

**ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN  
(AUTONOMOUS)**

**Re-accredited with B<sup>++</sup> by NAAC in 3<sup>rd</sup> cycle**  
**(Run by Hindu Religious and Charitable Board under the Aegis of**  
**Arulmigu Dhandayuthapani Swamy Thirukovil, Palani)**  
**(Affiliated to Mother Teresa Women's University, Kodaikanal)**  
**Chinnakalayamputhur (PO), Palani 624 615.**

Curriculum Framework and Syllabus for Outcome Based Education in

**MASTER OF SCIENCE  
(COMPUTER SCIENCE)**

**(PROGRAMME CODE: PGCSS)**

**(Based on the syllabus recommended by TANSCHÉ)**

Degree Programme for the students admitted from the Academic year  
**2022-2023 Onwards**



**PG DEPARTMENT OF COMPUTER SCIENCE**

---

## **ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN**

### **INSTITUTIONAL VISION AND MISSION**

#### **VISION**

- Enlightenment and Empowerment of Rural Women

#### **MISSION**

- To imbibe research activity and collaborative programs with our local communities.
- High quality teaching, providing learning environment with practical exposure.
- Encouragement of a questioning spirit and self-reliance.
- Strong and support education for the students employability

### **PG DEPARTMENT OF COMPUTER SCIENCE**

#### **VISION**

- Employing women in the field of Information Technology.
- Molding rural women into Future Leaders.

#### **MISSION**

- Training students in latest trends in IT Field.
- Motivating students to organize IT related competitions.
- Conducting special lectures for the students to advance the state of the art in computer science and IT Field.
- Training students to do projects in recent technologies.

## **M.Sc (COMPUTER SCIENCE)**

### **REGULATION FOR ADMISSION**

#### **1. Preamble**

Computer Science department was established in 1998 as self supporting department with the curriculum specifically designed to reflect the depth and breadth of computer science. To encourage young rural women students to adopt higher education, M.Sc Computer Science Programme is added in the department in 2005. Expert members from Academia and Industry provide inputs in introducing specialized courses in the curriculum to suit industry needs. To further enhance the quality of the programme, the department adheres Outcome Based Education (OBE) 2019-2020 onwards.

#### **2. Eligibility for Admission**

Candidates for admission to the M.Sc (Computer Science) course (Full-Time) should possess a B.Sc (Computer Science) / B.Sc(IT)/ B.Sc(CT) / BCA or any equivalent degree with a minimum aggregate of 55% marks in Part III Subjects.

#### **3. Duration of the Course**

Full-Time M.Sc (Computer Science) Degree course shall be divided into four semesters of two years duration.

#### **4. Eligibility for the Degree**

- Candidates for the degree shall besides undergoing the prescribed course of the study, do practical work like case study, project report, prescribed field training etc., under the guidance of staff members and the Head of the Department.
- No candidate shall be eligible for the degree unless she has completed the prescribed course of the study in an Institution and has passed the prescribed examinations.
- No candidate shall be admitted to the examination unless she has put in not less than 60% attendance in terms of total number of working days and has produced a certificate from the Head of the Institution where she has studied that her progress and conduct have been satisfactory.

#### **5. Passing Rules**

75% of marks are allotted for external evaluation and 25% of the marks are allotted for internal evaluation in each of the theory subjects.

60% of marks are allotted for external evaluation and 40% of the marks are allotted for internal evaluation in each of the practical subjects.

A Candidate is deemed to have passed in a subject if she gets a **minimum of 50%** of the total marks taking the University examination.

#### 6. Distribution of Marks for External Examinations

Course	External (75 Marks)	Average of Passing Minimum
PG	38/75 (50%)	50/100

#### 7. Pattern of Evaluation

For each paper there will be Internal Assessment (IA) and Semester Examination (External).

	Int.	Ext.	Total
Theory	25	75	100
Practical	40	60	100
Project	50	150	200

#### 8. Internal Assessment Components

##### Theory

Test	-	15
Assignment	-	5
Seminar	-	5
		-----
		25
		-----

#### 9. Content Delivery Methods

- Lecture method
- Group Discussion
- ICT

**10. Pattern of the Question Paper(Internal)****Maximum: 30 marks****Time: 2 Hours****Part – A****I. Answer the following questions(Either or Choice)****(2\*5=10)****Part – B****II. Answer the following questions(Either or Choice)****(2\*10=20)****11. Pattern of the Question Paper(External)****Maximum: 75 marks****Time: 3 Hours****Part – A****I. Answer any FIVE out of EIGHT questions****(5\*3=15)**

Each unit must have ONE or TWO questions

**Part – B****II. Answer the following questions (Either or Choice)****(5\*6=30)**

ONE question from each unit

**Part – C****III. Answer any THREE out of FIVE questions****(3\*10=30)**

ONE question from each unit

## **BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN**

**K1**-Knowledge; **K2**- Comprehension; **K3**- Application; **K4**-Analysis;  
**K5**- Synthesis; **K6**-Evaluation;

### **1. External Question Pattern : Theory – 75 Marks (3 Hours)**

Bloom's Category	Section	Marks	Course Outcomes	Description	Total
K1, K2	Part-A (5 Out of 8)	<b>5 x 3 = 15</b>	CO1,CO2	Short Answers	<b>75</b>
K3, K4 & K5	Part-B (Either or Choice)	<b>5 x 6 = 30</b>	CO2,CO3	Descriptive / Detailed	
K4, K5 & K6	Part-C (3 Out of 5)	<b>3 x 10 = 30</b>	CO4,CO5	Descriptive / Detailed	

### **2. Internal Question Pattern : Theory – 30 Marks (2 Hours) (Converted into 15 Marks )**

Bloom's Category	Section	Marks	Course Outcomes	Description	Total
K1, K2 & K3	Part-A (Either or Choice)	<b>2 x 5 = 10</b>	CO1,CO2	Short Answers /Descriptive	30 (Converted into 15 Marks)
K4, K5 & K6	Part-B (Either or Choice)	<b>2 x 10 = 20</b>	CO3, CO4,CO5	Descriptive / Detailed	

### **3. External Practical Examinations:**

Knowledge Level	Section	Marks
K3	Practical & Record Work	<b>60</b>
K4		
K5		

**ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN  
(AUTONOMOUS)**

**Nationally Re-accredited with B<sup>++</sup> by NAAC in 3<sup>rd</sup> Cycle**

(Run by Arulmigu Dhandayuthapani Swami Thirukovil, H.R & C.E (Admin) Dept. Govt. of Tamilnadu)  
A Government Aided College - Affiliated to Mother Teresa Women's University, Kodaikanal)  
Chinnakalyamputhur, Palani -624 615.

**Curriculum Framework and syllabus for Outcome Based Education in  
Master of Science  
(Computer Science)  
(For the students Admitted from the Academic year 2022-2023)**

**BOARD OF STUDIES MEETING HELD ON 11.05.2022**

**UNIVERSITY NOMINEE**

**Dr.(Mrs) S.VIMALA,**  
Associate Professor,  
Department of Computer Science,  
Mother Teresa Women's University,  
Attuvampatty,  
Kodaikanal – 624 101.  
**Contact No. : 9444690081**

*[Signature]*  
11/5/2022

**SUBJECT EXPERTS**

**Dr. M. DEEPAMALAR,**  
Associate Professor & Head,  
Department of Computer Science,  
Parvathy's Arts and Science College,  
Winsdom City, Madurai Road,  
Begampur (PO), Dindigul 624 002.  
**Contact No. : 8270909398**

*[Signature]*  
11/5/22

**Dr. K.R.ANANTH,**  
Associate Professor & Head,  
School of Computer Science,  
VET Institute of Arts and Science College (Co-Ed),  
Thindal, Erode-12.  
**Contact No. : 9965812134**

*[Signature]*  
11/5/22

*[Signature]*  
**HOD**  
11/5/2022

*[Signature]*  
**DEAN**  
11.5.22

*[Signature]*  
**PRINCIPAL**  
11/05/22

**SEMESTER-WISE DISTRIBUTION OF COURSES WITH  
SCHEME OF VALUATION  
UNDER CBCS PATTERN  
OUTCOME BASED EDUCATION (OBE)**

SEM.	SUBJECT CODE	TITLE OF THE PAPER	HOURS	CREDITS	MARKS			Exam (Hrs)
					INT.	EXT.	TOT.	
SEMESTER I								
I	APCSC1	Core Paper I: Discrete Structures	5	4	25	75	100	3
	APCSC2	Core Paper II: Advanced Java Programming	5	4	25	75	100	3
	APCSC3	Core Paper III: Advanced Operating System Concepts	5	4	25	75	100	3
	APCSL1	Core IV - Practical I: Advanced Java Programming	5	4	40	60	100	3
	APCSL2	Core V - Practical II: Advanced Web Technology	5	4	40	60	100	3
	APCSE1	ELECTIVE I 1. Data Mining and Warehousing 2. Artificial Intelligence and Machine Learning	5	4	25	75	100	3
		Total	30	24			600	
SEMESTER II								
II	APCSC4	Core Paper VI: Cryptography and Network Security	5	4	25	75	100	3
	APCSC5	Core Paper VII: Internet of Things and its Applications	5	4	25	75	100	3
	APCSC6	Core Paper VIII: Advanced Python Programming	5	4	25	75	100	3
	APCSL3	Core IX - Practical III: Advanced Python Programming	5	4	40	60	100	3
	APCSL4	Core X - Practical IV: Dot Net Framework	5	4	40	60	100	3
	APCSE2	ELECTIVE II 1. Grid and Cloud Computing 2. Principles of Compiler Design	5	4	25	75	100	3
		Total	30	24			600	



SEMESTER III								
III	APCSC7	<b>Core Paper XI:</b> Big Data Science and Analytics	5	4	25	75	100	3
	APCSC8	<b>Core Paper XII:</b> Advanced Software Engineering	5	4	25	75	100	3
	APCSC9	<b>Core Paper XIII:</b> PHP and MYSQL	5	4	25	75	100	3
	APCSL5	<b>Core XIV- Practical V:</b> PHP and MYSQL	5	4	40	60	100	3
	APCSL6	<b>Core XV - Practical VI:</b> Advanced MATLAB	5	4	40	60	100	3
	APCSE3	<b>ELECTIVE III</b> 1. Mobile Application Development 2. System Software	5	4	25	75	100	3
		<b>Total</b>	<b>30</b>	<b>24</b>			<b>600</b>	
SEMESTER IV								
IV	APCSL7	<b>Core XVI - Practical VII:</b> Advanced R Programming	5	4	40	60	100	3
	APCSPR	<b>Core XVII:</b> Project Work	20	10	50	150	200	3
	APCSE4	<b>ELECTIVE IV</b> 1. Digital Image Processing 2. Soft Computing 3. MOOC Online Educational Course	5	4	25	75	100	3
		<b>Total</b>	<b>30</b>	<b>18</b>			<b>400</b>	
		<b>Grand Total</b>	<b>120</b>	<b>90</b>			<b>2200</b>	

**DISTRIBUTION OF CORE AND ELECTIVE**

CORE	: 17 (9 Theory + 7 Lab + 1 Project)
ELECTIVE	: 04
TOTAL MARKS	: 2200
TOTAL CREDITS	: 90

**LIST OF ELECTIVE PAPERS****ELECTIVE I:**

1. Artificial Intelligence and Machine Learning
2. Data Mining and Warehousing

**ELECTIVE II:**

1. Grid and Cloud Computing
2. Principles of Compiler Design

**ELECTIVE III:**

1. Mobile Application Development
2. System Software

**ELECTIVE IV:**

1. Digital Image Processing
2. Soft Computing
3. MOOC Online Educational Course

**PROGRAM OUTCOMES**

Upon successful completion of the programme, the student will be able to

<b>PO1</b>	Communicate Computer Science concepts, designs, and solutions effectively and professionally.
<b>PO2</b>	Apply knowledge of computing to produce effective designs and solutions for specific problems.
<b>PO3</b>	Employ latest and updated tools and technologies to solve complex issues.
<b>PO4</b>	Use software development tools, software systems, and modern computing platforms.
<b>PO5</b>	Optimism, flexibility and diligence that would make them professionally competent.

