <li>6. Write a program using JDBC for creating a table, Inserting, Deleting records and list out the records.</li> <li>7. Write a program using Java servlet to handle form data.</li> <li>8. Write a simple Servlet program to create a table of all the headers it receives along with their associated values.</li> <li>9. Write a program in JSP by using session object.</li> <li>10. Write a program to build a simple Client Server application using RMI.</li> <li>11. Create an applet for a calculator application.</li> <li>12. Program to send a text message to another system and receive the text message from the system (use socket programming).</li> </ol>	<b>90</b>

**Textbooks**

1. Jamie Jaworski, (1999). *Java Unleashed*. SAMS Techmedia Publications.

2. Campione, Walrath and Huml, (1999). *The Java Tutorial*. Addison Wesley.

#### Reference Books

1. Jim Keogh, (2010). *The Complete Reference J2EE*, Tata McGraw Hill Publishing Company Ltd.
2. David Sawyer McFarland, (2011). *JavaScript And JQuery-The Missing Manual*. O'Reilly Publications, (3<sup>rd</sup> edition).

#### Web Resources

1. <https://www.javatpoint.com/servlet-tutorial>
2. <https://www.tutorialspoint.com/java/index.htm>
3. [https://onlinecourses.nptel.ac.in/noc19\\_cs84/preview](https://onlinecourses.nptel.ac.in/noc19_cs84/preview)

### MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3	3	3	2	2	3
<b>CO2</b>	3	3	3	3	3	3	3	2	3	3
<b>CO3</b>	3	3	3	3	3	3	3	2	3	3
<b>CO4</b>	3	3	3	3	3	3	3	2	3	3
<b>CO5</b>	3	3	3	3	3	3	3	2	3	3
<b>Total</b>	15	15	15	15	15	15	15	11	14	15
<b>Average</b>	3	3	3	3	3	3	3	2.2	2.8	3

**3 – Strong, 2- Medium, 1- Low**



**SEMESTER II**  
**ELECTIVE COURSE III: a) ADVANCED OPERATING SYSTEMS**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232EC1	4	-	-	-	3	4	60	25	75	100

**Pre-requisite:**

Basics of OS & its functioning.

**Learning Objectives:**

1. Enable the students to learn the different types of operating systems and their functioning.
2. Gain knowledge on Distributed Operating Systems

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	understand the design issues associated with operating systems	<b>K1,K2</b>
2	master various process management concepts including scheduling, deadlocks and distributed file systems	<b>K3,K4</b>
3	prepare Real Time Task Scheduling	<b>K4,K5</b>
4	analyze Operating Systems for Handheld Systems	<b>K5</b>
5	analyze Operating Systems like LINUX and iOS	<b>K5,K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Units	Contents	No. of Hours
<b>I</b>	<b>BASICS OF OPERATING SYSTEMS:</b> Basics of Operating Systems: What is an Operating System? – Main frame Systems –Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems –Real-Time Systems – Handheld Systems –Process: Process Scheduling – Algorithms - Cooperating Processes – Inter Process Communication: Shared Memory-Message Passing System.	<b>12</b>
<b>II</b>	<b>DISTRIBUTED OPERATING SYSTEMS:</b> Distributed Operating Systems: Issues – Communication Primitives - Deadlock – Resource-Necessary conditions for a deadlock – Resource Allocation graph - Deadlock handling strategies - deadlock detection- Deadlock Avoidance - Deadlock Recovery - distributed file systems –design issues – Case studies – The Sun Network File System.	<b>12</b>
<b>III</b>	<b>REAL TIME OPERATING SYSTEM (RTOS):</b> Real time Operating Systems: Introduction – Types of Real time OS- Hard Real time - Firm Real Time- Soft Real Time Systems - Difference between Hard and Real - Advantages Disadvantages of RTOS - Applications of Real Time Systems	<b>12</b>

