

SYLLABUS

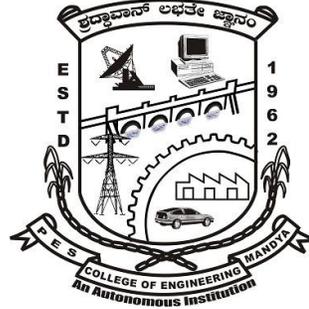
(With effect from 2018-19 Academic year)

ಪಠ್ಯಕ್ರಮ

(ಶೈಕ್ಷಣಿಕವರ್ಷ 2018-19)

V & VI Semester Bachelor Degree in Information Science and Engineering

Out Come Based Education
with
Choice Based Credit System



P.E.S. College of Engineering, Mandya - 571 401, Karnataka

(An Autonomous Institution Affiliated to VTU, Belagavi,
Grant -in- Aid Institution (Government of Karnataka), World Bank Funded College (TEQIP)
Accredited by NBA & NAAC and Approved by AICTE, New Delhi.)

ಪಿ.ಇ.ಎಸ್. ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ

ಮಂಡ್ಯ-571 401, ಕರ್ನಾಟಕ

(ವಿ.ಟಿ.ಯು, ಬೆಳಗಾವಿ ಅಡಿಯಲ್ಲಿನ ಸ್ವಾಯತ್ತ ಸಂಸ್ಥೆ)

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Preface

PES College of Engineering, Mandya, started in the year 1962, has become autonomous in the academic year 2008-09. Since, then it has been doing the academic and examination activities successfully. The college is running Eight Undergraduate and Six Postgraduate programs. It consists of four M.Tech programs, which are affiliated to VTU. Other postgraduate programs are MBA and MCA.

India has become a Permanent Member by signing the Washington Accord. The accord was signed by the National Board of Accreditation (NBA) on behalf of India on 13th June 2014. It enables not only the mobility of our degree globally but also establishes equivalence to our degrees with that of the member nations such as Taiwan, Hong Kong, Ireland, Korea, Malaysia, New Zealand, Russia, Singapore, South Africa, Turkey, Australia, Canada and Japan. Among other signatories to the international agreement are the US and the UK. Implementation of Outcome Based Education (OBE) has been the core issue for enabling the equivalence and of Indian degrees and their mobility across the countries.

Our Higher Educational Institution has adopted the CBCS based semester structure with OBE scheme and grading system.

The credit based OBE semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching.

The OBE, emphasize setting clear standards for observable, measurable outcomes of programs in stages. There lies a shift in thinking, teaching and learning processes moving towards Students Centric from Teacher Centric education. OBE standards focus on mathematics, language, science, attitudes, social skills & moral values.

The key features which may be used to judge, if a system has implemented an outcome based education system is mainly Standard based assessments that determines whether students have achieved the stated standard. Assessments may take any form, so long as the process actually measure whether the student knows the required information or can perform the required task. Outcome based education is a commitment that all students of all groups will ultimately reach the same minimum standards. Outcome Based Education is a method or means which begins with the end in mind and constantly emphasizes continuous improvement.

Choice Based Credit System (CBCS) provides choice for students to select from the prescribed courses (core, Foundation, Foundation Elective, elective, open elective and minor or soft skill courses). The CBCS provides a 'cafeteria' type approach in which the students can Choose electives from a wide range of courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, adopt an interdisciplinary approach to learning which enables integration of concepts, theories, techniques, and, perspectives from two or more disciplines to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline. These greatly enhance the skill/employability of students.

In order to increase the Industry/Corporate readiness, many Soft Skills, Personality Development modules and Technical Skills have been added to the existing curriculum of the academic year 2018-19. Internship have been made compulsory to enhance the field experience. In order to enhance creativity and innovation Technical Skills and Skill Oriented Lab are included in all undergraduate programs.

Dr. Umesh D R
Deputy Dean (Academic)
Associate Professor,
Dept. of CS & Engg

(Dr. Nagarathna)
Dean (Academic)
Professor
Dept. of CS & Engg



PES College of Engineering

Vision

“PESCE shall be a leading institution imparting quality engineering and management education developing creative and socially responsible professionals.”

Mission

1. Provide state of the art infrastructure, motivate the faculty to be proficient in their field of specialization and adopt best teaching-learning practices.
2. Impart engineering and managerial skills through competent and committed faculty using outcome based educational curriculum.
3. Inculcate professional ethics, leadership qualities and entrepreneurial skills to meet the societal needs.
4. Promote research, product development and industry-institution interaction.

DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING

About the Department

The Department of Information science and Engineering takes pride in producing quality engineers over the past 14 years. The credit for all the flowery results goes to the highly motivating staff, from whom all students draw inspiration. The Department was started in the year 2000. The present intake of the undergraduate program is 60. The department has well equipped classrooms, computer laboratories with high-end systems, department library and good collection of software's. Also a research centre is a major credential to our department. We are proud to produce the first PhD student in our college. Faculty members of the department are involved in research activities in different fields such as Medical Image Processing, Pattern Recognition, and Data Mining etc. The department is using Outcome-based education (OBE), which is a recurring education reform model, and it is affiliated to Visvesvaraya Technological University (VTU). The department has achieved good Placement, conducted International /national Conferences and other sponsored short-term courses, workshops, National seminars and symposia. The laboratory facilities and the Internet access are available round the clock to the staff and students of the Information Science and Engineering

Vision

“The department strives to equip our graduates with Knowledge and Skills to contribute significantly to Information Science & Engineering and enhance quality research for the benefit of society”.

Mission

- M1:** To provide students with state of art facilities and tools of Information Science & Engineering to become productive, global citizens and life-long learners.
- M2:** To prepare students for careers in IT industry, Higher education and Research.
- M3:** To inculcate leadership qualities among students to make them competent Information Science & Engineering professionals or entrepreneurs.

1.2. State the Program Educational Objectives (PEOs)

Graduates of the program will be able to

- PEO1:** Establish a productive Information Science & Engineering career in industry, government or academia.
- PEO2:** Interact with their peers in other disciplines by exhibiting professionalism and team work to contribute to the economic growth of the country.
- PEO3:** Promote the development of innovative systems and solutions to the problems in Information Science using hardware and software integration.
- PEO4:** Pursue higher studies in Engineering, Management or Research.



A. List of Program Outcomes (POs)

Engineering Graduates will be able to:

- PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



B. List of Program Specific Outcomes (PSOs)

Information Science & Engineering Graduates will be able to:

PSO1. Analyze, design, develop and test the principles of System software and Database concepts for computer-based systems.

PSO2. Develop computer communication systems and applications for Information security.

PSO3. Apply the knowledge of Information Science and Engineering to solve any software and hardware related problems and to organize, manage and monitor IT Infrastructure.



V Semester B.E. (IS&E)

Scheme of Teaching and Examination 2018- 19

Sl. No	Course Code	Course Title	Teaching Dept.	Hours/ Week			Credits	Examination Marks		
				L	T	P		CIE	SEE	Total Marks
1	P18IS51	Management & Entrepreneurship for IT Industry	IS&E	4	-	-	4	50	50	100
2	P18IS52	Operating System	IS&E	4	-	-	4	50	50	100
3	P18IS53	Communication Networks	IS&E	4	-	-	4	50	50	100
4	P18IS54	Data Mining	IS&E	4	-	-	4	50	50	100
5	P18IS55X	Professional Elective-I	IS&E	2	2	-	3	50	50	100
6	P18ISL56	Database Management Systems Lab	IS&E	-	-	3	1.5	50	50	100
7	P18ISL57	Data Mining Lab	IS&E	-	-	3	1.5	50	50	100
8	P18ISL58	Skill Oriented Lab-1 (Python Lab)	IS&E	-	-	2	1	50	50	100
9	P18IS590	Technical skills (Python Programming)	IS&E	-	2	-	1	50	50	100
10	P18HU510	Aptitude and Reasoning Development –Advanced. (ARDA)	HS&M	-	2	-	1	50	50	100
Total							25	500	500	1000

Professional Elective – I		
Sl. No.	Course Code	Course title
1	P18IS551	Software Testing
2	P18IS552	Unix System Programming
3	P18IS553	User Interface Design
4	P18IS554	Robotic Process Automation



VI Semester B.E.(IS&E)

