



**THIRUVALLUVAR UNIVERSITY**  
**SERKKADU, VELLORE-632115**

# **M.SC. INFORMATION TECHNOLOGY**

**SYLLABUS**

**FROM THE ACADEMIC YEAR**  
**2023 – 2024**

<b>(ii) TANSCHÉ REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION</b>	
<b>Programme</b>	<b>M.Sc. INFORMATION TECHNOLOGY</b>
<b>Programme Code</b>	
<b>Duration</b>	<b>2 years for PG</b>
<b>Programme Outcomes (Pos)</b>	<p><b>PO1: Problem Solving Skill</b> Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.</p> <p><b>PO2: Decision Making Skill</b> Foster analytical and critical thinking abilities for data-based decision-making.</p> <p><b>PO3: Ethical Value</b> Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.</p> <p><b>PO4: Communication Skill</b> Ability to develop communication, managerial and interpersonal skills.</p> <p><b>PO5: Individual and Team Leadership Skill</b> Capability to lead themselves and the team to achieve organizational goals.</p> <p><b>PO6: Employability Skill</b> Inculcate contemporary business practices to enhance employability skills in the competitive environment.</p> <p><b>PO7: Entrepreneurial Skill</b> Equip with skills and competencies to become an entrepreneur.</p> <p><b>PO8: Contribution to Society</b> Succeed in career endeavors and contribute significantly to society.</p> <p><b>PO 9 Multicultural competence</b> Possess knowledge of the values and beliefs of multiple cultures and a global perspective.</p> <p><b>PO 10: Moral and ethical awareness/reasoning</b> Ability to embrace moral/ethical values in conducting one's life.</p>
<b>Programme Specific Outcomes (PSOs)</b>	<p><b>PSO1 – Placement</b> To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.</p>

**PSO 2 - Entrepreneur**

To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.

**PSO3 – Research and Development**

Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.

**PSO4 – Contribution to Business World**

To produce employable, ethical and innovative professionals to sustain in the dynamic business world.

**PSO 5 – Contribution to the Society**

To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

### Template for P.G., Programmes

Semester-I	Credit	Hours	Semester-II	Credit	Hours	Semester-III	Credit	Hours	Semester-IV	Credit	Hours
1.1. Core-I	5	7	2.1. Core-IV	5	6	3.1. Core-VII	5	6	4.1. Core-XI	5	6
1.2 Core-II	5	7	2.2 Core-V	5	6	3.2 Core-VII	5	6	4.2 Core-XII	5	6
1.3 Core – III	4	6	2.3 Core – VI	4	6	3.3 Core – IX	5	6	4.3 Project with viva voce	7	10
1.4 Discipline Centric Elective -I	3	5	2.4 Discipline Centric Elective – III	3	4	3.4 Core – X	4	6	4.4Elective - VI (Industry / Entrepreneurship) 20% Theory 80% Practical	3	4
1.5 Generic Elective-II:	3	5	2.5 Generic Elective -IV:	3	4	3.5 Discipline Centric Elective - V	3	3	4.5 Skill Enhancement course / Professional Competency Skill	2	4
			2.6 NME I	2	4	3.6 NME II	2	3	4.6 Extension Activity	1	
						3.7 Internship/ Industrial Activity	2	-			
	<b>20</b>	<b>30</b>		<b>22</b>	<b>30</b>		<b>26</b>	<b>30</b>		<b>23</b>	<b>30</b>
<b>Total Credit Points -91</b>											

**Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credits and Hours Distribution System for all Post – Graduate Courses including Lab Hours**

**First Year – Semester – I**

<b>Part</b>	<b>List of Courses</b>	<b>Credits</b>	<b>No. of Hours</b>
	Core – I	5	7
	Core – II	5	7
	Core – III	4	6
	Elective – I	3	5
	Elective – II	3	5
		<b>20</b>	<b>30</b>

**Semester-II**

<b>Part</b>	<b>List of Courses</b>	<b>Credits</b>	<b>No. of Hours</b>
	Core – IV	5	6
	Core – V	5	6
	Core – VI	4	6
	Elective – III	3	4
	Elective – IV	3	4
	Skill Enhancement Course [SEC] - I	2	4
		<b>22</b>	<b>30</b>

**Second Year – Semester – III**

<b>Part</b>	<b>List of Courses</b>	<b>Credits</b>	<b>No. of Hours</b>
	Core – VII	5	6
	Core – VIII	5	6
	Core – IX	5	6
	Core (Industry Module) – X	4	6
	Elective – V	3	3
	Skill Enhancement Course - II	2	3
	Internship / Industrial Activity [Credits]	2	-
		<b>26</b>	<b>30</b>

**Semester-IV**

<b>Part</b>	<b>List of Courses</b>	<b>Credits</b>	<b>No. of Hours</b>
	Core – XI	5	6
	Core – XII	5	6
	Project with VIVA VOCE	7	10
	Elective – VI (Industry Entrepreneurship)	3	4
	Skill Enhancement Course – III / Professional Competency Skill	2	4
	Extension Activity	1	-
		<b>23</b>	<b>30</b>

**Total 91 Credits for PG Courses**

**Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)** can be carried out accordingly, assigning the appropriate level in the grids:

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	POs							...	PSOs		
	1	2	3	4	5	6	1		2	...	
CLO1											
CLO2											
CLO3											
CLO4											
CLO5											

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## 2 b. Structure of Course

Course Code	Course Name		Credits
<b>Lecture Hours: (L) per week</b>	<b>Tutorial Hours : (T) per week</b>	<b>Lab Practice Hours: (P)per week</b>	<b>Total: (L+T+P) per week</b>
<b>Course Category :</b>	<b>Year &amp; Semester:</b>	<b>Admission Year:</b>	
<b>Pre-requisite</b>			
<b>Links to other Courses</b>			
<b>Learning Objectives:</b> (for teachers: what they have to do in the class/lab/field)			
<b>Course Outcomes:</b> (for students: To know what they are going to learn)			
CO1:			
CO2:			
CO3:			
CO4:			
CO5:			
<b>Recap:</b> (not for examination) Motivation/previous lecture/ relevant portions required for the course) [ This is done during 2 Tutorial hours)			
Units	Contents	Required Hours	
<b>I</b>		<b>18</b>	
<b>II</b>		<b>18</b>	
<b>III</b>		<b>18</b>	
<b>IV</b>		<b>18</b>	
<b>V</b>		<b>18</b>	
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)		
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill		
<b>Learning Resources:</b>			
<ul style="list-style-type: none"> <li>• Recommended Texts</li> <li>• Reference Books</li> <li>• Web resources</li> </ul>			
<b>Board of Studies Date:</b>			

### 3. Learning and Teaching Activities

#### 3.1 Topic wise Delivery method

Hour Count	Topic	Unit	Mode of Delivery

#### 3.2 Workload

The information below is provided as a guide to assist students in engaging appropriately with the course requirements.