	– Basic Model of Real Time System – Characteristics – Safety and Reliability - Real Time Task Scheduling	
<b>IV</b>	<b>HANDHELD SYSTEMS:</b> Features of Handheld Operating System-Types of Handheld Operating Systems- Operating Systems for Handheld Systems: Requirements–Technology Overview–Handheld Operating Systems –Palm OS - Symbian Operating System-Android OS – Architecture of android - Applications of Android OS – Securing handheld systems -Advantages - Disadvantages	<b>12</b>
<b>V</b>	<b>CASE STUDIES:</b> Case Studies : Linux System: Introduction – Memory Management –Contiguous memory management -paging-Segmentation-Disk Scheduling- Algorithms- First Come First Serve - Shortest Seek Time First - SCAN- CSCAN Scheduling - Managing I/O devices – Accessing Files- iOS: Architecture and SDK Framework - Media Layer - Services Layer - Core OS Layer - File System.	<b>12</b>

<b>Self Study</b>	<b>Distributed File Systems Core OS Layer</b>
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### Textbooks

1. Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, (2004). *Operating System Concepts*, (7<sup>th</sup> edition), John Wiley & Sons.
2. Mukesh Singhal and Niranjan G. Shivaratri, (2001). *Advanced Concepts in Operating Systems –Distributed, Database, and Multiprocessor Operating Systems*. Tata McGraw-Hill.

### Reference Books

1. RajibMall, (2006). *Real-Time Systems: Theory and Practice*, Pearson Education India.
2. Pramod Chandra P. Bhatt, (2010). *An introduction to operating systems, concept and practice*, PHI, (3<sup>rd</sup> edition).
3. Daniel.P.Bovet & Marco Cesati, (2005). *Understanding the Linux kernel*. ,(3<sup>rd</sup>edition),O'Reilly.
4. NeilSmyth, (2011). *iPhone iOS 4 Development Essentials–Xcode*. (4<sup>th</sup> edition),Payload media.
5. Abraham Silberschatz .6th edition, “operating system concepts”

### Web Resources

1. [https://onlinecourses.nptel.ac.in/noc20\\_cs04/preview](https://onlinecourses.nptel.ac.in/noc20_cs04/preview)
2. <https://www.udacity.com/course/advanced-operating-systems--ud189>
3. <https://minnie.tuhs.org/CompArch/Resources/os-notes.pdf>
4. <https://os.ecci.ucr.ac.cr/slides/Abraham-Silberschatz-Operating-System-Concepts-10th-2018.pdf>
5. <https://www.amazon.in/Operating-System-Concepts-Abraham-Silberschatz/dp/1118129385>

**MAPPING WITH PROGRAMME OUTCOMES  
AND PROGRAMME SPECIFIC OUTCOMES**

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	2	3	3	3	3	2	2	2	2
<b>CO2</b>	3	3	3	3	3	3	3	2	3	3
<b>CO3</b>	3	3	3	3	3	3	3	2	3	3
<b>CO4</b>	3	3	3	3	3	3	3	2	3	3
<b>CO5</b>	3	3	3	3	3	3	3	2	3	3
<b>Total</b>	15	14	15	15	15	15	14	11	14	14
<b>Average</b>	3	2.8	3	3	3	3	2.8	2.2	2.8	2.8

**3-Strong; 2-Medium; 1-Low**

**SEMESTER II**  
**ELECTIVE COURSE III: b) MOBILE COMPUTING**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232EC2	4	-	-	-	3	4	60	25	75	100

**Pre-requisite:**

Basics of Mobile Communication

**Learning Objectives:**

1. Present the overview of Mobile computing, Applications and Architectures.
2. Enable to understand the futuristic computing challenges.

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	understand the need and requirements of mobile communication	<b>K1,K2</b>
2	focus on mobile computing applications and techniques	<b>K2,K3</b>
3	demonstrate satellite communication in mobile computing	<b>K4</b>
4	analyze about wireless local loop architecture	<b>K5,K6</b>
5	analyze various mobile communication technologies	<b>K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Units	Contents	No. of Hours
<b>I</b>	<b>INTRODUCTION:</b> Introduction: Advantages of Digital Information - Introduction to Telephone Systems –Mobile communication: Need for Mobile Communication –Requirements of Mobile Communication – History of Mobile Communication- Properties of Wireless medium.	<b>12</b>
<b>II</b>	<b>MOBILE COMMUNICATION:</b> Introduction to Cellular Mobile Communication – Mobile Communication Standards –Mobility Management –Hand off- Radio link transfer-Roaming Management-Frequency Management – Cordless Mobile Communication Systems-Cordless-Multichannel-Wireless Communications.	<b>12</b>
<b>III</b>	<b>MOBILE COMPUTING:</b> Mobile Computing: History of data networks – Classification of Mobile data networks - CDPD System – Satellites in Mobile Communication: Satellite classification – Global Satellite Communication – Changeover from one satellite to other – Global Mobile Communication – Interferences in Cellular Mobile Communication.	<b>12</b>
<b>IV</b>	<b>MOBILE COMMUNICATION SYSTEM:</b> Important Parameters of Mobile Communication System – Mobile Internet: Working of Mobile IP – Wireless Network Security – Wireless Local Loop Architecture: Components in WLL – Problems in WLL – Modern Wireless Local Loop – Local Multipoint Distribution Service – Wireless Application Protocol.	<b>12</b>