**PROGRAM SPECIFIC OUTCOMES**

Graduate with a M.Sc. in Computer Science will have the ability to

<b>PSO1</b>	Apply standard Computer science practices and strategies in real-time software project development using open-source programming environment or commercial environment to deliver quality product for the organization success.
<b>PSO2</b>	Understand the concepts and applications in the field of Computer Science like Web designing and development, Mobile application development, and Network communication technologies.
<b>PSO3</b>	Able to pursue research in Data mining, Image processing and Networking areas and implement his work in MATLAB and .Net environment.
<b>PSO4</b>	Ability to understand the structure and development methodologies of software systems.
<b>PSO5</b>	Apply the acquired knowledge to develop software and innovative solutions by adopting emerging technologies.

## PROGRAM EDUCATIONAL OBJECTIVES

After few years from the completion of M.Sc programme, the students will be able to

<b>PEO1</b>	Work productively as successful Computer professionals in diverse career paths including supportive and leadership roles on multidisciplinary teams or be active in higher studies..
<b>PEO2</b>	Communicate effectively, recognize and incorporate societal needs and constraints in their professional endeavors and practice their profession with high regard to Ethical responsibilities.
<b>PEO3</b>	Engage in life-long learning and to remain current in their profession to foster personal and organizational growth.
<b>PEO4</b>	They will be efficient individual and team performers who would deliver excellent professional service exhibiting progress, flexibility, transparency, accountability and in taking up initiatives in their professional work.
<b>PEO5</b>	They will engage locally and globally evincing social and environmental stewardship demonstrating civic responsibilities and employing right skills at the right moment.

## MAPPING INSTITUTION MISSION WITH PROGRAMME EDUCATIONAL OBJECTIVES

Mapping				
	<b>IO1</b>	<b>IO2</b>	<b>IO3</b>	<b>IO4</b>
<b>PEO1</b>		*		*
<b>PEO2</b>	*	*	*	
<b>PEO3</b>		*	*	*
<b>PEO4</b>	*			*
<b>PEO5</b>	*	*	*	

**CORE I****APCSC1 - DISCRETE STRUCTURES****Hours : 5****Credits : 4****Semester : I****Preamble**

The main objective of this course is to introduce the basic terminology used in Computer application. This emphasizes the development of rigorous logical thinking for solving different kinds of problems that occur in computer applications. This course aims at giving adequate exposure in the theory and applications of Set theory, relations, functions, graph theory and Automata theory.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Recognize mathematical logics to solve computational problems	Comprehension (Level K2)
CO2	Examine the concepts of sets, relations and functions	Application(Level K3)
CO3	Formulate problems and solve recurrence relations	Application(Level K3) Analysis (Level K4)
CO4	Develop solutions for real world problems using graph theory	Synthesis (Level K5)
CO5	Evaluate the real world problems using graph theory	Evaluation (Level K6)

**COURSE CONTENT****UNIT-I:**

**Mathematical Logic:** Introduction – Propositions – Connectives – Order of Precedence for Logic Connectives – Conditional and Bi-Conditional Propositions – Tautology and Contradiction – Equivalence of Propositions – Duality Law – Algebra of Propositions – Tautological Implication – Normal Forms.

**UNIT-II:**

**Set Theory:** Introduction – Basic Concepts and Notations – Ordered Pairs and Cartesian Products – Set Operations.

**Relations:** Type of Relations – Some Operations on Relations – Composition of Relations – Properties of Relations – Partition of a Set - Matrix Representation of Relations by Graphs – Representation of Relations by Graphs.

**UNIT-III:**

**Functions:** Introduction – Representation of a Function – Types of Functions – Classification of Functions –Composition of Functions – Inverse of Function – Binary n-ary Operations –Properties of Binary Operations.

**UNIT-IV:**

**Graph Theory:** Introduction –Basic Definitions –Degree of a Vertex – Some Special Simple Graphs - Matrix Representation of Graphs – Paths, Cycles and Connectivity – Eulerian and Hamiltonian Graphs – Connectedness in Directed Graphs – Shortest Path Algorithms.

**UNIT-V:**

**Formal Languages and Automata Theory:** Introduction –Phrase – Structure Grammar – Types of Phrase –structure Grammar – Backus-Naur Form (BNF).

**Finite State Machine:** Input and Output Strings for FSM – Finite State Automata(FSA).

**TEXT BOOK**

- T.Veerarajan, *Discrete Mathematics with Graph Theory and Combinatorics*, McGraw Hill, 2007.

**REFERENCE BOOK**

- C.L.Liu, *Elements of Discrete Mathematics*, 2<sup>nd</sup> Edition, McGraw Hill, 1985.

**WEBLIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_cs49/preview](https://onlinecourses.nptel.ac.in/noc22_cs49/preview)
- [https://onlinecourses-archive.nptel.ac.in/noc19\\_cs20](https://onlinecourses-archive.nptel.ac.in/noc19_cs20)
- [https://onlinecourses.nptel.ac.in/noc22\\_cs04/preview](https://onlinecourses.nptel.ac.in/noc22_cs04/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs36/preview](https://onlinecourses.nptel.ac.in/noc21_cs36/preview)
- <http://discrete.openmathbook.org/>
- <http://math.oscarlevin.com/>
- <http://www.researchgate.net>
- <http://www.cs.uh.edu>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	H	H	L	H
<b>CO2</b>	L	M	H	H	H
<b>CO3</b>	M	H	H	H	M
<b>CO4</b>	H	M	H	M	H
<b>CO5</b>	H	H	H	H	M

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE II****APCSC2 - ADVANCED JAVA PROGRAMMING****Hours : 5****Credits : 4****Semester : I****Preamble**

This course helps the students to understand the advanced features of java programming such as applet, servlet, java beans, RMI and JDBC.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Understand the logics of applets, AWT event handling, Servlet and RMI	Comprehension (Level K2)
CO2	Write Servlets to access database using Java Data Base Connectivity (JDBC)	Application(Level K3)
CO3	Applications of database using Java Data Base Connectivity (JDBC)	Application(Level K3)
CO4	Demonstrate capabilities of server using the concept of Servlet	Analysis(Level K4)
CO5	Validate remote methods in an application using Remote Method Invocation (RMI)	Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

**Applet And Graphics:** Applet life cycle - Applet methods - Passing parameters to Applets - `getDocumentBase()` and `getCodeBase()` - Using images - Applet interfaces - Difference between Applet and Application Program - Drawing lines and different Shapes - Clipping.



**UNIT-II:**

**AWT And Event Handling:** Introduction – Component – Frame - Button class - Layout Management – Insets – Canvas – Label - Text field- Check box - Check box group – Choice – List – Menu - Event handling - Adapter class.

**UNIT-III:**

**Servlet:** Introduction – DHTML - CGI Script - Java Servlet - Servlet Container - Servlet Life Cycle - Servlet Interface - Generic Servlet class - HttpServlet Class - HttpServlet Interface - getOutputStream method - setHeader() method - parameter passing to servlet - More about Servlet Owner - Java Web Server and Cookies.

**UNIT-IV:**

**JDBC:** Introduction – Introduction to SQL – Database connectivity – ODBC and JDBC API – JDBC application architecture – Steps for creating ODBC DSN – The statement object – Working with Resultset

**Java Beans:** Introduction – Getting started for Beans – Using BDK Demonstration Beans – Saving and restoring Beans – Building an applet from BeanBox – Create your own bean – InfoBus – Java Activation Framework – Enterprise JavaBeans – The JavaBean bridge for ActiveX – Other Bean Development Tools

**UNIT-V:**

**Networking:** TCP/IP - UDP/IP - IP Address – DNS – Port – URL - Socket Programming using TCP/IP and UDP/IP

**RMI:** Introduction - RMI Packages - Programming using RMI – RMI Enhancements

**TEXT BOOK**

- R.Krishnamoorthy and S.Prabhu, *Internet and Java Programming*, 1<sup>st</sup> Edition, New Age International Publications, 2013.

**REFERENCE BOOKS**

- Herbert Schildt, *Java2: The Complete Reference*, 5<sup>th</sup> Edition, Tata McGraw Hill, 2013
- Dr. C.Muthu, *Essentials of Java programming*, 2<sup>nd</sup> Edition, Vijay Nicole Imprints Pvt. Ltd., 2011.
- K.Somasundaram, *Advanced Java Programming in Java2*, 1<sup>st</sup> Edition, Jaico Publishing House, Mumbai, 2008.

**WEBLIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_cs47/preview](https://onlinecourses.nptel.ac.in/noc22_cs47/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs03/preview](https://onlinecourses.nptel.ac.in/noc21_cs03/preview)
- <http://www.javatpoint.com>
- <https://www.tutorialspoint.com>
- <https://www.geeksforgeeks.com> e-resources
- <https://epathshala.nic.in/>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	H	M	H	L
<b>CO2</b>	H	M	H	H	H
<b>CO3</b>	M	H	M	H	H
<b>CO4</b>	H	H	H	M	H
<b>CO5</b>	H	H	H	H	M

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE III****APCSC3 - ADVANCED OPERATING SYSTEM CONCEPTS****Hours : 5****Credits : 4****Semester : I****Preamble**

This course intended to give students a thorough understanding of design and implementation issues for modern multicore operating systems and helps the students to learn the theoretical foundation of clock, mutual exclusion, deadlock detection, resource sharing and concurrency control in distributed environment.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Understand the concepts of distributed operating system	Comprehension (Level K2)
CO2	Describe the concepts of distributed operating system	Comprehension (Level K2)
CO3	Apply the concepts of synchronization and handle Deadlocks	Application(Level K3)
CO4	Examine the functionalities of distributed resource management	Analysis(Level K4)
CO5	Evaluate various operating systems such as multiprocessor operating system and database operating system	Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

**Process Synchronization:** Overview - Functions of an OS – Design approaches. **Synchronization mechanisms:** Concept of a process – concurrent process – Critical section problem – Other synchronization problems. **Process Deadlocks:** Preliminaries – Models of Deadlocks – Models of resources – A Graph theoretic model of a system state – Systems with only reusable Resources.