Activity	Quantity	Workload periods
Lectures	60	60
Tutorials	15	15
Assignments	5	5
Cycle Test or similar	2	4
Model Test or similar	1	3
University Exam Preparation	1	3
Total		90 periods

#### 1. Tutorial Activities

Tutorial Count	Topic

#### 2. Laboratory Activities

#### 3. Field Study Activities

#### 4. Assessment Activities

##### Assessment Principles:

Assessment for this course is based on the following principles:

1. Assessment must encourage and reinforce learning.
2. Assessment must measure achievement of the stated learning objectives.
3. Assessment must enable robust and fair judgments about student performance.
4. Assessment practice must be fair and equitable to students and give them the opportunity to demonstrate what they learned.



5. Assessment must maintain academic standards.

**Assessment Details:**

<b>Assessment Item</b>	<b>Distributed Due Date</b>	<b>Weightage</b>	<b>Cumulative Weightage</b>
Assignment 1	3 <sup>rd</sup> week	2%	2%
Assignment 2	6 <sup>th</sup> Week	2%	4%
Cycle Test – I	7 <sup>th</sup> Week	6%	10%
Assignment 3	8 <sup>th</sup> Week	2%	12%
Assignment 4	11 <sup>th</sup> Week	2%	14%
Cycle Test – II	12 <sup>th</sup> Week	6%	20%
Assignment 5	14 <sup>th</sup> Week	2%	22%
Model Exam	15 <sup>th</sup> Week	13%	35%
Attendance	All weeks as per the Academic Calendar	5%	40%
University Exam	17 <sup>th</sup> Week	60%	100%

**TEACHING METHODOLOGIES**

**Traditional Teaching methods** like Chalk and Board, Virtual Class room, LCD projector, Smart Class, Video Conference, Guest Lectures.

**Asking students to formulate a problem from a topic covered in a week's time**

Assignment, Class Test, Slip test

**Asking students to use state-of-the-art technologies/software to solve problems**

Applications, Use of Mathematical software

**Introducing students to applications before teaching the theory**

**Training students to engage in self-study without relying on faculty (for example – library and internet search, manual and handbook usage, etc.)**

Library, Net Surfing, Manuals, NPTEL Course Materials published in the website

Other university websites.

## Faculty Course File Structure

### CONTENTS

- a. Academic Schedule
- b. Students Name List
- c. Time Table
- d. Syllabus
- e. Lesson Plan
- f. Staff Workload
- g. Course Design(content, Course Outcomes(COs), Delivery method, mapping of COs with Programme Outcomes(POs), Assessment Pattern in terms of Revised Bloom's Taxonomy)
- h. Sample CO Assessment Tools.
- i. Faculty Course Assessment Report(FCAR)
- j. Course Evaluation Sheet
- k. Teaching Materials(PPT, OHP etc)
- l. Lecture Notes
- m. Home Assignment Questions
- n. Tutorial Sheets
- o. Remedial Class Record, if any.
- p. Projects related to the Course
- q. Laboratory Experiments related to the Courses
- r. Internal Question Paper
- s. External Question Paper
- t. Sample Home Assignment Answer Sheets
- u. Three best, three middle level and three average Answer sheets
- v. Result Analysis (CO wise and whole class)
- w. Question Bank for Higher studies Preparation (GATE/Placement)
- x. List of mentees and their academic achievements

**Credit Distribution for PG Programme in Information Technology**  
**M.Sc., Information Technology**

**Illustration – I**

	<b>First Year Semester-I</b>	<b>Credit</b>	<b>Hours per week(L/T/P)</b>
Part A	CC1 - Python Programming	5	7
	CC2 - Python Programming - Practical	5	7
	CC3 - Web Development using Word Press– Practical	4	6
	Elective I(Generic / Discipline Specific)(One from Group A) Data Structures	3	5( 4 L+ 1T )
	Elective II(Generic / Discipline Specific)(One from Group B) Operating Systems	3	5( 4L + 1T )
	<b>Total</b>	<b>20</b>	<b>30</b>

### **Elective Courses**

**Courses are grouped (Group A to Group F) so as to include topics focussed on IT Oriented (ITC) courses for flexibility of choice by the stakeholders / institutions.**

**Semester I : Elective I and Elective II**

**Elective I** to be chosen from **Group A** and **Elective II** to be chosen from **Group B**

**Group A:**

1. Data Structures
2. Compiler Design
3. Natural Language Processing

**Group B:**

1. Operating Systems
2. Digital Computer Architecture
3. Human Computer Interaction

**Semester II : Elective III & Elective IV**

**Elective III** to be chosen from **Group C** and **Elective IV** to be chosen from **Group D**

**Group C:**

1. Biometric Techniques
2. Digital Watermarking and Steganography
3. Digital Image Processing

**Group D :**

1. Software Engineering
2. Object oriented analysis and design
3. Software Project Management

### **Skill Enhancement Courses**

**Skill Enhancement Courses are chosen so as to keep in pace with the latest developments in the academic / industrial front and provides flexibility of choice by the stakeholders / institutions.**

**Group G (Skill Enhancement Courses) SEC:**

- Multimedia Tools Lab
- Documentation using LATEX / other packages
- Office Automation and ICT Tools
- React JS – Practical
- Web Design
- Animation in Flash

### Ability Enhancement Courses

- Soft Skill courses

### Extra Disciplinary Courses for other Departments (not for Information Technology students)

Students from other Departments may also choose any one of the following as Extra Disciplinary Course.

ED-I: E-Commerce and Content Management Systems

ED-II: Computer Fundamentals

ED-III: Image Editing and Animation

ED-IV: Game Theory and Strategy

ED-V: Introduction to Data Analysis

### Instructions for Course Transaction

Courses	Lecture hrs	Tutorial hrs	Lab Practice	Total Hrs
Core	75	15	--	90
Electives	75	15	--	90
ED	75	15	--	90
Lab Practice Courses	45	15	30	90
Project	20	--	70	90

### Testing Pattern (25+75)

#### Internal Assessment

**Theory Course:** For theory courses there shall be three tests conducted by the faculty concerned and the

average of the best two can be taken as the Continuous Internal Assessment (CIA) for a maximum of 25 marks. The duration of each test shall be one / one and a half hour.

**Computer Laboratory Courses:** For Computer Laboratory oriented Courses, there shall be two tests in Theory part and two tests in Laboratory part. Choose one best from Theory part and other best from the two Laboratory part. The average of the best two can be treated as the CIA for a maximum of 25 marks. The duration of each test shall be one / one and a half hour.

There is no improvement for CIA of both theory and laboratory, and, also for University End Semester Examination.