Scheme of Teaching and Examination 2018- 19

Sl. No	Course Code	Course Title	Teaching Dept.	Hours/ Week			Credits	Examination Marks		
				L	T	P		CIE	SEE	Total Marks
1	P18IS61	Machine Learning	IS&E	4	-	-	4	50	50	100
2	P18IS62	Object Oriented System Development	IS&E	4	-	-	4	50	50	100
3	P18IS63	Internet of Things	IS&E	4	-	-	4	50	50	100
4	P18IS64X	Professional Elective-II	IS&E	2	2	-	4	50	50	100
5	P18ISO65X	Open Elective -I	IS&E	3	-	-	3	50	50	100
6	P18ISL66	Machine Learning Lab	IS&E	-	-	3	1.5	50	50	100
7	P18ISL67	IoT Laboratory	IS&E	-	-	3	1.5	50	50	100
8	P18ISL68	Skill Oriented Lab-II (Mobile Application Development Lab)	IS&E	-	-	2	1	50	50	100
9	P18HU691	Technical Skills-II (Internals of C Programming)	HM	-	2	-	1	50	50	100
Total							23	450	450	900

List of Electives					
Professional Elective -II			Open Elective – I		
Sl. No	Course Code	Course title	Sl. No.	Course Code	Course title
1	P18IS641	Cloud Computing	1	P18ISO651	Python Programming
2	P18IS642	Compiler Design	2	P18ISO652	Internet Programming
3	P18IS643	Web Technologies	3	P18ISO653	Database Management System
4	P18IS644	Supply Chain Management	4	P18ISO654	Data Structures



Course title: Management & Entrepreneurship for IT Industry			
Course Code: P18IS51	Semester: V	L-T-P-H : 4:0:0:4	Credit:4
Contact Period: Lecture: 52 Hrs Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to,

1. Explain the principles of management, organization and entrepreneur.
2. Discuss on planning, staffing, ERP and their importance
3. Infer the importance of intellectual property rights and relate the institutional support

Course Contents

Unit - I

Introduction - Meaning, nature and characteristics of management, scope and Functional areas of management, goals of management, levels of management, brief overview of evolution of management theories,. Planning- Nature, importance, types of plans, steps in planning, Organizing- nature and purpose, types of Organization.

Self-Study: Staffing- meaning, process of recruitment and selection

10 Hours

Unit - II

Directing and controlling- meaning and nature of directing, leadership styles, motivation Theories, Communication- Meaning and importance, Coordination- meaning and Importance , Controlling- meaning, steps in controlling.

Self-Study: methods of establishing control

10 Hours

Unit – III

Entrepreneur – meaning of entrepreneur, characteristics of entrepreneurs, classification and types of entrepreneurs, various stages in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India and barriers to entrepreneurship. Identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study.

Self-Study: social feasibility study.

10 Hours

Unit – IV

Preparation of project and ERP - meaning of project, project identification, project selection, project report, need and significance of project report, contents, formulation, guidelines by planning commission for project report

Enterprise Resource Planning: Meaning and Importance- ERP and Functional areas of Management – Marketing / Sales- Supply Chain Management – Finance and Accounting – Human Resources.

Self-Study: Types of reports and methods of report generation

12 Hours

Unit – V

Micro and Small Enterprises: Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in establishing micro and small enterprises, Government of India industrial policy 2007 on micro and small enterprises, case study (Microsoft), Case study(Captain G R Gopinath),case study (N R Narayana Murthy & Infosys), Institutional support: MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency.

Self-Study: Introduction to IPR.

10 Hours



Text Books:

1. Principles of Management -P. C. Tripathi, P. N. Reddy; Tata McGraw Hill, 6th Edition, 2017.
2. Dynamics of Entrepreneurial Development & Management -Vasant Desai Himalaya Publishing House.
3. Entrepreneurship Development -Small Business Enterprises -Poornima M Charantimath Pearson Education – 2006.
4. Management and Entrepreneurship - Kanishka Bedi- Oxford University Press-2017

Reference Books:

1. Management Fundamentals -Concepts, Application, Skill Development Robert Lusier – Thomson.
2. Entrepreneurship Development -S S Khanka -S Chand & Co.
3. Management -Stephen Robbins -Pearson Education /PHI -17th Edition, 2003

Course Outcomes

After learning all the units of the course, the student is able to

1. Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship
2. Develop leadership qualities and controlling skills.
3. Analyze the different feasibility study
4. Utilize the resources available effectively through ERP
5. Make use of IPRs and institutional support in entrepreneurship

.Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes(PO'S)												PSO'S		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1	1			2		1	2	2	1		1	1	
CO2		2	1	1				1		3	1		1	2	
CO3	1	3					1	1		2	1		1	1	
CO4	1	2	1	2		1		1			1	1	2	1	
CO5	1	1		1		1			1	1	3	1	2	2	



Course title: Operating System			
Course Code: P18IS52	Semester: V	L-T-P-H : 4-0-0-4	Credit:4
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Operating system, computer networks

Course Learning Objectives (CLOs)

This course aims to:

1. Understand the basic principles of OS and its functionalities.
2. Describe CPU scheduling algorithms and process synchronization in OS.
3. Discuss deadlocks and memory management concepts in OS.
4. Summarize virtual memory management techniques and basic file system.
5. Understand file system structure and disk management strategies.