<b>V</b>	<b>COMMUNICATION TECHNOLOGY:</b> WCDMA Technology and Fiber Optic Microcellular Mobile Communication – Ad hoc Network and Bluetooth technology – Intelligent Mobile Communication system-Power Delivery-Processing Gain – Fourth Generation Mobile Communication systems.	<b>12</b>
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<b>Self Study</b>	<b>Satellites in Mobile Communication Bluetooth Technology</b>
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**Textbooks**

1. T.G.Palanivelu,R.Nakkeeran, (2009). “Wireless and Mobile Communication”,PHI Limited.
2. Jochen Schiller, (2007). Mobile Communications.,(2<sup>nd</sup> edition),Pearson Education.

**Reference Books**

1. Asoke K Talukder, Hasan Ahmed,RoopaYavagal,( 2010). *Mobile Computing*. TMH.

**Web Resources**

1. [https://www.tutorialspoint.com/mobile\\_computing/index.htm](https://www.tutorialspoint.com/mobile_computing/index.htm)
2. <https://www.javatpoint.com/mobile-computing>
3. <https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs13/>

**MAPPING WITH PROGRAMME OUTCOMES  
AND PROGRAMME SPECIFIC OUTCOMES**

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3	3	3	2	2	3
<b>CO2</b>	3	3	3	3	3	3	3	2	3	3
<b>CO3</b>	3	3	3	3	3	3	3	2	3	3
<b>CO4</b>	3	3	3	3	3	3	3	2	3	3
<b>CO5</b>	3	3	3	3	3	3	3	2	3	3
<b>Total</b>	15	15	15	15	15	15	15	10	14	15
<b>Average</b>	3	3	3	3	3	3	3	2	2.8	3

**3 – Strong, 2- Medium, 1- Low**

**SEMESTER II**  
**ELECTIVE COURSE III: c)BLOCKCHAIN TECHNOLOGY**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232EC3	4	-	-	-	3	4	60	25	75	100

**Pre-requisite:**

Basics of BlockChain & Crypto Currency

**Learning Objectives:**

1. Understand the fundamentals of blockchain and cryptocurrency.
2. Identify problems & challenges posed by Block Chain

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	demonstrate blockchain technology and crypto currency	<b>K1,K2</b>
2	understand the mining mechanism in blockchain	<b>K2</b>
3	apply and identify security measures, and various types of services that allow people to trade and transact with bitcoins	<b>K3,K4</b>
4	apply and analyze Blockchain in health care industry	<b>K4,K5</b>
5	analyze security, privacy, and efficiency of a given Blockchain system	<b>K5,K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Units	Contents	No. of Hours
<b>I</b>	<b>INTRODUCTION:</b> Introduction to Blockchain - The big picture of the industry – size, growth, structure, players. Bitcoin versus Cryptocurrencies versus Blockchain - Distributed Ledger Technology (DLT). Strategic analysis of the space – Blockchain platforms, regulators, application providers. The major application: currency, identity, chain of custody.	<b>12</b>
<b>II</b>	<b>NETWORK AND SECURITY:</b> Advantage over conventional distributed database, Blockchain Network- Certificate Authorities-Adding Network Administrators- Consortium-Mining Mechanism-Distributed Consensus-Blockchain 1.0, 2.0 and 3.0 – transition, advancements and features. Privacy-Security issues in Blockchain.	<b>12</b>
<b>III</b>	<b>CRYPTOCURRENCY:</b> Cryptocurrency - History, Distributed Ledger, Bitcoin protocols -Symmetric-key cryptography - Public-key cryptography - Digital Signatures -High and Low trust societies - Types of Trust model: Peer-to-Peer, Leviathan, and Intermediary. Application of Cryptography to Blockchain	<b>12</b>
<b>IV</b>	<b>CRYPTO CURRENCY REGULATION:</b> Cryptocurrency Regulation-Stakeholders, Roots of Bitcoin, Legal views- exchange of cryptocurrency- Foreign Exchange Market-Medium of exchange-Black Market-Global Economy. Crypto economics–assets, supply and demand-inflation and deflation – Regulation	<b>12</b>