**UNIT-II:**

**Distributed Mutual exclusion:** Preliminaries – Non- Token based and Token Based Algorithms. **Distributed Deadlock detection:** Deadlock handling strategies – Control organization for Distributed Deadlock Detection.

**UNIT-III:**

**Distributed Resource Management:** Architecture – Mechanisms – Design Issues – **Distributed shared memory:** Architecture – Algorithms for Implementing DSM – Memory coherence – Coherence protocols. **Distributed scheduling:** Issues in Load Distributing – components – Load distributing algorithms.

**UNIT-IV:**

**Multiprocessor Operating Systems:** Motivations – Basic Multiprocessor System Architectures – Interconnection Networks – Caching – MOS Structures – Threads – Process Synchronization – Processor Scheduling – Memory Management.

**UNIT-V:**

**Database Operating Systems:** Introduction – Concurrency Control: Introduction -Database Systems : Transactions – Transaction Processing – Serializability Theory – Distributed database systems : Transaction Processing Model - Serializability Condition in DDBS – Data Replication – Complications due to Data Replication.

**LINUX:** What is Linux? - Free Software – Where I can use Linux? Linux Kernel – Linux Distributions. Linux Essential Commands – File system Concept – Standard Files – Vi Editor.

**TEXT BOOK**

- Mukesh Singhal, Niranjana G.Shivaratri, *Advanced Concepts in Operating Systems: Distributed, Database and Multiprocessor Operating Systems*, TMH, 2001.
- Machtelt Garrels, “*Introduction to Linux*”, Third Edition, Fultus Corporation Ltd., 2010.

**REFERENCE BOOKS**

- Andrew S. Tanenbaum, *Modern Operating System*, 4<sup>th</sup> Edition, PHI , 2003.
- Pradeep K.Sinha, *Distributed Operating System concepts and Design*, PHI, 2003.

**WEBLIOGRAPHY**

- <https://www.edx.org/course/computer-hardware-and-operating-systems>
- <https://edu.gcfglobal.org/en/computerbasics/understanding-operating-systems/1/>
- <https://whatis.techtarget.com/definition/operating-system-OS>
- <https://www.computerhope.com/jargon/o/os.htm>
- <https://www.geeksforgeeks.org/introduction-of-operating-system-set-1/>
- <https://www.guru99.com/operating-system-tutorial.html>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	M	H	H	M
<b>CO2</b>	H	H	M	H	L
<b>CO3</b>	M	M	M	H	M
<b>CO4</b>	H	H	H	H	H
<b>CO5</b>	H	H	H	M	H

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE IV PRACTICAL - I**  
**APCSL1 - ADVANCED JAVA PROGRAMMING**

**Hours : 5**

**Credits : 4**

**Semester : I**

**Preamble**

This course helps the students to develop projects using advanced features of java programming such as applet, servlet, java beans, RMI and JDBC.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Execute interactive web pages using HTML and JavaScript	Application(Level K3)
CO2	Apply interactive web pages using HTML and JavaScript	Application(Level K3)
CO3	Acquire knowledge about Servlet and RMI	Analysis(Level K4)
CO4	To connect java program with external database using JDBC	Synthesis(Level K5)
CO5	Evaluate with external database using JDBC	Synthesis(Level K5)

**PROGRAM LIST**

1. Program to display life cycle of an applet.
2. Program to display digital clock using applet
3. Program to display different graphical Shapes in applet.
4. Program to display graphical bar chart by passing parameters in applet
5. Program to find factorial of N using AWT high level event handling.
6. Program to illustrate window closing using AWT low level event handling.
7. Program to find sum of digits using RMI.
8. Program to find length of the given string using RMI.
9. Program to compute factorial of N using Servlet.

10. Program to compute factorial value of N using Servlet.

11. Program to display student mark statement using Servlet and JDBC.

### WEBLIOGRAPHY

- [https://onlinecourses.nptel.ac.in/noc22\\_cs47/preview](https://onlinecourses.nptel.ac.in/noc22_cs47/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs03/preview](https://onlinecourses.nptel.ac.in/noc21_cs03/preview)
- <http://www.javatpoint.com>
- <https://www.tutorialspoint.com>
- <https://www.geeksforgeeks.com> e-resources
- <https://epathshala.nic.in/>

Mapping					
	PO1	PO2	PO3	PO4	PO5
CO1	H	H	M	M	H
CO2	H	H	H	H	M
CO3	H	H	M	H	M
CO4	M	H	H	H	H
CO5	H	L	H	M	H

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE V PRACTICAL - II****APCSL2 - ADVANCED WEB TECHNOLOGY****Hours : 5****Credits : 4****Semester : I****Preamble**

This course enable the students to learn the concepts of designing the websites using HTML, CSS, JavaScript and JSP.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Create web pages using HTML and CSS	Application(Level K3)
CO2	Describe web pages using HTML and CSS	Application(Level K3)
CO3	Apply JavaScript for interactive web pages	Application(Level K3)
CO4	Validate server side scripting using JSP	Synthesis(Level K5)
CO5	Evaluate server side scripting using JSP	Synthesis(Level K5)

**PROGRAM LIST**

1. Simple HTML Page using formatting tags, table, image and frames
2. Create a HTML file by applying the different styles using inline, external and internal style sheets.
3. Design a web page using CSS
4. Prepare a resume using forms
5. Website Design for a Department (or) College (or) Company etc.
6. Create a Link to a CSS to display student information
7. Java Script for a Mathematical Calculator
8. Java Script – Number Puzzle



9. Java script-Games using Random number generation
10. Java script- To show Light on/ off
11. Java script- Creating and reading Cookies .
12. Validation of name, mobile number, date of birth, email id using Java Script
13. Online Quiz using JSP
14. Perform Arithmetic operations using JSP
15. Generate Fibonacci series using JSP

### WEBLIOGRAPHY

- <https://www.edx.org/professional-certificate/harvardx-computer-science-for-web-programming>
- <https://www.w3schools.com>
- <https://www.php.net.in>
- <http://html.net>
- <http://www.programmersneed.com> e-resources
- <https://epgp.inflibnet.ac.in> T. Y

Mapping					
	PO1	PO2	PO3	PO4	PO5
CO1	H	H	H	M	H
CO2	H	H	M	H	H
CO3	H	H	M	H	M
CO4	M	H	H	H	H
CO5	H	M	H	H	L

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**ELECTIVE 1.1****APCSE1 - ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING****Hours : 5****Credits : 4****Semester : I****Preamble**

This course offers knowledge about fundamentals of knowledge representation for problem solving, learning methods of Artificial Intelligence. It also helps the students to understand the deeper concepts of Machine Learning and Algorithms

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Understand the basic concepts of Artificial Intelligence and machine learning algorithms	Comprehension (Level K2)
CO2	Classify strength and weakness of different problem solving techniques	Comprehension (Level K2)
CO3	Apply Artificial Intelligence and Machine Learning Techniques to solve real world problems	Application(Level K3)
CO4	Examine the different heuristic techniques for problem solving and create new solutions	Analysis(Level K4)
CO5	Evaluate various Programming Environment used to Develop Machine Learning Algorithms	Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

**Introduction:** Definition of AI - AI Problems – Topics of AI – Production Systems – State space Representation - Applications of AI

**UNIT-II:**

**Heuristic Search Techniques:** Generate and Test - Hill Climbing - Search techniques - Problem Reduction – Constraint Satisfaction – Means –end- Analysis.

**UNIT-III:**

**Game Playing:** MINIMAX Procedure – ALPHA-BETA Pruning – Combined Approach  
Knowledge representation: – Knowledge Management – types of Knowledge – Knowledge representation – Approaches to knowledge Representation - Issues in Knowledge representation – Reasoning

**UNIT-IV:**

Learning –Association Learning - clustering: K-means clustering – Fuzzy clustering – Hierarchical Clustering – Reinforcement Learning: Markov Decision Problem - Q- Learning – Learning Automata – Statistical Learning: Hidden Markov Models – Linear Classifiers – Quadratic Classifiers –Decision Trees – Bayesian Networks

**UNIT-V:**

Supervised Learning: Support Vector - Case-based Reasoning – Ensemble Classifiers – Nearest Neighborhood – Unsupervised Learning: Expectation maximization – Self organizing Maps – Adaptive Resonance Theory

**TEXT BOOK**

- S.S. Vinod Chandra, S. Anand Hareendran, *Artificial Intelligence and machine Learning*, Eastern Economy Edition, PHI Learning Private Limited, New Delhi, 2014.

**REFERENCE BOOKS**

- Elaine Rich and Kevin Knight, *Artificial Intelligence*, 3/e, Tata McGraw Hill, 2009.
- Donald A. Waterman, *A Guide to Expert Systems*, Tech knowledge Series in Knowledge Engineering, New Delhi, 2003.
- Charnaik, E., C.K. Reiesbeck, and D.V. McDermott, *Artificial Intelligence Programming*, Lawrence Erlbaum Associates, New Jersey, 2000.
- Stephen Marsland, *Machine Learning: An Algorithmic Perspective*, Chapman and Hall, 2009.

**WEBLIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_cs56/preview](https://onlinecourses.nptel.ac.in/noc22_cs56/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs42/preview](https://onlinecourses.nptel.ac.in/noc21_cs42/preview)
- [http://www.nist.gov/artificial\\_intelligence](http://www.nist.gov/artificial_intelligence)
- [http://www.fda.gov/medical\\_devices/software\\_medical\\_device\\_artificial\\_intelligence\\_and\\_machine\\_Learning](http://www.fda.gov/medical_devices/software_medical_device_artificial_intelligence_and_machine_Learning)
- [http://medium.com/swlh/top\\_20\\_websites\\_for\\_machine\\_Learning\\_and\\_data\\_science](http://medium.com/swlh/top_20_websites_for_machine_Learning_and_data_science)
- <http://www.frontiersin.org/articles>

Mapping					
	PO1	PO2	PO3	PO4	PO5
CO1	H	H	M	H	H
CO2	H	M	H	M	H
CO3	M	H	H	M	H
CO4	H	H	H	H	M
CO5	H	H	H	L	H

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**ELECTIVE 1.2****APCSE1 - DATA MINING AND WAREHOUSING****Hours : 5****Credits : 4****Semester : I****Preamble**

This course enables the students to learn the concepts of data mining tasks, classification, clustering and web mining. It also imparts the storage of heterogeneous data in data warehousing.

**Course Outcomes**

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

CO	COURSE OUTCOMES	Blooms' Taxonomy Level
CO1	Understand the basic Concepts of data mining and data warehousing	Comprehension (Level K2)
CO2	Analyze various data mining techniques like classifications, clustering, association rule mining, prediction and related algorithm	Comprehension (Level K2)
CO3	Choose appropriate data mining techniques to carry out simple data mining tasks	Application(Level K3)
CO4	Develop data mining algorithms to store heterogeneous data	Analysis(Level K4)
CO5	Evaluate various Data mining concepts and techniques	Synthesis(Level K5)

**COURSE CONTENT****UNIT – I:**

**Introduction:** Definition – Kind of Data – Data Mining Functionalities.

**Data Preprocessing:** Data Cleaning – Data Integration and Transformation – Data Reduction

**UNIT – II:**

**Data Warehouse:** What is a Data Warehouse? – Multidimensional Data Model – Data Warehouse Architecture – Data cube technology.