Relevance of the course:

An operating system is an essential part of any computer system. The purpose of this course is providing a clear understanding of the concepts that underlie operating systems. This course covers the classical internal algorithms and structures of operating systems, including CPU Scheduling, memory management, and device management, file systems, virtual memory, disk request scheduling, concurrent processes, deadlocks, security, and integrity. This course may be taken by other students with sufficient computer science background who have an interest in learning how an operating system works.

Course Content

Unit – I

INTRODUCTION AND PROCESS CONCEPT

Operating System Structure – Operating System Operations – Process Management – Memory Management – Storage Management – System Structures: Operating System Services – User Operating System Interface – System Calls – Types of System Calls – System Programs. Process Scheduling – Operations on Processes – Inter-process Communication.

Self –Study Component: Protection and Security – Distributed Systems – Computing Environments.

11 Hours

Unit - II

PROCESS SCHEDULING AND SYNCHRONIZATION

Overview – Multithreading Models – Threading Issues Basic Concepts of process scheduling – Scheduling Criteria – Scheduling Algorithms — Synchronization – The Critical-Section Problem – Peterson’s Solution – Synchronization Hardware – Semaphores – Classic problems of Synchronization – Monitors.

Self-study Component: Multiple-Processor Scheduling

11 Hours

Unit -III

DEADLOCK AND MEMORY MANAGEMENT STRATEGIES

System Model – Deadlock Characterization – Methods for Handling Deadlock – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock. Swapping – Contiguous Memory Allocation – Paging — Segmentation.

Self –Study - Component: Structure of the Page Table

10 Hours

Unit - IV

VIRTUAL MEMORY MANAGEMENT AND FILE SYSTEM

Demand Paging – Copy on Write – Page Replacement – Allocation of Frames – Thrashing File Concept – Access Methods – Directory Structure – File sharing.

Self- study-Component: Protection

10 Hours



Unit - V

IMPLEMENTING FILE SYSTEMS AND SECONDARY STORAGE STRUCTURE

File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management. Disk Structure – Disk Scheduling – Disk Management – Swap-Space Management.

Self Study Component: Case Study: Linux OS, Android OS.

10 Hours

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Principles”, John Wiley & Sons (Asia) Pvt. Ltd, Ninth Edition, 2013.
2. Andrew S. Tanenbaum, “Modern Operating Systems”, Third Edition Prentice Hall of India Pvt. Ltd, 2010 (Case Study Topic).

Reference Books:

1. Harvey M. Deitel, “Operating Systems”, Pearson Education Pvt. Ltd, Second Edition.
2. William Stallings, “Operating System”, Pearson Education, Sixth Edition, 2012.
3. Christopher Negus, Christine Bresnahan, “Linux Bible”, Wiley Pvt Ltd, Eighth Edition, 2013.
4. http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/Operating%20Systems/New_index1.html.
5. www.thenewboston.com (for Android Application development)

Course Outcomes

After learning all the units of the course, the student is able to

1. Outline the operating system concepts and its functionalities.
2. Implementation of various CPU scheduling algorithms and process synchronization using programming languages.
3. Identify deadlock Occurrence, deadlock recovery in various OS and outline memory management concepts.
4. Compare page replacement algorithms in OS and understand fundamental file concepts.
5. Discuss file system structure and implement disk scheduling algorithms.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	1	1					1					2	1	1
CO 2	3	3	3					2	2				2	1	2
CO 3	3	2	1					2	2				2	1	1
CO 4	2	2	1					2	2				2	1	1
CO 5	2	2	3					2	2				2	2	1



Course Title: Communication Networks			
Course Code: P18IS53	Sem : V	L- T - P - H : 4 - 0 - 0 -4	Credit : 4
Contact period : Lecture: 52 Hr, Exam:3 hr		Weightage: CIE: 50%, SEE:50%	

Course learning objectives (CLOs)

This Course Aims to:

1. Understand the Data communication system, Networks and Internet.
2. Understand and recognize the OSI model and TCP/IP model, and also explain the layers in each model.
3. Identify the periodic analog signals and non-periodic digital signals.
4. Discuss the digital-to-digital conversion, digital-to-analog conversion, analog-to-analog conversion and analog-to-digital conversion techniques.
5. Identify the different types of guided media and unguided media.
6. Identify the different error detection and correction techniques handled by Data link layer
7. Discuss transport layer services and understand UDP and TCP protocols
8. Explain routers, IP and Routing Algorithms in network layer
9. Disseminate the Wireless and Mobile Networks covering IEEE 802.11 Standard
10. Illustrate concepts of Multimedia Networking, Security and Network Management
11. Identifying different application layer protocols with their principles

Course Content

Unit I

Overview Of Networks And Physical Layer

Introduction: Data Communications; Networks; The Internet; Layered tasks; The OSI Model and the layers in the OSI model; TCP / IP Protocol Suite; Addressing; Physical Layer: Analog and digital signals; periodic analog signals - sine wave, phase, wavelength, time and frequency domain, bandwidth; Digital signals; Transmission impairment

Digital Transmission and Analog Transmission: Digital-to-Digital conversion; Analog-to Digital conversion; Transmission modes; Digital-to-Analog conversion; Analog-to-Analog conversion; Transmission media: Guided Media: Twisted pair cable, Coaxial cable, Fiber-Optic cable.

Self Study: Microwaves, Infrared waves.

10 hours

Unit II

Error Detection and Correction: Introduction; Block coding; Linear block codes; Cyclic codes - CRC, polynomials; Data Link Control: Framing; Flow and Error control; Protocols; Noiseless channels; Noisy channels.

Introduction to Network layer: Introduction, switching, packet switching at network layer, Network layer services. IPv4 Address: introduction, Classful Addressing, Classless Addressing, special Addresses, NAT. IPv4: introduction, Datagrams, fragmentation, options, checksum, IP package. ARP: Address mapping, the ARP protocol, ATM ARP, ARP package. Self study: Delivery and forwarding IP packets: delivery, forwarding based on destination address.

Self Study: forwarding based on Label.

12 hours



Unit III

ICMPv4: Introduction, messages, debugging tools, ICMP package. Mobile IP: Addressing, Agents, Three phases, inefficiency in mobile IP. Unicast Routing Protocols: Introduction, intra and Inter domain routing, Distance Vector Routing, RIP, Link state routing, OSPF, Path vector routing.

10 hours

Self Study: BGP

Unit IV

Multicast and Multicast routing protocols: introduction, Multicast address, IGMP. Multicast Routing, Routing Protocols. Introduction and Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control.

Self study: TCP Congestion Control.

12 Hours

Unit V

Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, DNS—The Internet’s Directory Service. Self-Study:

8 hours

Self study: Peer-to-Peer Applications

Text Books:

1. Behrouz A. Forouzan: “TCP/IP Protocol Suite” Fourth Edition Tata McGraw-Hill, 2010 (unit - 1 and unit - 2)
2. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson, 2017 .(unit -3, unit -4 and unit-5)

Reference Books:

1. Larry L Peterson and Bruce S Davie, Computer Networks, fifth edition, ELSEVIER
2. Andrew S Tanenbaum, Computer Networks, fifth edition, Pearson.

Course outcomes

After learning all the units of the course, the student is able to

1. Describe the OSI model and TCP/IP model and brief the significance of digital signals
2. Apply the knowledge of error detection mechanism and Classify different protocol mechanism of network layer.
3. Determine various unicast routing protocols and their applications.
4. Describes the mechanism of Multicasting Routing, TCP and UDP
5. List the various application layer protocols and their backend usage for internet service

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO’s)												PSO’s		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	1	1											2	2
CO 2	2	1	1											2	2
CO 3	2	1	2	1										2	2
CO 4	2	1	1											2	1
CO 5	2	1	1											1	1



Course title: Data Mining			
Course Code: P18IS54	Semester: V	L-T-P-H : 4-0-0-4	Credit:4
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Data Structures, DBMS and Graph Theory.