<b>V</b>	<b>CHALLENGES IN BLOCKCHAIN:</b> Opportunities and challenges in Block Chain – Application of block chain: Industry 4.0 – machine to machine communication – Data management in industry 4.0 – future prospects. Block chain in Health 4.0 - Blockchain properties - Healthcare Costs - Healthcare Quality - Healthcare Value - Challenges for using blockchain for healthcare data	<b>12</b>
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<b>Self Study</b>	Types of Trust model Blockchain properties
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**Textbooks**

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, (July 19, 2016). “*Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction*”, Princeton University Press
2. Antonopoulos, “*Mastering Bitcoin: Unlocking Digital Cryptocurrencies*”.

**Reference Books**

1. Satoshi Nakamoto, “*Bitcoin: A Peer-to-Peer Electronic Cash System*”
2. Rodrigoda Rosa Righi, Antonio Marcos Alberti, Madhusudan Singh, 2020, “*Blockchain Technology for Industry 4.0*” Springer ..

**Web Resources**

1. <https://www.javatpoint.com/blockchain-tutorial>
2. <https://www.tutorialspoint.com/blockchain/index.htm>
3. <https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs01/>

**MAPPING WITH PROGRAMME OUTCOMES  
AND PROGRAMME SPECIFIC OUTCOMES**

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3	3	3	2	2	3
<b>CO2</b>	3	3	3	3	3	3	3	2	3	3
<b>CO3</b>	3	3	3	3	3	3	3	2	3	3
<b>CO4</b>	3	3	3	3	3	3	3	2	3	3
<b>CO5</b>	3	3	3	3	3	3	3	2	3	3
<b>Total</b>	15	15	15	15	15	15	15	10	14	15
<b>Average</b>	3	3	3	3	3	3	3	2	2.8	3

**3 – Strong, 2- Medium, 1- Low**

**SEMESTER II**  
**ELECTIVE COURSE IV: a) ARTIFICIAL INTELLIGENCE AND**  
**MACHINE LEARNING**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232EC4	4	-	-	-	3	4	60	25	75	100

**Pre-requisite:**

Basics of AI & an Introduction about ML

**Learning Objectives:**

1. Enable the students to learn the basic functions of AI, Heuristic Search Techniques.
2. Provide knowledge on concepts of Representations and Mappings and Predicate Logic.

**Course Outcomes**

<b>On the successful completion of the course, student will be able to:</b>		
1	demonstrate AI problems and techniques	<b>K1,K2</b>
2	understand machine learning concepts	<b>K2,K3</b>
3	apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	<b>K3,K4</b>
4	analyze the impact of machine learning on applications	<b>K4,K5</b>
5	analyze and design a real world problem for implementation and understand the dynamic behavior of a system	<b>K5,K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Units	Contents	No. of Hours
<b>I</b>	<b>INTRODUCTION:</b> Introduction: History of AI - AI Problems - AI techniques - Criteria for success. Problems, Problem Spaces, Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search - Building AI Systems – Intelligent Agents.	<b>12</b>
<b>II</b>	<b>SEARCH TECHNIQUES:</b> Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First, Problem Reduction, Constraint Satisfaction, Means-end analysis. Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.	<b>12</b>
<b>III</b>	<b>PREDICATE LOGIC:</b> Using Predicate logic: Representing simple facts in logic - Representing Instance and Is a relationships - Computable functions and predicates - Resolution - Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge- Logic programming Forward Vs Backward reasoning -Matching-Control knowledge.	<b>12</b>
<b>IV</b>	<b>MACHINE LEARNING:</b> Understanding Machine Learning: What Is Machine Learning?-Defining Big Data- Big Data in Context with Machine Learning-The Importance of the Hybrid Cloud-Leveraging the Power of Machine Learning-The Roles of Statistics and Data Mining with Machine	<b>12</b>