**UNIT – III:**

**Mining Association Rules in Large Databases:** Association Rule Mining – Mining Single Dimensional Boolean Association Rules from Transactional Databases - Mining Multilevel Association Rules from Transactional Databases – Constraint based Association Mining.

**UNIT – IV:**

**Classification and Prediction:** Issues in Classification and Prediction – Classification by Decision Tree Induction – Bayesian Classification – Prediction – Classifier Accuracy.

**UNIT – V:**

**Clustering Analysis:** Types of Data in Cluster Analysis – Partitioning methods – Hierarchical methods – Density based methods – Outlier Analysis.

**TEXT BOOK:**

- Jewie Han, Michelins Kamber, *Data Mining :Concepts and Techniques*, 3<sup>rd</sup> Edition, 2011.

**REFERENCE BOOKS:**

- Arun K. Pujari , *Data Mining Techniques*, Universities Press, 2001.
- Pang-Ning Tan, Michael Steinbach, Vipin Kumar, *Introduction to Data Mining*, Pearson Education, 2007.

**WEBLIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_cs11/preview](https://onlinecourses.nptel.ac.in/noc22_cs11/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs06/preview](https://onlinecourses.nptel.ac.in/noc21_cs06/preview)
- [http://thesai.org/downloads/data\\_mining\\_web\\_data\\_mining\\_techniques](http://thesai.org/downloads/data_mining_web_data_mining_techniques)
- [http://www.analyticsvidhya.com/introduction\\_to\\_clustering\\_and\\_different\\_methods\\_of\\_clustering](http://www.analyticsvidhya.com/introduction_to_clustering_and_different_methods_of_clustering)
- <http://www.datanovia.com>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	M	M	H	H
<b>CO2</b>	H	H	M	M	H
<b>CO3</b>	H	H	H	M	H
<b>CO4</b>	H	M	H	H	H
<b>CO5</b>	H	H	H	H	L

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE VI****APCSC4 - CRYPTOGRAPHY AND NETWORK SECURITY****Hours : 5****Credits : 4****Semester : II****Preamble**

This course provides an essential study of Computer Security Issues and Methods in Networking Systems. It also helps students to identify Ethical, Professional responsibilities, Risks and Liabilities in Computer and Network Environment.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Describe cryptography and network security concepts and its application	Comprehension (Level K2)
CO2	Get the idea about encryption standards	Comprehension (Level K2)
CO3	Examine various cryptography algorithms	Application(Level K3)
CO4	Validate the authentication using digital signature and authentication protocols	Synthesis(Level K5)
CO5	Evaluate the authentication using digital signature and authentication protocols	Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

**Introduction:** The OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms- **Classical Encryption Techniques** : Symmetric Cipher Model – Substitution Techniques – Transposition Techniques



**UNIT-II:**

**Block Ciphers and the Data Encryption Standards :** Block Cipher Principles – The Data Encryption Standard– **Advanced Encryption Standards:** Evaluation Criteria For AES – The AES Cipher

**UNIT-III:**

**More on Symmetric Cipher:** Multiple Encryption and Triple DES – Block Cipher models of operation. **Confidentially using Symmetric Encryption:** Placement of encryption function – Traffic confidentially – Key distribution – Random number generation

**UNIT-IV:**

**Public Key Cryptography and RSA:** Principles of Public Key Crypto systems – The RSA Algorithm – **Key Management :** Key Management – Diffie Hellman Key Exchange

**UNIT-V:**

**Message Authentication and Hash Functions:** Authentication Requirements - Authentication Functions –Message Authentication Codes – Hash Functions. **Digital Signatures and Authentication Protocols:** Digital Signatures –Authentication Protocols – Digital Signature Standards.

**TEXT BOOK**

- William Stallings, *Cryptography and Network Security Principles and Practices*, 4<sup>th</sup> edition, Pearson Education, 2005.

**REFERENCE BOOK**

- Atul Kahate, *Cryptography and Network Security*, 3<sup>rd</sup> Edition, McGraw Hill Education, 2017.

**WEBLIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_cs03/preview](https://onlinecourses.nptel.ac.in/noc22_cs03/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs43/preview](https://onlinecourses.nptel.ac.in/noc21_cs43/preview)
- <http://www.catonetworks.com/blog/top-15-network-security-websites/>
- <http://williamstallings.com/crypto/crypto4e.html>
- [http://onlinecourses.nptel.ac.in/noc21\\_cs16/preview](http://onlinecourses.nptel.ac.in/noc21_cs16/preview)
- [http://www.vssut.ac.in/lecture\\_notes/lecture1428550736.pdf](http://www.vssut.ac.in/lecture_notes/lecture1428550736.pdf)

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	H	M	M	H
<b>CO2</b>	H	M	M	M	M
<b>CO3</b>	H	M	H	L	M
<b>CO4</b>	H	M	H	H	M
<b>CO5</b>	H	H	H	M	L

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE VII****APCSC5 - INTERNET OF THINGS AND ITS APPLICATIONS****Hours : 5****Credits : 4****Semester : II****Preamble**

This course helps the students to know about the Internet of Things.

**Course Outcome**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Gain and understand the concepts of Internet of Things	Knowledge(Level K1)
CO2	Analyze basic protocols in wireless sensor network	Knowledge(Level K1)
CO3	Understand the application areas of IOT.	Comprehension (Level K2)
CO4	Implement interfacing of various network & communication aspects	Analysis(Level K4)
CO5	Evaluate the various state of the art methodologies	Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

**Introduction to Internet of Things:** Introduction – IoT Applications – Benefits of IoT - Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT & Deployment Templates. **Domain Specific IoTs:** Introduction – Home Automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Health & Life style.

**UNIT-II:**

**IoT and M2M :** Introduction : M2M – Difference between IoT and M2M – SDN and NFV for IoT.

**IoT System Management with NETCONF-YANG :** Need for IoT Systems Management – Simple Network Management Protocol (SNMP) – Network Operator Requirements – NETCONF-YANG – IoT Systems Management with NETCONF\_YANG.

**UNIT-III:**

**IoT Platforms Design Methodology:** Introduction – IoT Design Methodology – Case Study on IoT System for Weather Monitoring – Motivation for using Python.

**IoT Systems –Logical Design using Python:** Introduction – Installing Python – Python Data types & Data Structures – Control Flow – Functions – Modules – Packages – File Handling – Date/Time Operations – Classes – Python packages of Interest for IoT.

**UNIT-IV:**

**IoT Physical Devices & Endpoints:** What is an IoT Device – Exemplary Device: Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces – Programming Raspberry Pi with Python – Other IoT devices.

**IoT Physical Servers & Cloud Offerings :** Introduction to Cloud Storage Models & Communication APIs – WAMP - AutoBahn for IoT– Xively Cloud for IoT – Python Web application Framework-Django – Designing a REST ful Web API – Amazon Web Services for IoT – SkynetIoT messaging platform.

**UNIT-V:**

**Data Analytics for IoT :** Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Oozier – Apache Spark – Apache Storm – Using Apache Storm for Real-time Data Analysis.

**TEXT BOOK**

- Vijay Madisetti, Arshdeep Bahga - *Internet of Things: A Hands-On Approach*, Orient Blackswan Private Limited - New Delhi, 2014.

**REFERENCE BOOKS**

- Waltenegus Dargie and Christian Pollabauer, “*Fundamentals of Wireless Sensor Networks: Theory and Practices*”, John Wiley & Sons Publications, 2010.
- Cuno Pfister and O'Reilly, *Getting Started with the Internet of Things*, 1<sup>st</sup> Edition, Make Community, LLC, 2011.
- Adrian McEwen and Hakin Cassimally, *Designing the Internet of Things*, 1<sup>st</sup> Edition, Willey, 2013.
- Honbo Zhou, *The Internet of Things in the Cloud: A Middleware Perspective*, CRC Press, 2012.

**WEBLIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_cs53/preview](https://onlinecourses.nptel.ac.in/noc22_cs53/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs17/preview](https://onlinecourses.nptel.ac.in/noc21_cs17/preview)
- [http://en.m.wikipedia.org/wiki/internet\\_of\\_things](http://en.m.wikipedia.org/wiki/internet_of_things)
- <http://www.oracle.com/in/internet-of-things/what-is-IOT>
- <http://www.se.com/>
- <http://sites.google.com/site/v3viceIOT/references>
- <http://link.springer.com/chapter/10.1007/978-3-030-41110-7>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	H	H	H	M
<b>CO2</b>	H	H	H	M	H
<b>CO3</b>	M	H	M	H	M
<b>CO4</b>	H	H	H	M	M
<b>CO5</b>	H	M	L	H	H

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE VIII****APCSC6 - ADVANCED PYTHON PROGRAMMING****Hours : 5****Credits : 4****Semester : II****Preamble**

This course helps the students to understand the core concepts of programming in Python such as strings, operators, conditional statements, loops, functions and regular expressions.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Get the basic knowledge about Python Programming	Comprehension (Level K2)
CO2	Apply essential programming concepts like strings, operators, conditional statements, functions, files and exception handling of Python in simple programs	Application(Level K3)
CO3	Analyze various concepts of Python	Analysis (Level K4)
CO4	Acquire the knowledge of problem solving and programming capability in python.	Synthesis (Level K5)
CO5	Evaluate applications using core concepts of Python	Evaluation (Level K6)

**COURSE CONTENT****UNIT-I:**

**Introduction to Python:** Introduction-Python Overview-Getting started with python-Comments-Python identifiers-Reserved Keywords-Variables-Standard data types- Operators-Statements and Expressions-String operations-Boolean expressions.

**Classes and Objects :** Overview of OOP-Class definition-Creating objects-Objects as Arguments-Objects as return value-Build in class attributes-Inheritance-Method overriding-Data encapsulation-Data hiding.

**UNIT-II:**

**Control statements:** The for loop – While Statement – if -if else statement-Input from keyboard`

**Functions :** Introduction-Built –in functions-Type conversion-Type coercion-Date and time-dir() function-help() function-user defined functions-Parameters & arguments-Function calls-The return statement-Python recursive function-The anonymous functions-writing python scripts.

**UNIT-III:**

**Strings :** Strings Compound data type - len function-String slices- Strings are Immutable – String traversal – Escape characters –String formatting operator – String formatting functions.

**Lists :** Values and accessing elements – Lists are Mutable – Traversing a list –Deleting elements from list – Build –in list operators-Built – in list methods.

**UNIT-IV:**

**Tuples :** Creating tuples – Accessing values in tuples –Tuple assignment – Tuples as return values –Basic tuple operations –Built – in list methods.

**Dictionaries :** Creating Dictionary-Accessing values in Dictionary-Updating Dictionary-Deleting Elements from Dictionary-Operations in dictionary Built in dictionary methods.

**UNIT-V:**

**Files and Exceptions:** Text files-Opening a file-Opening file-Closing a File-File object attributes-Reading from a file-Writing to a file-Renaming a file-Deleting a file-File related methods-Directories-Exceptions-Built-in-Exceptions-Handling Exceptions-Exception with arguments-User defined Exception.