Course Learning Objectives (CLOs)

This course aims to

1. Outline fundamental concepts of data mining and data pre-processing techniques
2. Analyze algorithms used in association analysis .
3. Compare and Contrast algorithms used in classification and clustering .
4. Summarize the concepts of Web Data Mining.
5. Explain fundamental concepts of ODS, Data warehouses, OLAP and data cube

Course Content

Unit - I

Introduction: Introduction, what is Data Mining?, Why Data Mining Now? The Data Mining Process-Software Development Approach, The CRISP-DM Approach, Data Mining Applications, Data Mining Techniques, Practical Examples of Data Mining, The Future of Data Mining, Guidelines for successful Data Mining, Guidelines for successful Data Mining, Limitations of Data Mining. **Data Understanding And Data Preparation:** Introduction, Data Collection and Pre-Processing, Outliers, Mining Outliers, Missing Data, Types of Data, Computing Distance, Data Summarising Using Basic Statistical Measurements.

10 Hours

Self Study: Using WEKA Software in class, Data Mining Software, Displaying Data Graphically.

Unit - II

Association Rules Mining: Introduction, Basics, The Task and a Naïve Algorithm, The Apriori Algorithm, Apriori-TID, Direct Hashing and Pruning(DHP), Dynamic Itemset Counting(DIC), Mining Frequent Patterns without Candidat Generation(FP-Growth)

11 Hours

Self Study: Improving the efficiency of the Apriori algorithm, Performance Evaluation of Algorithms.

Unit - III

Classification: Introduction, Decision Tree, Building a Decision Tree- The Tree Induction algorithm, Split Algorithm Based on Information Theory, Split Algorithm Based on the Gini Index, OverFitting and pruning, Decision Tree Rules, Decision Tree Summary, Naïve bayes Method.

11 Hours

Self Study: Improving Accuracy of Classification Methods, Other Evaluation Criteria for Classification Methods, Classification Software.

Unit - IV

Cluster Analysis: Introduction, Desired Features of Cluster Analysis, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based methods.

10 Hours

Self Study: Dealing with large DataBases, Quality and validity of Cluster Analysis Methods, Cluster Analysis Software.

Unit - V

Data Warehousing: Introduction, Operational Data Stores (ODS), Data Warehouses, Data Warehouse Design , Guidelines for Data Warehouse Implementation, Data Warehouse metadata. **Online Analytical Processing(OLAP):** Introduction, OLAP, Characteristics of OLAP systems, motivations for using OLAP, Multidimensional view and Data cube, Data cube implementations, Data cube operations.

10 Hours



Self Study: Software for ODS and Data Warehousing, Guidelines for Implementation of OLAP, OLAP Software

Text Books:

1. Introduction to Data Mining with case studies – G K Guptha, PHI, 3rd edition 2014.

Reference Books:

1. Data Mining Techniques - Arun K Pujari, Universities press 2009.
2. Data mining concepts and techniques – Jiawei and Micheline Kamber, Morgan Kauffmann publisher. 3rd Edition 2011.
3. Introduction to Data Mining – Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson education 2012.
4. Discovering Knowledge in Data: An introduction to Data Mining, Daniel T. Larose, John Wiley, 2nd Edition, 2014

Course Outcomes

After learning all the units of the course, the student is able to

1. Apply different pre-processing techniques for data cleaning.
2. Evaluate performance of algorithms for Association Rules
3. Apply the different classification techniques.
4. Analyze different clustering algorithms.
5. Understand different data models used in data warehouse.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2	1	1	2									2	2
CO 2	2	3	3	2					2					2	2
CO 3	2	3	3	2					2					3	2
CO 4	2	3	3	2					2					2	3
CO 5	2	2	1	1										1	1



Course title: Database Management Systems Lab			
Course Code: P18ISL56	Semester: V	L-T-P-H : 0:0:3:3	Credit:1.5
Contact Period: Lecture: 39 Hr Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

OBJECTIVES:

1. To understand the foundation knowledge in database concepts, technology and practice to prepare students into well-informed database application developers.
2. Strong practice in SQL programming through a variety of database problems.
3. Develop database applications using front-end tools and back-end DBMS.

PART-A: SQL Programming

- Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.
- Create Schema and insert at least 5 records for each table. Add appropriate database constraints.

List of programs:

1. Implementation of DDL commands of SQL with suitable examples
 - a) Create database
 - b) Create table
 - c) Alter table
 - d) Drop Table
2. Study and Implementation of different types of constraints.
3. Implementation of DML commands of SQL with suitable examples
 - a) Insert
 - b) Update
 - c) Delete
 - d) Alter
4. Implementation of different types of operators in SQL
 - a) Arithmetic Operators
 - b) Logical Operators
 - c) Comparison Operator
 - d) Special Operator
 - e) Set Operation
5. Implementation of different types of function with suitable examples
 - a) Number function
 - b) Aggregate Function
 - c) Character Function
 - d) Conversion Function
 - e) Date Function
6. Study and Implementation of
 - a) Group By & having clause
 - b) Order by clause
 - c) Nested queries
 - d) views
7. Implementation of different types of Joins
 - a) Inner Join
 - b) Outer Join
 - c) Natural Join etc.