**Written Examination : Theory Paper (Bloom's Taxonomy based)****Question paper Model**

<b>Intended Learning Skills</b>	<b>Maximum 75 Marks</b> <b>Passing Minimum: 50%</b> <b>Duration : Three Hours</b>
	<b>Part –A (10x 2 = 20 Marks)</b> Answer ALL Questions <b>Each Question carries 2 marks</b>
Memory Recall / Example/ Counter Example / Knowledge about the Concepts/ Understanding	Two questions from each UNIT
	<b>Question 1 to Question 10</b>
	<b>Part – B (5 x 5 = 25 Marks)</b> Answer ALL Questions <b>Each questions carries 5 Marks</b>
Descriptions/ Application (problems)	<b>Either-or Type</b> Both parts of each question from the same UNIT
	<b>Question 11(a) or 11(b)</b> To <b>Question 15(a) or 15(b)</b>
	<b>Part-C (3x 10 = 30 Marks)</b> Answer any <b>THREE</b> questions <b>Each question carries 10 Marks</b>
Analysis /Synthesis / Evaluation	There shall be FIVE questions covering all the five units
	<b>Question 16 to Question 20</b>

Each question should carry the course outcome and cognitive level

For instance,

1. [CO1 : K2] Question xxxx
2. [CO3 : K1] Question xxxx

**Different Types of Courses**

**(i) Core Courses ( Illustrative )**

**(ii) Elective Courses (ED within the Department Experts) ( Illustrative )**

**(iii) Elective Courses (ED from other Department Experts)**

**(iv) Skill Development Courses**

**(v) Institution-Industry-Interaction ( Industry aligned Courses)**

Programmes /course work/ field study/ Modelling the Industry Problem/ Statistical Analysis /  
Commerce-Industry related problems / MoU with Industry and the like activities.



## M.Sc. Information Technology

<b>Title of the Course</b>		<b>PYTHON PROGRAMMING</b>					
<b>Paper Number</b>		<b>CORE I</b>					
<b>Category</b>	Core	<b>Year</b>	I	<b>Credits</b>	4	<b>Course Code</b>	
		<b>Semester</b>	I				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>	<b>Total</b>		
		4	1	-	5		
<b>Pre-requisite</b>		Basic understanding on object oriented programming concepts					
<b>Objectives of the Course</b>		To acquire programming skills in core Python and to develop database applications in Python					
<b>Course Outline</b>		<b>UNIT-I : Core Python:</b> Introduction - Python Basics: Comments - Statements and syntax - variable Assignment - Identifiers - <b>Python objects</b> : Built-in-types - Internal types - Standard Type operators - Standard type Built-in-functions. <b>Numbers</b> : Introduction to Numbers - Integers - Floating point numbers - Complex numbers - Operators - Built-in and factory functions – Conditionals and Loops - <b>Sequences</b> : Strings, Lists and Tuples					
		<b>UNIT-II :</b> Mapping and set types.- <b>Functions and functional programming:</b> Introduction - Calling functions - Creating functions - passing functions - Formal arguments - Variable - Length Arguments - Functional Programming - Variable Scope – Recursion					

	<p><b>UNIT-III : Modules:</b> Modules and Files – namespaces - Importing Modules - Features - Built-in functions. <b>Object Oriented Programming:</b> Introduction - Object Oriented Programming – Encapsulation Inheritance – Polymorphism - <b>Errors and Exceptions:</b> Introduction – Exceptions in Python.</p>
	<p><b>UNIT-IV : GUI Programming:</b> Introduction – <b>Using Widgets:</b> Core widgets- Generic widget properties – Labels – Buttons – Radio Buttons – Check Buttons – Text – Entry – List Boxes – Menus –Frame – Scroll Bars – Scale</p>
	<p><b>UNIT-V: Database Programming:</b> Connecting to a database using MongoDB - Creating Tables - INSERT-UPDATE - DELETE - READ operations.</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>
<p><b>Recommended Text</b></p>	<ol style="list-style-type: none"> <li>1. Wesley J. Chun, (2007), “Core Python Programming”, Pearson Education, Second Edition – (Unit I,II,III).</li> <li>2. Charles Dierbach, (2015), “Introduction to Computer Science Using Python A Computational Problem-Solving Focus”, Wiley India Edition- (Unit III- Object Oriented Programming)</li> <li>3. Martin C Brown, (2018), “The Complete Reference Python”, McGraw Hill Education (India)Private Limited – (Unit IV)</li> </ol>
<p><b>Reference Books</b></p>	<ol style="list-style-type: none"> <li>1. Mark Lutz, (2013), “Learning Python Powerful Object Oriented Programming”, O’reillyMedia, 5 th Edition.</li> <li>2. Timothy A. Budd, (2011), “Exploring Python”, Tata MCGraw Hill Education PrivateLimited, First Edition.</li> <li>3. Allen Downey, Jeffrey Elkner, Chris Meyers, (2012), “How to think like a computerscientist: learning with Python”</li> </ol>

<b>Website and e-Learning Source</b>	<ol style="list-style-type: none"> <li>1. <a href="http://interactivepython.org/courselib/static/pythonds">http://interactivepython.org/courselib/static/pythonds</a></li> <li>2. <a href="http://www.ibiblio.org/g2swap/byteofpython/read/">http://www.ibiblio.org/g2swap/byteofpython/read/</a></li> <li>3. <a href="http://www.diveintopython3.net/">http://www.diveintopython3.net/</a></li> <li>4. <a href="http://docs.python.org/3/tutorial/index.html">http://docs.python.org/3/tutorial/index.html</a></li> </ol>
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### Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
<b>CLO1</b>	Explain the basic concepts in python language.
<b>CLO2</b>	Apply the various data types and identify the usage of control statements, loops, functions and modules in python for processing the data
<b>CLO3</b>	Analyze and solve problems using basic constructs and techniques of python.
<b>CLO4</b>	Assess the approaches used in the development of interactive application.
<b>CLO5</b>	To build real time programs using python

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
<b>CLO1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>
<b>CLO2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>CLO3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CLO4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CLO5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>Weightage of course contribute to each PSO</b>	<b>15</b>	<b>13</b>	<b>15</b>	<b>15</b>	<b>13</b>	<b>15</b>

<b>Title of the Course</b>		<b>PYTHON PROGRAMMING - PRACTICAL</b>					
<b>Paper Number</b>		<b>CORE II</b>					
<b>Category</b>	Core	<b>Year</b>	I	<b>Credits</b>	4	<b>Course Code</b>	
		<b>Semester</b>	I				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>	<b>Total</b>		
		-	1	4	5		
<b>Pre-requisite</b>		Basic understanding of C, C++ and Java programming languages					
<b>Objectives of the Course</b>		This course gives practical experience in Python basics, Object Oriented programming like Classes, Inheritance, and Polymorphism, GUI Applications and Database connection.					
<b>Course Outline</b>		<ol style="list-style-type: none"> <li>1. Python Basic programs</li> <li>2. Control Structures</li> <li>3. Lists</li> <li>4. Functions and Recursions</li> <li>5. Modules</li> <li>6. String Processing</li> <li>7. Dictionaries and Sets</li> <li>8. Classes and Objects</li> <li>9. Polymorphism</li> <li>10. Inheritance</li> <li>11. GUI Application</li> <li>12. Working with Database</li> </ol>					
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)		Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)					
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill					
<b>Recommended Text</b>		Wesley J. Chun, (2007), “Core Python Programming”, Pearson Education, Second Edition –					

<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Mark Lutz, (2013), “Learning Python Powerful Object Oriented Programming”, O’reillyMedia, 5 th Edition.</li> <li>2. Timothy A. Budd, (2011), “Exploring Python”, Tata McGraw Hill Education Private Limited, First Edition.</li> <li>3. Allen Downey, Jeffrey Elkner, Chris Meyers, (2012), “How to think like a computerscientist: learning with Python”</li> </ol>
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### Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