**TEXT BOOK**

- E.Balagurusamy, “*Introduction to Computing and Problem Solving Python*”, 4<sup>th</sup> Edition, McGraw Hill publications, 2018.

**REFERENCE BOOKS**

- Mark Lutz, *Programming Python*, 4/e, O’Reilly Media, 2010.
- Mark Summerfield, *Programming in Python 3*, 2<sup>nd</sup> Edition, Addison Wesley, 2010.

**WEBLIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_cs26/preview](https://onlinecourses.nptel.ac.in/noc22_cs26/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs21/preview](https://onlinecourses.nptel.ac.in/noc21_cs21/preview)
- [https://onlinecourses.nptel.ac.in/noc22\\_cs31/preview](https://onlinecourses.nptel.ac.in/noc22_cs31/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs32/preview](https://onlinecourses.nptel.ac.in/noc21_cs32/preview)
- [www.tutorialspoint.com](http://www.tutorialspoint.com)
- [http://en.wikibooks.org/wiki/A\\_Beginners\\_Python\\_Tutorial](http://en.wikibooks.org/wiki/A_Beginners_Python_Tutorial).
- [www.geeksforgeeks.com](http://www.geeksforgeeks.com)
- <http://www.python.org/>
- <http://programminghistorian.org/en/lessons/working-with-web-pages>

Mapping					
	PO1	PO2	PO3	PO4	PO5
CO1	H	M	H	H	H
CO2	H	H	M	H	H
CO3	H	H	M	H	M
CO4	H	M	H	H	L
CO5	H	L	M	L	H

**H-High; M-Medium; L-Low**

\*\*\*\*\*



**CORE IX      PRACTICAL - III**  
**APCSL3      -      ADVANCED PYTHON PROGRAMMING**

**Hours    :    5**

**Credits        :    4**

**Semester      :    II**

**Preamble**

This course helps the students to produce well designed programs using advanced concepts of python like regular expressions, exception handling, multithreading, web programming and database programming.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Implement various operators of Python	Application(Level K3)
CO2	Applications of various operators of Python	Application(Level K3)
CO3	Review the Python programs with variables, loop, functions and operators	Analysis(Level K4)
CO4	Analyze the Python programs with variables, loop, functions and operators	Analysis(Level K4)
CO5	Develop application with Python core concepts	Synthesis(Level K5)

**PROGRAM LIST**

1. Exercises to implement File handling concept
2. Exercises to implement list
3. Exercises using Dictionary.
4. Exercises to perform set operations.
5. Exercises using object oriented concepts.
6. Exercises to perform operations using Regular expression.
7. Exercises using exceptional handling technique.
8. Exercises using multithreading.

9. Exercises to perform operations on Byte objects.
10. Create an application using python with database connectivity.

**WEBLIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_cs26/preview](https://onlinecourses.nptel.ac.in/noc22_cs26/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs21/preview](https://onlinecourses.nptel.ac.in/noc21_cs21/preview)
- [https://onlinecourses.nptel.ac.in/noc22\\_cs31/preview](https://onlinecourses.nptel.ac.in/noc22_cs31/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs32/preview](https://onlinecourses.nptel.ac.in/noc21_cs32/preview)
- [www.tutorialspoint.com](http://www.tutorialspoint.com)
- [http://en.wikibooks.org/wiki/A Beginners Python Tutorial.](http://en.wikibooks.org/wiki/A_Beginners_Python_Tutorial)
- [www.geeksforgeeks.com](http://www.geeksforgeeks.com)
- [http://www.python.org./](http://www.python.org/)
- <http://programminghistorian.org/en/lessons/working-with-web-pages>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	H	M	H	M
<b>CO2</b>	H	H	M	H	M
<b>CO3</b>	H	H	M	H	M
<b>CO4</b>	H	M	H	H	L
<b>CO5</b>	H	H	H	H	M

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE X      PRACTICAL - IV**  
**APCSL4      -      DOT NET FRAMEWORK**

**Hours : 5**

**Credits : 4**

**Semester : II**

**Preamble**

This course presents the practical aspects of application development using .Net framework. It also concerns about Common Language Runtime (CLR) and SQL Server concepts.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Develop simple VB.NET program using forms	Application(Level K3)
CO2	Apply simple VB.NET program using forms	Application(Level K3)
CO3	Execute VB.NET application with various controls	Analysis(Level K4)
CO4	Update database using SQL server	Synthesis(Level K5)
CO5	Evaluate database using SQL server	Synthesis(Level K5)

**PROGRAM LIST**

1. Write a VB.NET program to receive user feedback using Form and stored it in a database.
2. Write a simple VB.NET program to receive the text and print it using button.
3. Write an VB.NET program to design an application for dynamically populating checkbox list.
4. Create an VB.NET program to design an application using grid view control in a web page.

5. Create an VB.NET applications for
- Hospital management
  - Hotel management,
  - Online Quiz
  - Online Shopping
  - Student Mark Processing System
  - Online Ticket reservation

### WEBLIOGRAPHY

- <https://www.edx.org>
- <http://www.javapoint.com/vb-net>
- <http://www.tutorialspoint.com/v.net/index.htm>
- <http://www.vbtutor.net/index.php>
- <http://www.guru99.com/vb-net-tutorial.html>

Mapping					
	PO1	PO2	PO3	PO4	PO5
CO1	H	M	M	H	M
CO2	H	H	M	H	M
CO3	H	M	M	H	M
CO4	H	H	H	H	L
CO5	H	M	H	H	H

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**ELECTIVE 2.1****APCSE2 - GRID AND CLOUD COMPUTING****Hours : 5****Credits : 4****Semester : II****Preamble**

This course helps the students to learn the concepts and architecture of Grid and Cloud Computing. It also covers topics such Grid monitoring, Grid security and Cloud services.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Understand the basic concepts of Grid and Cloud computing	Comprehension (Level K2)
CO2	Describe the architecture of Grid and Cloud computing	Comprehension (Level K2) Application (Level K3)
CO3	Acquire knowledge about Grid Scheduling and Cloud Computing services	Analysis(Level K4)
CO4	Acquire knowledge about Grid Scheduling and Resource management	Analysis(Level K4)
CO5	Validate Cloud services by using various cloud service providers such as Amazon, Google and Microsoft	Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

**Concepts and Architecture:** Introduction - Parallel and Distributed Computing - Cluster computing Grid computing - Anatomy and physiology of Grid - Review of web services – OGSA – WSRF.

**UNIT-II:**

**Grid Monitoring:** Grid Monitoring Architecture (GMA) - An overview of Grid Monitoring systems: Grid ICE – JAMM – MDS - Network Weather Service – Other Monitoring systems: Ganglia and Grid Mon

**UNIT-III:**

**Grid security:** Grid Security - A Brief security primer – Cryptography -Grid security –  
**Grid Scheduling and Resource management:** Scheduling paradigms - Working principles of scheduling - A review of condor ,SGE, PBS and LSF - Grid scheduling with QoS

**UNIT-IV:**

**Examining the Value Proposition:** Defining Cloud Computing - Understanding Cloud Architecture - Understanding Services and Applications by Type

**UNIT-V:**

**Using Platforms:** Understanding Abstraction and Virtualization - Using Google Web Services - Using Amazon Web Services - Using Microsoft Cloud Services

**TEXT BOOKS**

- Maozhen Li, Mark Baker, *The Grid: Core Technologies*, 1<sup>st</sup> Edition, John Wiley & Sum, 2005.
- Barrie Sosinky, *Cloud Computing Bible*, 1<sup>st</sup> Edition, John Wiley Publishing Inc, 2011.

**REFERENCE BOOKS**

- Joshy Joseph & Craig Fellenstein, *Grid Computing*, Pearson Education, IBM Press, 2004.
- Lars Nielsen, *The Little Book of Cloud Computing*, New Street Communications, LLC, 2013 Edition.

**WEBLIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_cs20/preview](https://onlinecourses.nptel.ac.in/noc22_cs20/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs14/preview](https://onlinecourses.nptel.ac.in/noc21_cs14/preview)
- <http://www.researchgate.net>
- <http://www.silo.tips/download/chapter-2-grid-monitoring-architecture-and-tools-used-for-grid-monitoring>

- <http://www.slideshare.net/sandpoonia/11-grid-scheduling-and-resource-management>
- <http://www.azure.microsoft.com/en-in/overview/what-is-cloud-computing/>

Mapping					
	PO1	PO2	PO3	PO4	PO5
CO1	H	M	M	H	M
CO2	H	H	H	H	M
CO3	H	H	M	H	M
CO4	H	H	H	H	L
CO5	H	M	H	H	H

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**ELECTIVE 2.2****APCSE2 - PRINCIPLES OF COMPILER DESIGN****Hours : 5****Credits : 4****Semester : II****Preamble**

This course offers knowledge about concepts and principles of compiler design. It also provide basic understanding of grammars, language definitions and phases of designing compiler.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Examine the basic function of compiler and interpreter	Comprehension (Level K2)
CO2	Understand the core concepts of phases of compiler	Comprehension (Level K2)
CO3	Apply Context Free Grammar for simplify the expression using different kinds of parsers	Application(Level K3)
CO4	Design a simple code generator	Analysis(Level K4)
CO5	Interpret the code generation and optimization process	Analysis(Level K4) Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

**Introduction:** The structure of a Compiler – Compilers writing tools- The lexical and Syntactic Structure of a language – The role of the lexical analyzer – The design of lexical analyzers – Regular expressions – Finite automata.



**UNIT-II:**

Context-free Grammars – Derivation and parse trees – Capabilities of Context Free Grammars – Parses – Shift Reduce parsing - Operators Precedence Parsing – Top-down parsing – Predictive parsers.

**UNIT-III:**

LR Parsers – The canonical collection of LR (0) Items – Constructing SLR Parsing tables – **Symbol tables:** Data structure for Symbol tables

**UNIT-IV:**

**Syntax-Directed Translation:** Syntax-Directed Translation schemes –Implementation of Syntax-directed translators – Intermediate code – Postfix notation – Parse trees and syntax trees– Three-address code, quadruples and triples – Translation of assignment statements – Boolean expressions

**UNIT-V:**

**Introduction To Code Optimization:** The Principal source of optimization – Loop optimization – The DAG Representation of Basic Blocks – **Code Generation:** Problems in code generation – A Simple code generator

**TEXT BOOK**

- Alfred V. Aho Ravi Sethi Jeffrey D.Ullman, *Principles of Compiler Design*, International edition, Published by Narosa Publishing House, 2002.

**REFERENCE BOOK**

- Kennet C.Louden, *Compiler Construction:Principles and Practice*, Thomson publishers, 1997.

**WEBLIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_cs14/preview](https://onlinecourses.nptel.ac.in/noc22_cs14/preview)
- [https://onlinecourses.nptel.ac.in/noc21\\_cs07/preview](https://onlinecourses.nptel.ac.in/noc21_cs07/preview)
- <http://www.geeksforgeeks.org/introduction-of-compiler-design-amp/>
- [http://www.tutorialspoint.com/compiler\\_design/compiler\\_design\\_quick\\_guide.html](http://www.tutorialspoint.com/compiler_design/compiler_design_quick_guide.html)
- <http://www.javatpoint.com/compiler-tutorial>
- [http://en.m.wikipedia.org/wiki/compilers\\_principles\\_techniques\\_and\\_tools](http://en.m.wikipedia.org/wiki/compilers_principles_techniques_and_tools)
- [http://hjemmesider.diku.dk/~torbenm/basics/basics\\_lulu2.pdf](http://hjemmesider.diku.dk/~torbenm/basics/basics_lulu2.pdf)

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	M	H	H	M
<b>CO2</b>	H	H	M	H	L
<b>CO3</b>	H	M	H	M	H
<b>CO4</b>	H	H	H	H	H
<b>CO5</b>	H	L	H	H	M

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE XI****APCSC7 - BIG DATA SCIENCE AND ANALYTICS****Hours : 5****Credits : 4****Semester : III****Preamble**

This course offers knowledge about concepts and challenge of big data. It also the helps students to acquire knowledge about Hadoop, MapReduce, Pig and Hive technology.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Understand the concept of Big data techniques, environment, framework and Hadoop ecosystem	Comprehension (Level K2)
CO2	Apply data management concepts in MYSQL database	Application(Level K3)
CO3	Analyze Hadoop components and their uses for big data processing	Analysis(Level K4)
CO4	Examine the impact of big data for business decisions and strategy	Analysis(Level K4)
CO5	Manage large-scale analytics tools to solve some open big data problems	Synthesis(Level K5)

**COURSE CONTENT****UNIT-I**

**OVERVIEW OF BIG DATA :** Defining Big Data - Big Data Science – Major Applications of Data Science - Big Data Types –Big Data Types-Analytics-Industry-Examples of Big Data-Big Data and Data Risk-Big Data Technologies-Benefits of Big Data.

**UNIT-II**

**BASICS OF HADOOP:** Big Data Hadoop-Hadoop Architecture-Main Components of Hadoop Framework-Analysing Big Data with Hadoop-Benefits of Distributed Applications-Hadoop Distributed File system-Advantages of Hadoop-Ten Big Hadoop Platforms.

**UNIT-III**

**NoSQL DATABASES:** NoSQL Data Management-Typesw of NoSQL Databases-Query Model for Big Data-Benefits of NoSQL-MongoDB-Advantages of MongoDB over RDBMS-Replication in MongoDB.

**UNIT-IV**

MapReduce: Introduction to MapReduce-Working of MapReduce-Map Operations-MapReduce User Interfaces.

**UNIT-V:**

**HBase, CASSANDRA and JAQL:** Introduction to HBase-Row-Oriented and column-Oriented Data Stores-HDFS Vs HBase-HBase Architecture-HBase Data Model-Introduction to Cassandra-Features of Cassandra.Introduction to JAQL-JSON-Components of JAQL

**TEXT BOOKS**

- Michael Berthold, David J. Hand, *Intelligent Data Analysis*, Springer. (2007)  
(For Unit I to III)
- Tom White, *Hadoop:The Definitive Guide*, Third Edition, O'reilly Media  
(For Unit IV to V), 2012.

**REFERENCE BOOKS**

- Anand Rajaraman and Jeffrey David Ullman, *Mining of Massive Datasets*, 2<sup>nd</sup> Edition, Cambridge University Press, 2012.
- Viktor Mayer, Schonberger, Kenneth Cukier, *Big Data : A Revolution That Will Transform How We Live, Work and Think*, 2<sup>nd</sup> Edition, Houghton Mifflin Harcourt publishing company, 2013.

**WEBLIOGRAPHY**

- <https://www.edx.org/micromasters/adelaidx-big-data>
- <http://www.buisnessprocessincubator.com/content/top-10-websites-for-big-data-analytics>
- <http://www.sciencedirect.com//topics/computer-science/big-data-analytics>
- [http://en.m.wikipedia.org/wiki/Big\\_data](http://en.m.wikipedia.org/wiki/Big_data)
- <http://journalofbigdata.springeropen.com/>
- <http://link.springer.com/chapter/10.1007/978-3-319-65151-4-23>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	H	M	M	H
<b>CO2</b>	M	H	M	M	M
<b>CO3</b>	H	M	H	H	M
<b>CO4</b>	M	H	H	M	M
<b>CO5</b>	H	H	H	H	M

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE XII****APCSC8 - ADVANCED SOFTWARE ENGINEERING****Hours : 5****Credits : 4****Semester : III****Preamble**

This course imparts the skills of developing software for various applications and systems. It discusses the various software development life cycle models and testing methodologies.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Discuss the stages of software development life cycle	Comprehension (Level K2) Application (Level K3)
CO2	Examine various Software development life cycle models	Comprehension (Level K2)
CO3	Analyze the role of project management including requirement gathering, planning, designing and maintenance	Analysis(Level K4)
CO4	Apply software engineering design principles	Application (Level K3)
CO5	Evaluate various testing principles on software project for risk management	Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

The Evolving Role of Software – Definition of Software Engineering – The Changing Nature of Software – Software Myths – Terminologies – Software Life Cycle Models: Build and Fix Model – Evolutionary Process Models – Selection of a Life Cycle Model.

**UNIT-II:**

**Requirements:** Analysis and Specifications: Type of Requirements – Feasibility Studies – Requirement Elicitation: interviews, brain storming sessions, FAST – Requirement analysis: Data flow diagram, Data Dictionaries - Requirements Validation

**UNIT-III:**

**Project Planning:** Size Estimation – The Constructive Cost Model (COCOMO) – The Putnam Resource Allocation Model.

**UNIT-IV:**

**Software Design:** Design: Conceptual and Technical designs, Objectives of design – Modularity - Function Oriented Design – Software reliability: Basic concepts, software reliability, maturity levels - Software Testing: A Strategic Approach to Software Testing – Testing – Functional Testing – Structural Testing – Levels of Testing – Validation Testing.

**UNIT-V:**

**Software Maintenance:** Categories of Maintenance – Problems during Maintenance – Maintenance is Manageable – Potential Solutions to maintenance problems – Maintenance process – Estimation of maintenance cost

**TEXT BOOK**

- K.K.Agarwal, *Software Engineering*, Third Edition, New Age International Publishers, 2008.

**REFERENCE BOOK**

- Richard E. Fairley, *Software Engineering Concepts*, McGraw Hill Pvt Ltd, 2001.

**WEBILIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_cs39/preview](https://onlinecourses.nptel.ac.in/noc22_cs39/preview)
- [https://onlinecourses.nptel.ac.in/noc22\\_cs106/preview](https://onlinecourses.nptel.ac.in/noc22_cs106/preview)
- <https://www.edx.org/course/software-development-fundamentals>
- <http://softwareengineeringdaily.com/>
- [http://en.m.wikipedia.org/wiki/software\\_engineering](http://en.m.wikipedia.org/wiki/software_engineering)
- <http://www.rabbitse.com/>
- [http://www.ibm.com/topics/software development](http://www.ibm.com/topics/software%20development)

Mapping					
	PO1	PO2	PO3	PO4	PO5
CO1	M	H	M	H	H
CO2	H	M	L	H	M
CO3	H	H	M	H	H
CO4	M	H	H	H	H
CO5	H	H	H	M	L

**H-High; M-Medium; L-Low**

\*\*\*\*\*



**CORE XIII****APCSC9 - PHP AND MYSQL****Hours : 5****Credits : 4****Semester : III****Preamble**

This course introduces the concepts of PHP, HTML and MYSQL. It provides concepts of sessions and cookies to develop web pages and the basics of data manipulation using MYSQL database.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Understand the basic concepts of PHP and MYSQL	Comprehension (Level K2)
CO2	Describe the basic concepts of PHP and MYSQL	Comprehension (Level K2)
CO3	Illustrate String, array, mathematical, date and time functions in PHP	Application(Level K3)
CO4	Examine the regular expressions and file system of PHP	Analysis(Level K4)
CO5	To validate database queries in PHP using MYSQL	Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

Introduction: Server - Side Web Scripting - Syntax and Variables - Control and Functions.  
Passing Information between Pages: GET Arguments - POST Arguments - Formatting Form  
Variables - PHP Super global Arrays.

**UNIT-II:**

String: Strings in PHP - String Functions-Arrays and Array Functions: Creating Arrays - Retrieving Values - Multidimensional Arrays - Inspecting Arrays - Deleting from Arrays - Iteration. Advanced Array Functions: Transformation of Arrays. Number Handling: Numerical Types – Mathematical Operators - Simple Mathematical Functions – Randomness.

**UNIT-III:**

Regular Expressions: Tokenizing and parsing Functions - Regular Expressions - Perl – Compatible Regular Expressions - Advanced String Functions. Working with the File system: PHP File Permissions - File Reading and Writing Functions - File system and Directory Functions – Network Functions - Date and time Functions - Calendar Conversion Functions. Working with Sessions and Cookies: Sessions work in PHP - Session Functions - Configuration Issues - Cookies – Sending HTTP Headers.

**UNIT-IV:**

Structured Query Language (SQL): Relational Database and SQL - SQL standards – The Workhorses of SQL - Database Design - Privileges and Security. PHP and MYSQL: Connecting to MYSQL - Making MYSQL Queries - Fetching Data Sets - Multiple Connections - Error Checking -Creating MYSQL Databases with PHP - MYSQL Functions.

**UNIT-V:**

Performing Database Queries: HTML Tables and Database Tables - Complex mapping – Creating the sample Tables. Integrating Web Forms and Databases: HTML Forms - Basic Form Submission to a Database - Self Submission - Editing Data with an HTML Form.

**TEXT BOOK**

- Steve Suehring, Tim Converse and Joyce Park, *PHP6 and MYSQL Bible*, Wiley-India, New Delhi, 2012.

**REFERENCE BOOKS**

- Mike McGrath, *PHP and MYSQL*, McGraw Hill Education Private Limited, India, 2012.
- Beighley, *Head First Php & MYSQL*, O'Reilly Publisher, 2011.
- W. Jason Gilmore, *Beginning PHP and MYSQL: From Novice to Professional*, Dreamtech Press, 2010.

**WEBLIOGRAPHY**

- [https://onlinecourses.swayam2.ac.in/aic20\\_sp32/preview](https://onlinecourses.swayam2.ac.in/aic20_sp32/preview)
- <https://www.cloudways.com/blog/connect-mysql-with-php/>
- [http://www.w3schools.com/php/php/php\\_mysql\\_connect.asp](http://www.w3schools.com/php/php/php_mysql_connect.asp)
- <https://www.php.net/manual/en/book.mysql.php>
- <http://carpostudio.com/gah5nyd/mysql-if-exists-insert.html>
- <http://docs.microsoft.com/en-us/azure/app-service/tutorial-php-mysql-app>.