	Learning-Putting Machine Learning in Context-Approaches to Machine Learning.	
V	<b>APPLICATIONS OF MACHINE LEARNING:</b> Applying Machine Learning: Getting Started with a Strategy – Understanding Machine Learning Techniques – Tying Machine Learning Methods to Outcomes – Applying Machine Learning to Business Needs. Looking Inside Machine Learning: The Impact of Machine Learning on Applications-Data Preparation-The Machine Learning Cycle.	12

<b>Self Study</b>	<b>Logic Programming The Machine Learning Cycle</b>
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**Textbooks**

1. Elaine Richard Kevin Knight, (1991). *Artificial Intelligence*. Tata McGraw Hill Publishers company Pvt Ltd, (2<sup>nd</sup> edition).
2. George FLuger, 2002, "*Artificial Intelligence*", 4th Edition, Pearson Education Publ,

**Reference Books**

1. Judith Hurwitz, Daniel Kirsch. *Machine , "Learning For Dummies®"*, IBM Limited Edition
2. Dr. Dheeraj Mehrotra, "*Basics of Artificial Intelligence And Machine Learning*" Notion Press
3. Mariya Yao, Adelyn Zhou, 2018. Marlene Jia, "*Applied Artificial Intelligence: A Handbook for Business Leaders*"
4. Peter Norvig and Stuart J. Russell, "*Artificial Intelligence: A Modern Approach*", Third Edition.
5. Glaé Bassens, Grant Beyleveld, and Jon Krohn, 2019. "*Deep Learning Illustrated is a visual, interactive introduction to artificial intelligence*" published by Pearson's Addison-Wesley.

**Web Resources**

1. <https://www.ibm.com/downloads/cas/GB8ZMQZ3>
2. <https://www.javatpoint.com/artificial-intelligence-tutorial>
3. <https://nptel.ac.in/courses/106/105/106105077/>
4. [https://books.google.co.in/books/about/Applied\\_Artificial\\_Intelligence.html?id=qZ5vuAECAAJ&source=kp\\_cover&redir\\_esc=y](https://books.google.co.in/books/about/Applied_Artificial_Intelligence.html?id=qZ5vuAECAAJ&source=kp_cover&redir_esc=y)
5. [https://people.engr.tamu.edu/guni/csce421/files/AI\\_Russell\\_Norvig.pdf](https://people.engr.tamu.edu/guni/csce421/files/AI_Russell_Norvig.pdf)

**MAPPING WITH PROGRAMME OUTCOMES  
AND PROGRAMME SPECIFIC OUTCOMES**

Cos	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3	3	3	2	2	3
<b>CO2</b>	3	3	3	3	3	3	3	2	3	3
<b>CO3</b>	3	3	3	3	3	3	3	2	3	3
<b>CO4</b>	3	3	3	3	3	3	3	2	3	3
<b>CO5</b>	3	3	3	3	3	3	3	2	3	3
<b>Total</b>	15	15	15	15	15	15	15	10	14	15
<b>Average</b>	3	3	3	3	3	3	3	2	2.8	3

3 – Strong, 2- Medium, 1- Low

**SEMESTER II**  
**Elective Course IV: b) WEB SERVICES**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232EC5	4	-	-	-	3	4	60	25	75	100

**Pre-requisite:**

Basics of Distributed Computing

**Learning Objectives:**

1. Present the Web Services , Building real world Enterprise applications using Web Services with Technologies XML, SOAP , WSDL , UDDI
2. Get overview of Distributed Computing,XML,and its technologies