<b>CO’s</b>	<b>Course Outcomes</b>
<b>CLO1</b>	Understand the significance of control statements, loops and functions in creating simple programs.
<b>CLO2</b>	Apply the core data structures available in python to store, process and sort the data
<b>CLO3</b>	Analyze the real time problem using suitable python concepts
<b>CLO4</b>	Assess the complex problems using appropriate concepts in python
<b>CLO5</b>	Develop the real time applications using python programming language.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	3	3	3	2	2
CLO2	3	3	3	3	3	2
CLO3	3	2	3	3	3	3
CLO4	3	3	3	3	3	3
CLO5	3	3	3	3	3	3
<b>Weightage of course contribute to eachPSO</b>	<b>15</b>	<b>13</b>	<b>15</b>	<b>15</b>	<b>13</b>	<b>15</b>

<b>Title of the Course</b>		<b>WEB DEVELOPMENT USING WORD PRESS - PRACTICAL</b>					
<b>Paper Number</b>		<b>CORE III</b>					
<b>Category</b>	<b>Core</b>	<b>Year</b>	<b>I</b>	<b>Credits</b>	<b>4</b>	<b>Course Code</b>	
		<b>Semester</b>	<b>I</b>				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>	<b>Total</b>		
		<b>-</b>	<b>1</b>	<b>4</b>	<b>5</b>		
<b>Pre-requisite</b>		Basic understanding on HTML and CSS					
<b>Objectives of the Course</b>		The primary course objective of this paper is to learn the fundamentals of basic web concepts, HTML, DHTML, JavaScript and Word Press					
<b>Course Outline</b>		<b>UNIT-I :</b> <b>Introduction to HTML</b> - Lists - Adding Graphics to HTML Documents - Tables - Linking Documents - Frames- Developing HTML Forms					

	<p><b>UNIT-II :</b>  <b>Dynamic HTML</b> - Cascading Style Sheets - Use of SPAN Tag - External Style Sheets -Use ofDIV Tag - Developing Websites</p> <p><b>UNIT-III :</b>  <b>Introduction to JavaScript</b> - JavaScript in Web Pages - Advantages - Writing JavaScript into HTML - Basic Programming Techniques - Operators and Expressions- JavaScript Programming Construct: Conditional Checking, Controlled Loops, Functions: Built-in Functions, User-DefinedFunctions - Placing Text in a Browser - Dialog Boxes.</p> <p><b>UNIT-IV :</b>  <b>JavaScript Document Object Model:</b> Introduction - Understanding Objects in HTML -Handling Events using JavaScript. Forms used by a Website: Form Object - Built-in Objects.</p> <p><b>UNIT-V:</b>  <b>Word Press:</b> Installation - Stetting and administration- Word press: Theming basics - Our First Word Press Website - Theme Foundation - Menu and navigation - Home page - Dynamic Sidebars and Widgets - Page - archive Page results - Testing and Launching</p>
<p><b>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</b></p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved          (To be discussed during the Tutorial hour)</p>
<p><b>Skills acquired from this course</b></p>	<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>

<b>Recommended Text</b>	<ol style="list-style-type: none"> <li>1. Ivan N. Bayross, (2005), Web Enabled Commercial Applications Development UsingHTML, DHTML, JavaScript, perlCGI, 3<sup>rd</sup> Edition, BPB Publications. (Unit I, II, III and IV)</li> <li>2. Jesse Friedman,( 2012), Web Designer's Guide to WordPress: Plan, Theme, Build, Launch(Voices That Matter), 1<sup>st</sup> Edition , New Riders. (Unit V)</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. N.P. Gopalan, J. Akilandeswari, (2009), Web Technology: A Developer's Perspective, Eastern Economy Edition, PHI Learning Private Limited.</li> <li>2. Deitel&amp;Deitel, (2000), Internet and World Wide Web How to program, Prentice Hall.</li> <li>3. Jon Duckett, (2004), Beginning Web Programming with HTML, XHTML, and CSS, WileyPublishing, Inc.</li> </ol>
<b>Website and e-Learning Source</b>	<ol style="list-style-type: none"> <li>1. <a href="http://www.sergey.com/web_course/content.html">http://www.sergey.com/web_course/content.html</a></li> <li>2. <a href="http://www.pageresource.com/jscript/index.html">http://www.pageresource.com/jscript/index.html</a></li> <li>3. <a href="http://www.peachpit.com/guides/content.aspx">http://www.peachpit.com/guides/content.aspx</a></li> <li>4. <a href="https://www.tutorialspoint.com/wordpress/index.htm">https://www.tutorialspoint.com/wordpress/index.htm</a></li> </ol>

### Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
<b>CLO1</b>	Identify the tools which will be suitable for the requirement of the webpage.
<b>CLO2</b>	Implement Java script and Style Sheets effectively in the Web Pages
<b>CLO3</b>	Analyze the different tools and built-in functions available to be applied in the webpage
<b>CLO4</b>	Rate the design and effectiveness of the Web Pages created.
<b>CLO5</b>	Design and publish a website using Word press



<b>CO/PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PSO6</b>
<b>CLO1</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>
<b>CLO2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>
<b>CLO3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>
<b>CLO4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>
<b>CLO5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>Weightage of course contribute to each PSO</b>	<b>15</b>	<b>15</b>	<b>15</b>	<b>11</b>	<b>11</b>	<b>15</b>

<b>Title of the Course</b>		<b>DATA STRUCTURES</b>					
<b>Paper Number</b>		<b>ELECTIVE I (EC1)</b>					
<b>Category</b>	Elective	<b>Year</b>	I	<b>Credits</b>	3	<b>Course Code</b>	
		<b>Semester</b>	I				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>	<b>Total</b>		
		4	1	-	5		
<b>Pre-requisite</b>		Basic understanding of programming and foundational concepts in computer science					
<b>Objectives of the Course</b>		To become familiar with the various data structures and their applications and to increase the understanding of basic concepts of the design and use of algorithms					
<b>Course Outline</b>							
		<p><b>UNIT-I :</b></p> <p><b>Introduction and Overview:</b> Definitions – Concept of Data Structures – Overview of Data Structures – Implementation of Data Structures – Arrays: Definition – One Dimensional Array – Multidimensional Arrays: Two Dimensional Array – Sparse Matrices – Three dimensional and n-dimensional Arrays – Stacks : Introduction – Definition – Representation of Stack – Operations on Stack – Applications of Stacks: Evaluation of Arithmetic Expressions – Implementation of Recursion - Tower of Hanoi Problem</p>					
		<p><b>UNIT-II :</b></p> <p><b>Queues:</b> Introduction – Definition – Representation of Queues – <b>Various Queue Structures :</b> Circular Queue – Deque – Priority Queue – <b>Applications of Queues :</b> Simulation – CPU Scheduling in a Multiprogramming Environment – Round Robin Algorithm – <b>Linked Lists:</b> Single Linked List – Circular Linked List – Double Linked List – Circular Double Linked List – <b>Applications of Linked List:</b> Polynomial Representation</p>					