Mapping					
	PO1	PO2	PO3	PO4	PO5
CO1	H	H	M	H	H
CO2	H	M	H	L	H
CO3	H	H	H	H	M
CO4	H	M	M	H	M
CO5	H	H	M	M	H

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE XIV    PRACTICAL - V**  
**APCSL5    -    PHP AND MYSQL**

**Hours    :    5**

**Credits        :    4**

**Semester       :    III**

**Preamble**

This course helps the students to produce well designed programs using PHP and access database using MYSQL.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Describe String functions and regular expressions	Application(Level K3)
CO2	Illustrate String, array, mathematical, date and time functions in PHP	Application(Level K3)
CO3	Demonstrate the database connectivity with MYSQL database	Analysis(Level K4)
CO4	Develop web pages using PHP and MYSQL	Synthesis(Level K5)
CO5	Evaluate web pages using PHP and MYSQL	Synthesis(Level K5)

**PROGRAM LIST**

1. Exercise to pass information between web pages using GET and POST methods.
2. Exercise using arithmetic operations, String functions.
3. Exercise to apply advanced string functions to manipulate strings.
4. Exercise to implement file concepts to open, read, close and to delete a file.
5. Exercise using Regular expressions for validation.
6. Exercise to implement the date and time functions.
7. Exercise to manipulate data using different queries.
8. Exercise to implement explode and implode functions.
9. Create data base connectivity between PHP and MYSQL.
10. Create web pages with PHP and MYSQL database.

**WEBLIOGRAPHY**

- [https://onlinecourses.swayam2.ac.in/aic20\\_sp32/preview](https://onlinecourses.swayam2.ac.in/aic20_sp32/preview)
- <https://www.cloudways.com/blog/connect-mysql-with-php/>
- [http://www.w3schools.com/php/php/php\\_mysql\\_connect.asp](http://www.w3schools.com/php/php/php_mysql_connect.asp)
- <https://www.php.net/manual/en/book.mysql.php>
- <http://carpostudio.com/gah5nyd/mysql-if-exists-insert.html>
- <http://docs.microsoft.com/en-us/azure/app-service/tutorial-php-mysql-app>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	H	M	H	H
<b>CO2</b>	H	H	H	H	M
<b>CO3</b>	H	M	L	H	M
<b>CO4</b>	H	H	H	H	M
<b>CO5</b>	H	H	H	M	H

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE XV    PRACTICAL - VI**  
**APCSL6    -    ADVANCED MATLAB**

**Hours    :    5**

**Credits        :    4**

**Semester       :    III**

**Preamble**

This course provides the practical solution for mathematical problems and do image enhancement process.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Illustrate simple mathematical functions/equations in MATLAB	Application(Level K3)
CO2	Interpret simple mathematical functions and operations theorem using plots or display	Analysis(Level K4)
CO3	Visualize Fit probability distributions to data.	Analysis(Level K4)
CO4	Describe graphic features of MATLAB .	Analysis(Level K4)
CO5	Test the overall structure of MATLAB program to display required output	Analysis(Level K4)

**PROGRAM LIST**

1. Adding Two Images
2. Crop Image
3. Comparison of Two Values
4. Gray Scale to Binary Image
5. Flipping An Image
6. Image Complement
7. Adding and Reducing Noise in an Image
8. Color Space Conversion

9. Image Reduction
10. Multiply and Divide an Image
11. Image Transformation by DCT
12. Shearing an Image
13. Enhance Contrast in an Image
14. Edge Detection in an Image
15. Image Compression
16. Histogram Processing
17. Image Segmentation
18. Neural Network design

## WEBLIOGRAPHY

- <https://www.edx.org/course/matlab-essentials>
- <http://www.mathworks.com/help/rptgen/ug/create-links.html>
- <http://www.mathworks.com/help/rptgen/ug/mlreportgen.dom.pageref-class.html>
- [http://www.mathworks.com-help/slrequirements/ref/slreq.find.html](http://www.mathworks.com/help/slrequirements/ref/slreq.find.html)
- <http://www.mathworks.in/help/matlab/getting-started-with-matlab.html>

Mapping					
	PO1	PO2	PO3	PO4	PO5
CO1	H	H	L	H	H
CO2	H	H	M	H	M
CO3	H	L	H	H	M
CO4	H	H	M	H	H
CO5	H	H	M	H	M

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**ELECTIVE 3.1****APCSE3 - MOBILE APPLICATION DEVELOPMENT****Hours : 5****Credits : 4****Semester : III****Preamble**

This course introduces the fundamentals of mobile computing and its architecture. It also discusses topics such as mobile communications, wireless application protocol and wireless LAN.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Design and Develop User Interfaces for the Android Platform .	Comprehension (Level K2)
CO2	Comprehend the process to making software for smart phone and Digital Assistant commonly for Android and IOS.	Comprehension (Level K2)
CO3	Analysis State information across important Operating System.	Analysis(Level K4)
CO4	Apply Database concept to Android Application Development.	Synthesis(Level K5)
CO5	Acquire the knowledge on social media Integration	Application(Level K3) Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

**Hello Android:** A little background- What Android Isn't –Android: An open platform for Mobile Development – Native Android Applications- Android SDK Features – Introducing the Open Handset Alliance – What does Android run on? – Why develop for Mobile? – Why develop for Android? – introducing the Development Framework. **Getting Started:** Developing for Android – Developing for Mobile and Embedded Devices – Android Development Tools. **Creating Application and Activities:** What Makes an Android Application? – Introducing the Application Manifest File – Using the Manifest Editor – Externalizing Resources – The Android



Application Lifecycle- Introducing the Android Application class – A closer Look at Android Activities.

## UNIT-II:

**Building User Interfaces :** Fundamental Android UI Design – Android User Interface Fundamentals – Introducing Layouts – Introducing Fragments – Creating New views – Introducing Adapters. **Intents and Broadcast Receivers :** Introducing Intents – Creating Intent Filters and Broadcast Receivers. **Using Internet Resources :** Downloading and Parsing Internet Resources – Using the Download Manager.

## UNIT-III:

**Expanding the User experience:** Introducing the Action Bar – Creating and Using Menus and Action Bar Action Items – Introducing Dialogs – Introducing Notifications **Advanced User Experience :** Working with Animations – Enhancing yours views,.

## UNIT-IV:

**Invading the home screen:** Introducing Home Screen Widgets – Creating App Widgets – Creating Live Wallpaper **Audio, video, and Using the Camera:** Playing Audio and Video – Using the camera for Tasking Pictures – Recording Video

## UNIT-V:

**Databases and Content Providers:** Introducing Android Databases – Introducing SQLite – Content values and Cursors – Working with SQLite Databases – Creating Content Providers – Using Content Providers. **Maps, Geocoding , and Location- Based services:** Using Location – Based Services – Using the Emulator with Location – Based Services – Selecting a Location Provider – Finding your Current Location. **Monetizing, promoting, and distributing Applications:** Signing and Publishing Application – Distributing Applications

## TEXT BOOK

- Reto Meier, *Professional Android 4 Application Development*, Updated edition, Wiley India Ltd., 2012.

UNIT I: Chapter 1,2,3

UNIT II: Chapter 4,5,6

UNIT III: Chapter 10,11

UNIT IV: Chapter 14,15 & UNIT V: Chapter 8,13,19

**REFERENCE BOOK:**

1. Mark,L.murphy, *The Busy coders Guide to Android Development*, Commonsware LLC, 2016.
2. Android Apps for Absolute Beginners –m Wellace Jackson, Apress Publishing, 2014.

**WEBLIOGRAPHY**

- <https://www.edx.org/professional-certificate/curtinx-mobile-app-development-with-swift>
- [http://en.m.wikipedia.org/wiki/mobile\\_computing](http://en.m.wikipedia.org/wiki/mobile_computing)
- <http://onlinelibrary.wiley.co./journal/15308677>
- [http://www.tutorialspoint.com/mobile\\_computing/mobile\\_computing\\_overview.html](http://www.tutorialspoint.com/mobile_computing/mobile_computing_overview.html)
- <http://citationsy.com/styles/wireless-communications-and-mobile-computing>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	H	H	L	M
<b>CO2</b>	H	H	M	H	M
<b>CO3</b>	H	M	M	H	H
<b>CO4</b>	H	H	M	H	H
<b>CO5</b>	H	H	H	M	H

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**ELECTIVE 3.2****APCSE3 - SYSTEM SOFTWARE****Hours : 5****Credits : 4****Semester : III****Preamble**

This course introduces the basic concepts and to get sufficient knowledge on various system resources.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Get the idea about components of system software	Comprehension (Level K2)
CO2	Interpret the intermediate code generation in context of language designing.	Comprehension (Level K2)
CO3	Analyze and implement assemblers ,loaders, linkers, Macro and Compilers	Application(Level K3)
CO4	Collect the knowledge of process management and information management via different tools	Analysis(Level K4)
CO5	Evaluate the concept of system programming techniques using various software tools.	Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

**Introduction:** System Software and Machine Architecture – SIC, CISC – RISC machines.

**UNIT-II:**

**Assemblers:** Basic Assembler Functions – Machine Dependent, Independent Assembler features – Assembler design options.

**UNIT-III:**

**Loaders and Linkers:** Basic Loader functions – Machine Dependent, Independent Loader features – Loader design options.

**UNIT-IV:**

**Macro processors:** Basic Macro processor functions – Machine Independent Macro processor features – Macro processor Design options.

**UNIT-V:**

**Compiler:** Basic Compiler functions – Machine Dependent and Independent compiler features – Compiler Design options.

**TEXT BOOK**

- Leland L.Beck, *An Introduction to System Programming*, 3<sup>rd</sup> Edition, Addison Wesley, 1997. (Chapters: 1-5)

**REFERENCE BOOK**

- Dm Dhamdhare, *System Programming*, Tata McGraw-Hill Education, 2011.

**WEBLIOGRAPHY**

- <https://www.edx.org>
- <http://www.w3schools.com/>
- [http://www.techsystems embedded.com/c\\_links.php](http://www.techsystems embedded.com/c_links.php)
- [http://en.m.wikipedia.org/wiki/systems\\_programming](http://en.m.wikipedia.org/wiki/systems_programming)  
<http://indiacode.nic.in/>
- <http://dart.dev>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	M	H	H	M
<b>CO2</b>	H	H	H	M	H
<b>CO3</b>	H	M	M	L	H
<b>CO4</b>	H	M	H	H	M
<b>CO5</b>	M	H	H	H	M

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE XVI PRACTICAL - VII**  
**APCSL7 - ADVANCED R PROGRAMMING**

**Hours : 5**

**Credits : 4**  
**Semester : IV**

**Preamble**

This course facilitates the students to acquire knowledge on basic concepts of R – Programming to create wide range of applications.

---

**Course Outcome**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Import and summarize data-sets in R	Knowledge (Level K1)
CO2	Review and manipulate and summarize data-sets in R	Comprehension (Level K2)
CO3	Identify online resources for R and import new function packages into the R workspace.	Comprehension(Level K2)
CO4	Demonstrate use of basic functions.	Application (Level K3)
CO5	Create and edit visualizations with R	Analysis (Level K4) Synthesis(Level K5)

**PROGRAM LIST**

- 1) To prepare Student Mark Statement with Average and Grade.
- 2) To find Sum of Digits of the Given Integer Number.
- 3) To check whether given number is Armstrong or Not.
- 4) To create a Fibonacci Series up to 'n' values.
- 5) To create a list containing Strings, numbers, vectors and a logical values.
- 6) To add 10 to each elements of the first vector in a given list .
- 7) To merge given two list into one list.
- 8) To convert a given list into vector.