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	understand web services and its related technologies	<b>K1,K2</b>
2	understand XML concepts	<b>K2,K3</b>
3	analyze on SOAP and UDDI model	<b>K4,K5</b>
4	demonstrate the road map for the standards and future of web services	<b>K5</b>
5	analyze QoS enabled applications in web services	<b>K5,K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Units	Contents	No. of Hours
<b>I</b>	<b>INTRODUCTION:</b> Introduction to web services – Overview of Distributed Computing- Evolution and importance of web services-Industry standards, Technologies and concepts underlying web services-Web services and enterprises-web services standards organization-web services platforms.	<b>12</b>
<b>II</b>	<b>XML FUNDAMENTALS:</b> XML Fundamentals – XML documents: XML Syntax, XML Elements, XML Attributes, XML Namespaces – XML DOM - Validation of XML Documents - XML DTD - XML Schema – XML Server - Processing XML – XML XSLT – XML XQuery – XML XLink.	<b>12</b>
<b>III</b>	<b>SOAP MODEL:</b> SOAP: The SOAP model- SOAP messages-SOAP encoding- WSDL: WSDL structure- interface definitions-bindings-services- Using SOAP and WSDL- UDDI: About UDDI- UDDI registry Specification- Core data structures-Accessing UDDI	<b>12</b>
<b>IV</b>	<b>TECHNOLOGIES AND STANDARDS:</b> Advanced web services technologies and standards: Conversations overview-web services conversation language- WSCL interface components. Workflow: business process management- workflows and workflow management systems Security: Basics-data handling and forwarding- data storage-errors-Web services security issues.	<b>12</b>

<b>V</b>	<b>QUALITYOFSERVICE:</b> Quality of Service: Importance of QoS for web services- QoS metrics-holes-design patterns- QoS enabled web services- QoS enabled applications. Web services management-web services standards and future trends..	<b>12</b>
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<b>Self Study</b>	<b>Logic Programming The Machine Learning Cycle</b>
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**Textbooks**

1. Sandeep Chatterjee, James Webber, “*Developing Enterprise Web Services: An Architects Guide*”, Prentice Hall, Nov 2003.
2. Keith Ballinger, “*NET Web services: Architecture and Implementation with .Net*”, Pearson Education, First Edition, Feb 2003

**Reference Books**

1. Ramesh Nagappan, Feb 2003, “*Developing Java Web Services: Architecting and developing secure Web Services Using Java*”, John Wiley and Sons, first Edition .
2. Eric A Marks and Mark J Werrell, March 2003, “*Executive Guide to Web services*”, John Wileyand sons.
3. Anne Thomas Manes, “*Web Services: A managers Guide*”, Addison Wesley, June 2003.

**Web Resources**

1. <https://www.tutorialspoint.com/webservices/index.htm>
2. <https://www.javatpoint.com/web-services-tutorial>
3. <https://www.btechguru.com/training--programming--xml--web-services--web-services-part-1-video-lecture--11801--24--147.html>

**MAPPING WITH PROGRAMME OUTCOMES  
AND PROGRAMME SPECIFIC OUTCOMES**

Cos	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3	3	3	2	2	3
<b>CO2</b>	3	3	3	3	3	3	3	2	3	3
<b>CO3</b>	3	3	3	3	3	3	3	2	3	3
<b>CO4</b>	3	3	3	3	3	3	3	2	3	3
<b>CO5</b>	3	3	3	3	3	3	3	2	3	3
<b>Total</b>	15	15	15	15	15	15	15	10	14	15
<b>Average</b>	3	3	3	3	3	3	3	2	2.8	3

**3 – Strong, 2- Medium, 1- Low**

## SEMESTER II

### ELECTIVE COURSE IV: c) ROBOTIC PROCESS AUTOMATION FOR BUSINESS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232EC6	4	-	-	-	3	4	60	25	75	100

**Pre-requisite:**

Basics of Robots & its Applications

**Learning Objectives:**

1. Learn the concepts of RPA ,its benefits ,types and models.
2. Gain the knowledge in application of RPA in Business Scenarios.

#### Course Outcomes

On the successful completion of the course, student will be able to:		
1	demonstrate the benefits and ethics of RPA	K1,K2
2	understand the Automation cycle and its techniques	K2
3	draw inferences and information processing of RPA	K3,K4
4	implement& Apply RPA in Business Scenarios	K5
5	analyze on Robots& leveraging automation	K5,K6