8. Study and implementation of Database Backup and Recovery commands.
9. Study and implementation of Rollback, Commit, Save-point.

PART – B Mini Project

Develop a menu driven project for of database management system

- For any problem selected
- Make sure that the application should have five or more tables
- Use Java, C#, Python, or any other similar front-end tool (prior guide permission).
- All applications must be demonstrated on desktop/laptop as a stand-alone.or web based application (Mobile apps on Android/IOS are not permitted.)
- Indicative areas include; Health care, Education, Transportation.

References:

- Virtual Labs – IIT Bombay, <http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/labs/index.php>

Course Outcomes

After learning all the units of the course, students is able to:

1. Understand database language commands to create simple database
2. Analyze the database using queries to retrieve records
3. Analyze front end tools to design forms, reports and menus
4. Develop solutions using database concepts for real time requirements.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3			1								1		
CO 2	3	3		2	2	2							2		
CO 3	3	3	1	2	2	2							1		
CO 4	3	3	1	2	2	2					3		2		



Course title: Data Mining Lab			
Course Code: P18ISL57	Semester: V	L-T-P-H : 0:0:3:3	Credit:1.5
Contact Period: Lecture: 39 Hr Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to

To understand the applications of Different data Mining Techniques on Different Datasets.

Course Content

1. Programs Using Pre Processing Techniques on Datasets.
2. Programs to apply Apriori algorithm for different Datasets.
3. Programs to implement the Classification algorithms on different Datasets.
4. Programs to implement K-means algorithms on different Datasets.

Course Outcomes

After learning all the units of the course, students is able to:

1. Ability to Apply different Classification Rule process on any Dataset.
2. Ability to Demonstrate Pre-Processing Techniques on Various Datasets.
3. Ability to Demonstrate Association Rule Process on a Dataset.
4. Ability to Apply Clustering Rule process on a Dataset.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	3	3	2	3			1				1		2	2
CO 2	2	2	2	2	2			1				1		2	2
CO 3	2	3	3	2	3			1				1		2	2
CO 4	2	3	3	2	3			1				1		2	2



Course title: Python Programming Lab			
Course Code: P18ISL58	Semester: V	L-T-P-H: 0 - 0 – 2 -2	Credit:1
Contact Period: Lecture: 26 Hr, Exam: 3 Hr		Weightage: CIE:50%, SEE: 50%	

Course Objective:

1. Learn Syntax and Semantics and create Functions in Python.
2. Handle Strings and Files in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Using Numpy and Pandas

Programs

1. Programs on basics, operators, control flows, functions
2. Programs on Data structures
3. Programs on Files.
4. Programs on using Numpy, Pandas in Python

Course Outcomes

After learning all the units of the course, students is able to:

1. Understand the benefits of python programming over other languages and program using python language.
2. Understand and implement classes and objects in python.
3. Implement various data structures in Python language.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	3	3	2			2			2					
CO 2	3	2	3	2			2			2					
CO 3	3	2	3	2			2			2					



Course Title: PYTHON PROGRAMMING			
Course Code: P18IS590	Semester : V	L- T – P - H - 0 : 2 : 0 : 2	Credit : 1
Contact period : Tutorial: 26 Hrs Exam:		Weightage: CIE: 50	SEE:50

Prerequisites:

- Experience with a high level language (C/C++, Java) is suggested.
- Prior knowledge of a scripting language (Perl, UNIX/Linux shells).
- An object-oriented concept is helpful but not mandatory.

Course Learning Objectives (CLOs)

This course aims to:

1. To understand why Python is a useful scripting language for developers.
2. To learn how to design and program Python applications.
3. To learn how to use lists, tuples, and dictionaries in Python programs.
4. To learn how to identify Python object types.
5. To learn how to use indexing and slicing to access data in Python programs.
6. To define the structure and components of a Python program.
7. To learn how to write loops and decision statements and functions and pass arguments in Python.
8. To learn how to build and package Python modules for reusability.
9. To learn how to use various libraries in python

Unit – I

Basics of Python Programming: Features of Python, History of Python, The future of Python, Writing and Executing First Python Program, literal Constants, Variables and Identifiers, Data Types, Input Operation, Comments, Reserved Words, Operators and Expressions, Expressions in Python, Operations on strings, Other Data types, and Type conversion. **Decision Control Statements:** introduction to Decision Control Statements, Selection/Conditional branching statements, Basic Loop Structure / Iterative statements, Nested Loops, The Break statement, The Continue statement, The Pass statement, The else statement used with loops..