	<p><b>UNIT-III :</b></p> <p><b>Trees:</b> Basic Terminologies – Representation of Binary Tree: Linear Representation – Linked Representation – <b>Operations:</b> Traversals – <b>Types of Binary Trees:</b> Expression Tree – Binary Search Tree – Splay tree</p> <hr/> <p><b>UNIT-IV :</b></p> <p><b>Sorting:</b> Bubble Sort, Insertion Sort, Selection Sort, Shell Sort – Quick Sort - Merge Sort - Radix Sort - Heap Sort – <b>Searching:</b> Linear Search - Binary Search</p> <hr/> <p><b>UNIT-V:</b></p> <p><b>Graphs:</b> Introduction – Graph representation and its operations – Path Matrix – Graph Traversal - Application of DFS – Shortest Path Algorithm - <b>Minimum Spanning Tree :</b> Prim’s Algorithm – Kruskal’s Algorithm - Greedy – Knapsack – Back Tracking – 8 Queens</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>
<p><b>Recommended Text</b></p>	<ol style="list-style-type: none"> <li>1. Debasis Samantha (2013), Classic Data Structures, Second Edition, PHI Learning Private Limited.</li> <li>2. P. Sudharsan, J. John Manoj Kumar, C &amp; Data Structures, Third Edition, RBA Publications. Unit 4: Chapter 14, Unit 5: Chapter 13</li> <li>3. Ellis Horowitz, SartajSahni, Sanguthevar Rajeshakaran, (2007), Fundamentals of Computer Algorithms, Second Edition, Universities Press (P) Limited</li> </ol>
<p><b>Reference Books</b></p>	<ol style="list-style-type: none"> <li>1. Sara Baase, (1991), Computer Algorithms – Introduction to Design and Analysis, Addison- Wesley Publishing Company</li> <li>2. Robert Kruse, C.L.Tondo, Bruce Leung, Data Structures and Program Design in C ,2<sup>nd</sup> Edition, PHI Publications.</li> </ol>

<b>Website and e-Learning Source</b>	<ol style="list-style-type: none"><li>1. <a href="http://www.cs.sunysb.edu/~skiena/214/lectures/">http://www.cs.sunysb.edu/~skiena/214/lectures/</a></li><li>2. <a href="http://datastructures.itgo.com/graphs/dfsdfs.htm">http://datastructures.itgo.com/graphs/dfsdfs.htm</a></li><li>3. <a href="http://oopweb.com/Algorithms/Documents/PLDS210/VolumeFrames.html">http://oopweb.com/Algorithms/Documents/PLDS210/VolumeFrames.html</a></li><li>4. <a href="http://discuss.codechef.com/questions/48877/data-structures-and-algorithms">http://discuss.codechef.com/questions/48877/data-structures-and-algorithms</a></li><li>5. <a href="http://code.tutsplus.com/tutorials/algorithms-and-data-structures--cms-20437">http://code.tutsplus.com/tutorials/algorithms-and-data-structures--cms-20437</a></li></ol>
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**Course Learning Outcome (for Mapping with POs and PSOs)**

Students will be able to

<b>CO's</b>	<b>Course Outcomes</b>
<b>CLO1</b>	Outline the basic data structures
<b>CLO2</b>	Identify the different operations and memory representations
<b>CLO3</b>	Interpret different techniques with their complexities
<b>CLO4</b>	Compare the applications of various data structures
<b>CLO5</b>	Choose an algorithm to solve simple problems suited for appropriate situations

<b>CO/PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PSO6</b>
<b>CLO1</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>
<b>CLO2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>
<b>CLO3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>CLO4</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CLO5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>Weightage of course contribute to each PSO</b>	<b>15</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>12</b>	<b>14</b>

<b>Title of the Course</b>		<b>COMPILER DESIGN</b>					
<b>Paper Number</b>		<b>ELECTIVE I (EC1)</b>					
<b>Category</b>	Elective	<b>Year</b>	I	<b>Credits</b>	3	<b>Course Code</b>	
		<b>Semester</b>	I				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>	<b>Total</b>		
		4	1	-	5		
<b>Pre-requisite</b>		Basic knowledge in one of the programming language and data structures					
<b>Objectives of the Course</b>		To acquire the knowledge about the compiler design and to understand the different phases of Compiler					
<b>Course Outline</b>							
		<p><b>UNIT-I :</b></p> <p>Compilers &amp; Translators, Need of Translators, Structure of a Compiler, Phases, Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Code Optimization, Code Generation, Book Keeping, A Symbol Table in brief, Semantic Analysis, L-value, r-values, Error Handling</p>					
		<p><b>UNIT-II :</b></p> <p>Rules of Lexical Analyser, Need for Lexical Analysis, Input Buffering, Preliminary Scanning, A simple Approach to the Design of Lexical Analysers, Transition Diagrams, Regular Expression, String &amp; Languages, Finite Automata, Non-deterministic Automata, Deterministic Automata, From regular Expression to Finite Automata, Context free Grammars, Derivations &amp; Parse Trees, Parsers, Shift Reduce Parsing, Operator-Precedence Parsing</p>					

	<p><b>UNIT-III :</b></p> <p>Symbol Table Management, Contents of a Symbol Table, Names &amp; Symbol table records, reusing of symbol table spaces, array names, Indirection in Symbol Table entries, Data Structures for Symbol Tables, List, Self Organizing Lists, Search Trees, Hash Tables, Errors, Reporting Errors, Sources of Errors Syntactic Errors, Semantic Errors, Dynamic Errors, Lexical Phase Errors, Minimum Distance Matching, Syntactic Phase Error, Time of Detection, Ponc mode, Case study on Lex and Yacc</p> <p><b>UNIT-IV :</b></p> <p>Principal Sources of Optimization, Inner Loops, Language Implementation Details Inaccessible to the User. Further Optimization, Algorithm Optimization, Loop Optimization , Code Motion, Induction Variables, Reduction in Strength, Basic Blocks, Flow Graphs, DAG Representation of Basic Blocks, Value Numbers &amp; Algebraic Laws, Global Data Flow Analysis, Memory Management Strategies , Fetch Strategy, Placement Strategies, Replacement Strategies, Address Binding, Compile Time, Load Time, Execution Time, Static Loading, Dynamic Loading, Dynamic Linking</p> <p><b>UNIT-V:</b></p> <p>Problems in Code Generation, a Simple Code Generator, Next-Use Information, Register Descriptors, Address Descriptors, Code Generation Algorithm, Register Allocation &amp; Assignment, Global Register Allocation, Usage Counts, Register Assignment for Outer Loops, Register Allocation by Graph Coloring, Code Generation from DAG's, Peep-Hole Optimization, Redundant Loads &amp; Stores, Un-Reachable Code, Multiple Jumps, Algebraic Simplifications, Use of Machine Idioms</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>

Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
<b>Recommended Text</b>	Compilers: Principles, Techniques & Tools, Second Edition by A. V. Aho, Monicas. Lam, Ravi Sethi, J. D. Ullman
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Dhamdhare D.M., “Compiler Construction: Theory and Practice”, McMillan India Ltd., 1983</li> <li>2. Holub Allen, “Compiler Design in C”, Prentice Hall of India, 1990</li> </ol>
<b>Website and e-Learning Source</b>	<ol style="list-style-type: none"> <li>1. <a href="https://www.geeksforgeeks.org/compiler-design-tutorials/">https://www.geeksforgeeks.org/compiler-design-tutorials/</a></li> <li>2. <a href="https://www.tutorialspoint.com/compiler_design/">https://www.tutorialspoint.com/compiler_design/</a></li> <li>3. <a href="https://www.javatpoint.com/compiler-tutorial">https://www.javatpoint.com/compiler-tutorial</a></li> <li>4. <a href="https://onlinecourses.nptel.ac.in/noc19_cs01/preview">https://onlinecourses.nptel.ac.in/noc19_cs01/preview</a></li> <li>5. <a href="http://ecomputernotes.com/compiler-design">http://ecomputernotes.com/compiler-design</a></li> </ol>

### Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
<b>CLO1</b>	Identify the major phases of compilation and the functionality of LEX and YACC
<b>CLO2</b>	Describe the functionality of compilation process and symbol table management
<b>CLO3</b>	Apply the various parsing, optimization techniques and error recovery routines to have a better code for code generation
<b>CLO4</b>	Analyze the techniques and tools needed to design and implement compilers.
<b>CLO5</b>	Test a compiler and experiment the knowledge of different phases in compilation

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
<b>CLO1</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>
<b>CLO2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>
<b>CLO3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>CLO4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>CLO5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>Weightage of course contribute to each PSO</b>	<b>15</b>	<b>12</b>	<b>13</b>	<b>13</b>	<b>13</b>	<b>14</b>



<b>Title of the Course</b>		<b>NATURAL LANGUAGE PROCESSING</b>					
<b>Paper Number</b>		<b>ELECTIVE I (EC1)</b>					
<b>Category</b>	Elective	<b>Year</b>	I	<b>Credits</b>	3	<b>Course Code</b>	
		<b>Semester</b>	I				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>	<b>Total</b>		
		4	1	-	5		
<b>Pre-requisite</b>		Basic understanding of natural language and linguistics					
<b>Objectives of the Course</b>		To learn the fundamentals of natural language processing and to understand the role of CFG, semantics of sentences and pragmatics					
<b>Course Outline</b>							
		<p><b>UNIT-I :</b></p> <p>Introduction: Origins and challenges of NLP – Language Modeling: Grammar-based LM, Statistical LM - Regular Expressions, Finite-State Automata – English Morphology, Transducers for lexicon and rules, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance</p>					
		<p><b>UNIT-II :</b></p> <p>Word Level Analysis: Unsmoothed N-grams, Evaluating N-grams, Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rulebased, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models</p>					
		<p><b>UNIT-III :</b></p> <p>Syntactic Analysis: Context-Free Grammars, Grammar rules for English, Treebanks, Normal Forms for grammar – Dependency Grammar – Syntactic Parsing, Ambiguity, Dynamic Programming parsing – Shallow parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures</p>					

	<p><b>UNIT-IV :</b></p> <p>Semantics and Pragmatics: Requirements for representation, FirstOrder Logic, Description Logics – Syntax-Driven Semantic analysis, Semantic attachments – Word Senses, Relations between Senses, Thematic Roles, selection restrictions – Word Sense Disambiguation, WSD using Supervised, Dictionary &amp; Thesaurus, Bootstrapping methods – Word Similarity using Thesaurus and Distributional methods</p> <p><b>UNIT-V:</b></p> <p>Discourse Analysis and Lexical Resources: Discourse segmentation, Coherence – Reference Phenomena, Anaphora Resolution using Hobbs and Centering Algorithm – Coreference Resolution – Resources: Porter Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, WordNet, PropBank, FrameNet, Brown Corpus, British National Corpus (BNC)</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>
<p><b>Recommended Text</b></p>	<ol style="list-style-type: none"> <li>1. Daniel Jurafsky, James H. Martin;Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech; Pearson Publication; 2014.</li> <li>2. Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python , First Edition, OReilly Media, 2009.</li> </ol>

<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Breck Baldwin, —Language Processing with Java and LingPipe Cookbook, Atlantic Publisher, 2015.</li> <li>2. Richard M Reese, —Natural Language Processing with Java , O_Reilly Media, 2015.</li> <li>3. Nitin Indurkha and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.</li> <li>4. Tanveer Siddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval, Oxford University Press, 2008.</li> </ol>
<b>Website and e-Learning Source</b>	<ol style="list-style-type: none"> <li>1. <a href="http://www.cse.iitb.ac.in/~pb/papers/nlp-iitb.pdf">http://www.cse.iitb.ac.in/~pb/papers/nlp-iitb.pdf</a></li> <li>2. <a href="https://www.nitk.ac.in/faculty/dr-sarika-jain">https://www.nitk.ac.in/faculty/dr-sarika-jain</a></li> <li>3. <a href="https://www.simplilearn.com/tutorials/artificial-intelligence-tutorial/what-is-natural-language-processing-nlp">https://www.simplilearn.com/tutorials/artificial-intelligence-tutorial/what-is-natural-language-processing-nlp</a></li> <li>4. <a href="https://www.sas.com/en_us/insights/analytics/what-is-natural-language-processing-nlp.html">https://www.sas.com/en_us/insights/analytics/what-is-natural-language-processing-nlp.html</a></li> <li>5. <a href="https://towardsdatascience.com/your-guide-to-natural-language-processing-nlp-48ea2511f6e1">https://towardsdatascience.com/your-guide-to-natural-language-processing-nlp-48ea2511f6e1</a></li> </ol>

### Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

<b>CO's</b>	<b>Course Outcomes</b>
<b>CLO1</b>	Describe the concepts of morphology, syntax, semantics, discourse & pragmatics of natural language
<b>CLO2</b>	Identify various linguistic and statistical features relevant to the basic NLP task, namely, spelling correction, morphological analysis, parsing and semantic analysis
<b>CLO3</b>	Classify the text into an organized group using a set of handcraft linguistic rules with appropriate NLP processes and algorithms
<b>CLO4</b>	Analyze the system with various language analysis methods and interpret the results
<b>CLO5</b>	Assess NLP systems, identify and suggest solutions for the shortcomings

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	2	2	2	2	2
CLO2	3	2	2	2	2	2
CLO3	3	2	2	3	2	3
CLO4	3	2	2	3	2	3
CLO5	3	2	2	3	3	3
<b>Weightage of course contribute to each PSO</b>	<b>15</b>	<b>10</b>	<b>10</b>	<b>13</b>	<b>11</b>	<b>13</b>