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6**– Create

Units	Contents	No. of Hours
<b>I</b>	<b>INTRODUCTION:</b> Introduction to RPA -Overview of RPA -Benefits of RPA in a business environment -Industries & domains fit for RPA - Identification of process for automation - Types of Robots - Ethics of RPA & Best Practices - Automation and RPA Concepts - Different business models for implementing RPA -Centre of Excellence –Types and their applications -Building an RPA team -Approach for implementing RPA initiatives.	<b>12</b>
<b>II</b>	<b>AUTOMATION:</b> RoleofaBusinessManagerinAutomationinitiatives-SkillsrequiredbyaBusinessManagerfor successful automation - The importance of a Business Manager in automation - Analyzing different business processes - Process Mapping frameworks - Role of a Business Manager in successful implementation – Part 1 - Understanding the Automation cycle – First 3 automation stages and activities performed by different people.	<b>12</b>
<b>III</b>	<b>AUTOMATIONIMPLEMENTATION:</b> Evaluating the Automation Implementation Detailed description of last 3 stages and activities performed by different people - Role of a Business Manager in successful completion – Part 2 - Activities to be performed post-implementation - Guidelines for tracking the implementation success - Metrics/Parameters to be considered for gauging success - Choosing the right licensing option - Sending emails - Publishing and Running Workflows.	<b>12</b>
<b>IV</b>	<b>ROBOT:</b> Ability to process information through scopes/systems - Understand the skill of information processing and its use in business -	<b>12</b>

	Leveraging automation - Creating a Robot - New Processes. Establish causality by variable behavior - Understand the skill of drawing inference or establishing causality by tracking the behavior of a variable as it varies across time/referenced variable - Leveraging automation for this skill - Robot & new process creation.	
V	<b>ROBOTSKILL:</b> Inference from snapshots of curated terms – Omni-source data curation - Multisource trend tracking - Understand the skill of drawing inference from the behavior of curated terms by taking snapshots across systems in reference to time/variable(s) - Leveraging automation for this skill – Robot creation and new process creation for this skill.	12

<b>Self Study</b>	Publishing and Running Workflows Multi source trend tracking
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### Textbooks

1. Alok Mani Tripathi, 2018.” *Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool*” Packet Publishing Limited March
2. TomTaulli February 2020,“*The Robotic Process Automation Handbook*” A press,

### Reference Books

1. Steve Kaelble 2018, ”*Robotic Process Automation*” John Wiley & Sons, Ltd.,

### Web Resources

1. [https://www.tutorialspoint.com/uiopath/uiopath\\_robotic\\_process\\_automation\\_introduction.htm](https://www.tutorialspoint.com/uiopath/uiopath_robotic_process_automation_introduction.htm)
2. <https://www.javatpoint.com/rpa>
3. [https://onlinecourses.nptel.ac.in/noc19\\_me74/preview](https://onlinecourses.nptel.ac.in/noc19_me74/preview)

### MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	2	2	3
CO2	3	3	3	3	3	3	3	2	3	3
CO3	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	3	3	3	3	2	3	3
<b>Total</b>	15	15	15	15	15	15	15	10	14	15
<b>Average</b>	3	3	3	3	3	3	3	2	2.8	3

3 – Strong, 2- Medium, 1- Low

**SEMESTER II**  
**Skill Enhancement Course I : Practical: Data Mining Lab using R**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
SP232SE1	-	-	4	-	2	4	60	25	75	100

**Pre-requisite:**

Basics of DM Algorithms & R Programming.

**Learning Objectives:**

1. To enable the students to learn the concepts of Data Mining algorithms namely classification, clustering, regression.
2. To understand & write programs using the DM algorithms.

**Course Outcomes**

On the successful completion of the course, student will be able to:		
1	write programs using R for Association rules, Clustering techniques	<b>K1,K2</b>
2	implement data mining techniques like classification, prediction	<b>K2,K3</b>
3	use different visualizations techniques using R	<b>K4,K5</b>
4	apply different data mining algorithms to solve real world applications	<b>K5,K6</b>

**K1** - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Units	List of Exercises	No. of Hours
	<p><b>Implement the following problems using Python Programming</b></p> <ol style="list-style-type: none"> <li>1. Implement Apriori algorithm to extract association rule of data mining.</li> <li>2. Implement k-means clustering technique.</li> <li>3. Implement any one Hierarchical Clustering.</li> <li>4. Implement Classification algorithm.</li> <li>5. Implement Decision Tree.</li> <li>6. Linear Regression.</li> <li>7. Data Visualization.</li> </ol>	<b>60</b>

**Textbooks**

1. Margaret H. Dunham, (2003). *Data Mining: Introductory and Advanced Topics*. Pearson education.
2. C.S.R. Prabhu, *Data Warehousing Concepts, Techniques, Products and Applications*, PHI, (2<sup>nd</sup> edition)

**Reference Books**

1. Arun K.Pujari,(2003). *Data Mining Techniques*. Universities Press(India)Pvt. Ltd.
2. Alex Berson,Stephen J.Smith, (2001). *Data Warehousing, Data Mining and OLAP*,TMCH.