- 9) To convert a given data frame to a list by rows.
- 10) To count number of objects in a given list.
- 11) To assign NULL to a given list elements.
- 12) To convert given matrix to a list.
- 13) To find all the elements in the given list that are not in the another list.
- 14) To create a list named S containing sequence of 15 Capital letters starting from 'E' .
- 15) To Prepare a Bill for a Stationary Stores.

## WEBLIOGRAPHY

- <https://www.edx.org/course/r-programming-fundamentals>
- <http://www.r-project.org/about.html>
- <http://www.rstudio.com/>
- <http://www.tutorialspoint.com/r/index.htm>
- <https://www.coursera.org/learn/r-programming>
- <https://www.w3schools.com/r/default.asp>

Mapping					
	PO1	PO2	PO3	PO4	PO5
CO1	H	H	H	H	H
CO2	H	H	H	M	H
CO3	H	M	H	H	H
CO4	M	H	M	H	M
CO5	H	H	M	H	L

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**CORE XVII****APCSPR - PROJECT WORK****Hours : 20****Credits : 10****Semester : IV****Preamble**

The objective of the project is to motivate the students to work in emerging/latest technologies, help the students to develop ability, to apply theoretical and practical tools/techniques to solve real life problems related to industry, academic institutions and research laboratories.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Understand the problem.	Comprehension (Level K2)
CO2	Implement the real time application.	Application(Level K3)
CO3	Execute the real time application.	Application(Level K3)
CO4	Analyze various testing methods.	Analysis (Level K4)
CO5	Verify the expected results in real time applications.	Synthesis(Level K5)

The project is of 20 hours/week for one (semester IV) semester duration and a student is expected to do planning, analyzing, designing, coding, and implementing the project. The initiation of project should be with the project proposal. The synopsis approval will be given by the project guides.

The project proposal should include the following:

- Title
- Objectives
- Input and output



- Details of modules and process logic
- Data Flow Diagram
- Limitations of the project
- Tools/platforms, Languages to be used
- Scope of future applications

## WEBLIOGRAPHY

- <https://www.edx.org/learn/project-based-learning>
- [http:// docs.microsoft.com/en-us/previous-versions/aspnet/f3stod45\(v=vs.100\)](http://docs.microsoft.com/en-us/previous-versions/aspnet/f3stod45(v=vs.100))
- <http://www.bachelorprint.eu/academic-writing/referencing-citation-styles/how-to-cite-a-website/>
- <http://academic.guides.waldenu.edu/writingcenter/apa/references/example>
- <http://www.bibliography.com/how-to/how-to-write-a-bibliography-for-a-school-project/>

Mapping					
	PO1	PO2	PO3	PO4	PO5
CO1	H	M	M	L	M
CO2	H	H	M	H	M
CO3	H	M	H	M	M
CO4	H	M	H	M	M
CO5	H	H	M	H	H

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**ELECTIVE 4.1****APCSE4 - DIGITAL IMAGE PROCESSING****Hours : 5****Credits : 4****Semester : IV****Preamble**

This course helps the students to understand fundamental steps in Digital image processing. It also provide knowledge about image compression and image segmentation.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Understand the components of Digital Image Processing	Comprehension (Level K2)
CO2	Recognize the fundamental elements of DIP and representation of an image in multi dimensional aspects	Comprehension (Level K2)
CO3	Apply arithmetic and logical operations on image enhancement process	Application (Level K3)
CO4	Interpret the knowledge on compression techniques for security of an image	Analysis (Level K4)
CO5	Verify various deduction mechanisms in image segmentation	Synthesis(Level K5)

**COURSE CONTENT****UNIT-I:**

**Introduction:** What is Digital Image Processing - Fundamental steps in Digital Image Processing - Components of an Image Processing System.

**UNIT-II:**

**Digital Image Fundamentals:** Elements of Visual Perception – Image Sensing and Acquisition - Image Sampling And Quantization – Some Basic Relationship between Pixels – An Introduction to the Mathematical tools used in Digital Image Processing.

**UNIT-III:**

**Intensity Transformation And Spatial Filtering:** Background – Some basic Intensity Transformation Functions – Histogram Processing – Fundamentals of Spatial Filtering – Smoothing Spatial Filters.

**UNIT-IV:**

**Filtering In The Frequency Domain:** Sampling and the Fourier Transform of Sampled Functions – The Discrete Fourier Transform (DFT) of One Variable – Image Smoothing Using Frequency Domain Filters.

**Image Restoration And Reconstruction:** A model of the image degradation/ Restoration Process – Restoration in the presence of Noise Only – Spatial Filtering.

**UNIT-V:**

**Color Image Processing:** Color Fundamentals – Color Models .

**Image Compression:** Fundamentals – Some Basic Compression Methods – HUFFMAN Coding – Golomb Coding – Run –Length Coding – Predictive Coding .

**TEXT BOOK**

- Rafael C. Gonzalez & Richard. E. Woods Addison , *Digital Image Processing* – Wesley publishing Company Inc.(Third Indian Reprint, 2000).

**REFERENCE BOOKS**

- Anil K.Jain, "*Fundamentals Digital Image Processing*", PHI, 1989.
- B.Chandra and D.Dutta Majundar, "*Digital Image Processing and Analysis*", 2<sup>nd</sup> Edition, Prentice Hall of India Private Ltd., New Delhi, 2011.

**WEBLIOGRAPHY**

- [https://onlinecourses.nptel.ac.in/noc22\\_ee116/preview](https://onlinecourses.nptel.ac.in/noc22_ee116/preview)
- <http://imagingboook.com/links/>
- [http://en.m.wikipedia.org/wiki/digital\\_image\\_processing](http://en.m.wikipedia.org/wiki/digital_image_processing)
- <http://www.sciencedirect.com/topics/engineering/image-processing>
- <http://www.geeksforgeeks.org/digital-image-processing-basics/amp/>
- <http://www.codecool.ir/extra/2020816204611411digital.image.processing>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	M	H	H	H
<b>CO2</b>	H	H	H	L	H
<b>CO3</b>	H	H	H	H	H
<b>CO4</b>	H	M	H	H	H
<b>CO5</b>	H	L	H	H	M

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**ELECTIVE 4.2****APCSE4 - SOFT COMPUTING****Hours : 5****Credits : 4****Semester : IV****Preamble**

This course offers knowledge about neural network, basis of Fuzzy logic, fuzzy relations, fuzzy inference system and defuzzification techniques.

**Course Outcomes**

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

CO	Description of COs	Blooms' Taxonomy Level
CO1	Discuss the nature of soft computing and its applications	Comprehension (Level K2)
CO2	Apply soft computing techniques in small applications	Comprehension (Level K2) Application (Level K3)
CO3	Analyze various soft computing techniques to solve real life problems	Analysis (Level K4)
CO4	Evaluate the basis of Fuzzy logic, fuzzy relations and defuzzification techniques	Analysis (Level K4)
CO5	Develop intelligence systems leveraging the paradigm of soft computing techniques	Synthesis (Level K5)

**COURSE CONTENT****UNIT-I:**

Neural Networks : Fundamentals of Neural Networks – Basic Concepts of Neural Networks – Model of an Artificial Neuron – Neural Network Architecture – Characteristics of Neural Network – Learning Methods – Taxonomy of Neural Network Architecture – Back Propagation Network – Architecture of Back Propagation Network – Back Propagation Learning

**UNIT-II:**

Neural Network Associative Memory: Auto Correlations – Hetero Correlations – Exponential BAM – Associative Memory for Real Coded Pattern Pairs – Adaptive Resonance Theory – Introduction – ART1 – ART 2 - Applications

**UNIT-III:**

Fuzzy Set Theory: Crisp Sets – Fuzzy Sets – Crisp Relations – Fuzzy Relations – Fuzzy Systems: Crisp Logic – Predicate Logic – Fuzzy Logic – Fuzzy Rule Based System – Defuzzification Method - Applications

**UNIT-IV:**

Genetic Algorithms: History – Basic Concepts – Creation of off Springs – Working Principle – Encoding – Fitness Function – Reproduction .Genetic Modeling – Inheritance Operators – Cross Over – Inversion and Deletion – Mutation Operator –Applications – Advances in Genetic Algorithm

**UNIT-V:**

Hybrid System: Integration of Neural Network – Fuzzy Logic – Genetic Algorithm- Hybrid System – Neural Network – Fuzzy Logic – Genetic Algorithm Weight Determination – Application – Fuzzy Back Propagation Network – Language Recognition Type Fuzzy Members – Fuzzy Neuron – Fuzzy Back Propagation Architecture – Learning in Fuzzy Back Propagation – Applications – Knowledge Base Evaluation

**TEXT BOOK**

- S.Rajasekaran and G.A.Vijayalakshmi Pai, *Neural Networks,Fuzzy Logic and Genetic Algorithms Synthesis and Application*, Kindle Edition, Prentice Hall of India, Pvt. Ltd., 2011.

**REFERENCE BOOKS**

- Vinoth Kumar and R. Saravana Kumar, *Neural Network and Fuzzy logic*, S.K. Katria & Sons, Reprint 2012 edition, 2012.
- Haykin Simon, *Neural Networks and Learning Machines*, 3/e, Prentice Hall of India, 2011.
- Tang,Tan and Yi, *Neural Networks: Computational Models and Application*, Springer Verlag Publications, 2010.

**WEBLIOGRAPHY**

- <https://www.edx.org>
- <http://www.sciencedirect.com/journal/applied-soft-computing>
- <http://www.hindawi.com/journals/acisc/>
- <http://www.elsevier.com/journals/applied-soft-computing/15684946/guide-for-authors>
- <http://paperpile.com/s/soft-computing-citation-style/>
- <http://www.springer.com/journal/500>

<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	H	H	H	H
<b>CO2</b>	H	H	M	H	M
<b>CO3</b>	H	M	H	L	M
<b>CO4</b>	H	H	M	H	L
<b>CO5</b>	H	M	H	H	M

**H-High; M-Medium; L-Low**

\*\*\*\*\*

**ELECTIVE 4.3****APCSE4 - MOOC ONLINE EDUCATIONAL COURSE****Hours : 5****Credits : 4****Semester : IV****Preamble**

This course motivates the students to learn online courses.

---

**Course Outcome**

At the end of the course, the students will be able to gain the knowledge in the specific area and get an online certificate.

CO	Description of COs	Blooms' Taxonomy Level
CO1	Understand and use the web services available in Internet	Knowledge (Level K1) Comprehension (Level K2)
CO2	Know the web resources in Internet.	Analysis (Level K4)
CO3	Interpret usage of Online courses.	Synthesis (Level K5)
CO4	Know the available course content of the new technologies.	Analysis (Level K4)
CO5	Get an idea of New technologies.	Application (Level K3)

**WEBLIOGRAPHY**

- <https://onlinecourses.nptel.ac.in>
- <https://www.edx.org>
- [www.swayam.gov.in](http://www.swayam.gov.in)
- [www.mooc.in](http://www.mooc.in)



<b>Mapping</b>					
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	H	H	M	H	H
<b>CO2</b>	H	H	H	H	M
<b>CO3</b>	H	H	M	H	H
<b>CO4</b>	H	H	M	H	H
<b>CO5</b>	H	M	H	H	M

**H-High; M-Medium; L-Low**

\*\*\*\*\*