<b>Title of the Course</b>		<b>OPERATING SYSTEMS</b>				
<b>Paper Number</b>		<b>ELECTIVE II (EC2)</b>				
<b>Category</b>	Elective	<b>Year</b>	I	<b>Credits</b>	3	<b>Course Code</b>
		<b>Semester</b>	I			
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>	<b>Total</b>	
		4	1	-	5	
<b>Pre-requisite</b>		Basic understanding of working principles of computer and about hardware and software components				
<b>Objectives of the Course</b>		To develop fundamental knowledge of Operating systems, to become familiar with CPU Scheduling, memory and file management concepts, to learn concepts and programming techniques of Linux				
<b>Course Outline</b>						

	<p><b>UNIT-I :</b></p> <p><b>Introduction :</b> Evolution of Operating System - Structure - Processes - The Process Concepts - Inter Process Communication - IPC Problems - Scheduling Levels - Preemptive Vs Non- Preemptive Scheduling - <b>Scheduling Algorithms:</b> First Come First Served - Shortest Job First - Shortest Remaining Time Next - Three Level Scheduling - Round Robin Scheduling - Priority Scheduling -Multiple Queues - Shortest Process Next - Guaranteed Scheduling - Lottery Scheduling - Fair-Share Scheduling - Thread Scheduling</p>
	<p><b>UNIT-II :</b></p> <p>Swapping - Virtual Memory - Page Replacement Algorithm - Segmentation</p>
	<p><b>UNIT-III :</b></p> <p><b>Deadlock</b> - Examples of Deadlock - Detection - Recovery - Avoidance - Prevention – Semaphore -Shared Memory</p>
	<p><b>UNIT-IV :</b></p> <p><b>File System</b> - Files - Directories - I/O Management - Disks - Disk Arm Scheduling Algorithm</p>
	<p><b>UNIT-V:</b></p> <p><b>Introduction to Linux:</b> Introducing Shell Programming - Linux File Systems - Linux File system calls - Implementation of Linux File systems - Linux Commands - Directory Oriented Commands - File Oriented Commands - Communication Oriented Commands- General Purpose Commands</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>

<b>Recommended Text</b>	<ol style="list-style-type: none"> <li>1. Andrew S. Tanenbaum, (2001), Modern Operating Systems, 2<sup>nd</sup> Edition, Prentice Hall of India.</li> <li>2. B.Mohamed Ibrahim, (2005) Linux Practical Approach, Firewall Media.</li> </ol>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Silberchatz, Galvin, Gagne, (2003), Operating Systems Concepts, 6<sup>th</sup> Edition Wiley India Edition.</li> <li>2. JhonGoerzen, (2002), Linux Programming Bible, 4<sup>th</sup> Edition, Wiley- dreamtech India (P) Ltd.</li> </ol>
<b>Website and e-Learning Source</b>	<ol style="list-style-type: none"> <li>1. <a href="https://www.webopedia.com/TERM/O/operating_system.html">https://www.webopedia.com/TERM/O/operating_system.html</a></li> <li>2. <a href="https://www.tutorialspoint.com/operating_system/operating_system_tutorial.pdf">https://www.tutorialspoint.com/operating_system/operating_system_tutorial.pdf</a></li> <li>3. <a href="http://iips.icci.edu.iq/images/exam/Abraham-Silberschatz-Operating-System-Concepts---9th2012.12.pdf">http://iips.icci.edu.iq/images/exam/Abraham-Silberschatz-Operating-System-Concepts---9th2012.12.pdf</a></li> <li>4. <a href="https://www.informatics.indiana.edu/rocha/academics/i101/pdfs/os_intro.pdf">https://www.informatics.indiana.edu/rocha/academics/i101/pdfs/os_intro.pdf</a></li> <li>5. <a href="https://www.youtube.com/watch?v=oJMYYMIGVMU">https://www.youtube.com/watch?v=oJMYYMIGVMU</a></li> </ol>

### Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
<b>CLO1</b>	Outline the fundamental concepts of an OS and their respective functionality
<b>CLO2</b>	Demonstrate the importance of open-source operating system commands
<b>CLO3</b>	Identify and stimulate management activities of operating system
<b>CLO4</b>	Analyze the various services provided by the operating system
<b>CLO5</b>	Interpret different problems related to process, scheduling, deadlock, memory and files

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
<b>CLO1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>CLO2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>
<b>CLO3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>CLO4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>CLO5</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>Weightage of course contribute to eachPSO</b>	<b>15</b>	<b>12</b>	<b>11</b>	<b>13</b>	<b>12</b>	<b>12</b>

<b>Title of the Course</b>		<b>DIGITAL COMPUTER ARCHITECTURE</b>					
<b>Paper Number</b>		<b>ELECTIVE II (EC2)</b>					
<b>Category</b>	Elective	<b>Year</b>	I	<b>Credits</b>	3	<b>Course Code</b>	
		<b>Semester</b>	I				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>	<b>Total</b>		
		4	1	-	5		
<b>Pre-requisite</b>		Basic knowledge in Digital Design and Computer Architecture					
<b>Objectives of the Course</b>		To provide a comprehensive introduction of the basic design of a computer and the interdependence and interoperation between the various components inside a computer					
<b>Course Outline</b>							
		<p><b>UNIT-I :</b></p> <p>Data Representation - Data Types - Number Systems - Decimal and Alphanumeric Representation - Complements - (r-1)'s complement - (r's) complement - Fixed-point Representation - Floating-point Representation - Binary Codes - Gray Codes - Decimal Codes - Alphanumeric Codes – Error Detection Codes</p>					
		<p><b>UNIT-II :</b></p> <p>Digital Computers - Logic Gates - Boolean Algebra - K-Map Simplification - Combinational Circuits - Half Adder - Full Adder - SR, D, JK and T Flip Flops - Sequential Circuits - State Table - State Diagram - Digital Components: Integrated Circuits - Decoders - NAND Gate Decoder - Encoders - Multiplexers - Registers - Shift Registers - Binary Counters - Memory Unit</p>					

	<p><b>UNIT-III :</b></p> <p>Register Transfer and Micro-operations: Register Transfer Language - Register Transfer - Bus and Memory Transfers - Arithmetic Micro-operations - Logic Micro-operations - Shift Micro- operations - Arithmetic Logic Shift Unit. Computer Organization and Programming: Instruction Codes - Computer Registers - Computer Instructions - Timing and Control - Instruction Cycle - Memory Reference Instructions - Input-Output and Interrupt</p>
	<p><b>UNIT-IV :</b></p> <p>Central Processing Unit: General Register Organization - Instruction Formats - Addressing Modes - Data Transfer and Manipulation - Program Control. I/O Organization: Peripheral Devices - I/O Interface - Asynchronous Data Transfer - Modes of Transfer - Priority Interrupt - DMA</p>
	<p><b>UNIT-V:</b></p> <p>Memory Organization and CPU: Memory Hierarchy - Main Memory - Auxiliary Memory - Associative Memory - Cache Memory - Virtual Memory - Memory Management Hardware</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>
<p><b>Recommended Text</b></p>	<p>M. Morris Mano, “Computer System Architecture”, Prentice Hall of India, 2001</p>
<p><b>Reference Books</b></p>	<ol style="list-style-type: none"> <li>1. John P. Hayes, “Computer Architecture and Organization”, Tata McGraw Hill, 1996.</li> <li>2. V C Hamatcher et al, “Computer Organization”, Tata McGraw Hill, 1996.</li> </ol>