### Web Resources

1. <https://www.javatpoint.com/data-warehouse>
2. <https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs12/>
3. <https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html>
4. [introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html](https://www.btechguru.com/training--it--database-management-systems--file-structures--introduction-to-data-warehousing-and-olap-2-video-lecture--12054--26--151.html)

### MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

Cos	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3	3	3	2	2	3
<b>CO2</b>	3	3	3	3	3	3	3	2	3	3
<b>CO3</b>	3	3	3	3	3	3	3	2	3	3
<b>CO4</b>	3	3	3	3	3	3	3	2	3	3
<b>CO5</b>	3	3	3	3	3	3	3	2	3	3
<b>Total</b>	15	15	15	15	15	15	15	10	14	15
<b>Average</b>	3	3	3	3	3	3	3	2	2.8	3

3 – Strong, 2- Medium, 1- Low

**SEMESTER – I & II**  
**LIFE SKILL TRAINING – I ETHICS**

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
PG23LST1	1				1	1	15	-	50	100

**Prerequisites:** Value education-its purpose and significance in the present world

**Learning Objectives**

1. To familiarize students with values of the individual, society, culture, one's own health and life philosophy,
2. To impart knowledge of professional ethical standards, codes of ethics, obligations, safety, rights, and other worldwide challenges.

Course Outcomes	On completion of this course the student will be able to	
CO1	understand deeper insight of the meaning of their existence.	K1
CO2	recognize the philosophy of life and individual qualities	K2
CO3	acquire the skills required for a successful personal and professional life.	K3
CO4	develop as socially responsible citizens.	K4
CO5	create a peaceful, communal community and embrace unity.	K3

Unit	Contents	No. of Hours
I	<b>Goal Setting:</b> Definition - Brainstorming Session – Setting Goals – Few components of setting goals.	3
II	<b>Group Dynamics:</b> Definition - Nature of Groups – Types of Groups – Determinants of group behavior	3
III	<b>Conflict Resolution:</b> Definition – What is a conflict resolution – Why should conflicts be resolved? - Lessons for life	3



IV	<b>Decision Making:</b> Definition – 3C’s of decision making – Seven Steps to effective decision making – Barriers in effective decision making	3
V	<b>Anger Management:</b> Effects of anger – Tips to reduce anger – Anger warning signs – Identify your triggers – Ways to cool down your anger.	3
<b>TOTAL</b>		<b>15</b>
<b>Self-Study Portion:</b> Salient values for life, Human Rights, Social Evils and how to tackle them, Holistic living, Duties and responsibilities.		

## Textbooks

Life Skill Training – I Ethics, Holy Cross College (Autonomous), Nagercoil

## Reference Books

1. Holy Cross College (Autonomous), Nagercoil (2007). Foundation Course Life’s Challenges. Sipca Computers.
2. Mathew, Sam (2010). Self Help Life Book. Opus Press Publisher.
3. Swati Mehrotra. (2016). Inspiring Souls Moral Values and Life Skills (1st ed.) [English]. Acevision Publisher Pvt. Ltd.
4. Irai Anbu, v. (2010, August). Random Thoughts (1st ed.) [English]. THG Publishing Private Limited, 2019.
5. Holy Cross College (Autonomous), Nagercoil (2007). Foundation Course Life’s Challenges. Sipca Computers.

## Web Resources

1. <https://positivepsychology.com/goal-setting-exercises/>
2. [https://www.gov.nl.ca/iet/files/CCB\\_GroupDynamicsGuide.pdf](https://www.gov.nl.ca/iet/files/CCB_GroupDynamicsGuide.pdf)
3. [https://en.wikipedia.org/wiki/Conflict\\_resolution](https://en.wikipedia.org/wiki/Conflict_resolution)
4. <https://asana.com/resources/decision-making-process>
5. <https://www.mayoclinic.org/healthy-lifestyle/adult-health/in-depth/anger-management/art-20045434>