<b>Website and e-Learning Source</b>	<ol style="list-style-type: none"> <li>1. <a href="http://www.labri.fr/perso/strandh/Teaching/AMP/Common/Strandh-Tutorial/Dir.html">http://www.labri.fr/perso/strandh/Teaching/AMP/Common/Strandh-Tutorial/Dir.html</a></li> <li>2. <a href="http://www.computer-pdf.com/architecture/">http://www.computer-pdf.com/architecture/</a></li> <li>3. <a href="http://www.uotechnology.edu.iq/depcse/lectures/3/">http://www.uotechnology.edu.iq/depcse/lectures/3/</a></li> <li>4. <a href="http://www.csie.nuk.edu.tw/~kcf/course/ComputerArchitecture/">http://www.csie.nuk.edu.tw/~kcf/course/ComputerArchitecture/</a></li> <li>5. <a href="http://www.ecs.csun.edu/~cputnam/Comp546/Putnam/Cache%20Memory.pdf">http://www.ecs.csun.edu/~cputnam/Comp546/Putnam/Cache%20Memory.pdf</a>(UnitV: Cache Memory)</li> </ol>
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### Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
<b>CLO1</b>	Demonstrate the fundamental concept of binary representation and codes, combinational circuits, Instruction formats, register operations and memory organization
<b>CLO2</b>	Explain the various types of flip flops, different types of micro operations, as well as the addressing modes in the instruction set
<b>CLO3</b>	Apply the various number conversion systems and simplification of equations using K-map
<b>CLO4</b>	Analyze the various design of combinational circuits and flip flops to design a computer
<b>CLO5</b>	Distinguish the major components of a computer including CPU, memory, I/O and storage

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
<b>CLO1</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>CLO2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>CLO3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>CLO4</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>
<b>CLO5</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>
<b>Weightage of course contribute to eachPSO</b>	<b>14</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>12</b>	<b>11</b>

<b>Title of the Course</b>		<b>HUMAN COMPUTER INTERACTION</b>					
<b>Paper Number</b>		<b>ELECTIVE II (EC2)</b>					
<b>Category</b>	Elective	<b>Year</b>	I	<b>Credits</b>	3	<b>Course Code</b>	
		<b>Semester</b>	I				
<b>Instructional Hours per week</b>		<b>Lecture</b>	<b>Tutorial</b>	<b>Lab Practice</b>	<b>Total</b>		
		4	1	-	5		
<b>Pre-requisite</b>		Understanding the impact of human factors and Computer Science fundamentals					
<b>Objectives of the Course</b>		To think constructively and analytically in designing and evaluating interactive technologies					
<b>Course Outline</b>							
		<p><b>UNIT-I :</b></p> <p>Foundations: The Human: Introduction-Input-Output Channels- Memory. The Computer: Introduction- Text Entry Devices- Display Devices- Memory. The Interaction: Introduction – Models of Interaction-Frameworks and HCI Ergonomics-Interaction Styles-Elements of the WIMP Interface-Interactivity - The Context of the Interactions</p>					
		<p><b>UNIT-II :</b></p> <p>Design Process: Design Basics- Introduction - Process- User Focus-Scenarios- Navigation Design- Screen Design and Layout-Interaction and Prototyping. Design Rules- Introduction- Principles to Support Usability-Guidelines-Golden Rules and Heuristics-HCI Patterns</p>					
		<p><b>UNIT-III :</b></p> <p>Implementation Support: Introduction - Elements of Windowing Systems - Programming the Application- Using Toolkits-User Interface Management Systems. Evaluation Techniques: What is an Evaluation- Goal of Evaluation- Evaluation Through Expert Analysis-Choosing an Evaluation Method</p>					

	<p><b>UNIT-IV :</b></p> <p>Universal Design: Introduction - Universal Design Principles-Designing for Diversity. User Support: Introduction-Requirements of User Support-Approaches to User Support-Adaptive Help Systems-Designing User Support Systems</p> <p><b>UNIT-V:</b></p> <p>Models: Cognitive Models: Introduction-Goals and Task-Linguistic Models- Challenge of Display Based System-Physical and Device Models - Cognitive Architectures</p>
<p>Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)</p>	<p>Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)</p>
<p>Skills acquired from this course</p>	<p>Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill</p>
<p><b>Recommended Text</b></p>	<p>Alan dix, Janet finlay, Gregory D. Abowd and Russell Beale,(2004),Human Computer Interaction, 3<sup>rd</sup> edition, Pearson Education</p>
<p><b>Reference Books</b></p>	<ol style="list-style-type: none"> <li>1. John C. Caroll, (2002), Human Computer Interaction in the new millennium, Pearson Education</li> <li>2. Jenny Preece, Yvonne Rogers, Helen Sharp (2019), Interaction Design: Beyond Human–Computer Interaction,fifth edition, John Wiley &amp; Sons Inc.</li> </ol>
<p><b>Website and e-Learning Source</b></p>	<ol style="list-style-type: none"> <li>1. <a href="http://courses.iicm.tugraz.at/hci/">http://courses.iicm.tugraz.at/hci/</a></li> <li>2. <a href="http://www.hcibook.com/hcibook/downloads/pdf/exercises.pdf">http://www.hcibook.com/hcibook/downloads/pdf/exercises.pdf</a></li> <li>3. <a href="http://www.idemployee.id.tue.nl/g.w.m.rauterberg/lectures.html">http://www.idemployee.id.tue.nl/g.w.m.rauterberg/lectures.html</a></li> <li>4. <a href="http://user.medunigraz.at/andreas.holzinger/holzinger/papersen/HCI/Workshop/forISSEP%202005.pdf">http://user.medunigraz.at/andreas.holzinger/holzinger/papersen/HCI/Workshop/forISSEP%202005.pdf</a></li> <li>5. <a href="http://universaldesign.ie/What-is-Universal-Design/The-7-Principles/">http://universaldesign.ie/What-is-Universal-Design/The-7-Principles/</a> (Unit IV: Universal Design Principles)</li> </ol>

**Course Learning Outcome (for Mapping with POs and PSOs)**

Students will be able to

<b>CO's</b>	<b>Course Outcomes</b>
<b>CLO1</b>	Describe typical human-computer interaction (HCI) models, styles, and various historic HCI paradigms
<b>CLO2</b>	Identify the usability and the beneficiary factors of User support systems
<b>CLO3</b>	Analyze the core theories, models and methodologies in the field of HCI
<b>CLO4</b>	Evaluate interactive systems based on the human factor theories
<b>CLO5</b>	Elaborate an interactive system based on the design principles, standards and guidelines

<b>CO/PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PSO6</b>
<b>CLO1</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>CLO2</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>CLO3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CLO4</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>CLO5</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>3</b>
<b>Weightage of course contribute to each PSO</b>	<b>15</b>	<b>11</b>	<b>8</b>	<b>13</b>	<b>13</b>	<b>13</b>