05 Hours

TextBook:1

Unit – II

Functions and Modules: Introduction, Function Definition, Function call, variable scope and lifetime, The return statement, More on defining functions, Lambda function, Documentation strings, Good Programming practices, Recursive functions, Modules, Packages in python, standard library modules, Globals(), locals(), and reload(). **Python strings revisited:** Introduction, Concatenating, appending and multiplying strings, strings are immutable, strings formatting operator, built-in string methods and functions, slice operation, ord() and chr() functions, in and not in operators, comparing strings, iterating strings, the string module.

06 Hours

TextBook:1

Unit – III

Data structure: sequence, Lists, Functional Programming, Tuples, Sets, Dictionaries.

05 Hours

TextBook: 1



Unit – IV

NumPy Basics: Arrays and Vectorized Computation: The NumPy ndarray: A Multidimensional Array Object, Universal Functions: Fast Element-Wise Array Functions, Array-Oriented Programming with Arrays, File Input and Output with Arrays, Linear Algebra, Pseudorandom Number Generation. **05 Hours**

TextBook:2

Unit - V

Pandas: Introduction to pandas Data Structures, Series, DataFrame, Index Objects, Essential Functionality, Reindexing, Dropping Entries from an Axis, Indexing, Selection, and Filtering, Integer Indexes, Arithmetic and Data Alignment, Function Application and Mapping, Sorting and Ranking, Axis Indexes with Duplicate Labels. **05 Hours**

TextBook:2

Text Books:

1. “Python Programming” using problem solving approach by Reema Thareja Oxford University, 2017.
2. “Python for data Analysis: Data Wrangling with Pandas, NumPy, and Ipython”, by Wes McKinney O’RWILLY Publication, 2nd edition,

Reference Books:

1. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
2. Learning Python, Fourth Edition, Mark Lutz, O’Reilly publication

Course Outcomes

At the end of this course, the students will be able to

1. Understand and comprehend the basics of python programming.
2. Understand and implement modular approach using python
3. Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc
4. Understands the usage of Numpy libraries and to develop various applications of utilizing Numpy.
5. Ability to implement computing descriptive statics using pandas.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2	2	2								2			
CO 2	2	1	3									1			
CO 3	2	2	1	2					2						
CO 4	1	1	2						2						
CO 5	2	1	2	3	2					2		2			



Course Title: Aptitude and Reasoning Development - Advanced (ARDA)			
Course Code: P18HU510	Semester : V	L- T – P - H - 0 : 2 : 0 : 2	Credit : 1
Contact period : Tutorial: 32 Hr, Exam: 3 Hr		Weightage: CIE: 50%	SEE:50%

Prerequisites: Vocabulary builder, Concept of Percentage.

Course Learning Objectives (CLOs)

This course aims to

1. Describe the importance of reading with comprehension.
2. Explain seven dimensions approach to better reading skills.
3. Explain the purpose, plan and the ways to identify specific details in a paragraph for better comprehension.
4. Formulate easier ways to solve problems of averages.
5. Explain the Application of the technique of alligation while solving weighted average and mixture problems.
6. Describe the concepts of profit, loss, discount, Marked price.
7. Explain the application of percentage in our daily life.
8. Discover different ways to identify the progressions and to compare between AP < GP and HP.
9. Explain the basic concepts in calculating simple interest and compound interest.
10. Differentiate between simple interest and compound interest and describes the importance of compound interest and its behaviour.

Course Content

Unit – I

Reading Comprehension:

Introduction: Read more and more, The process of writing and its relevance to the process of writing, how reading skills are important for aspects other than the reading comprehension questions, the daily reading scheme.

Seven dimension approach to better reading skills:

Developing the ability of understanding vocabulary in context, Ability to identify and understand main ideas, Ability to predict and identify supporting details, Understanding the use of transition and idea organization patterns, Inferences, Identifying purpose and tone, Recognizing and evaluating arguments and their common structures.

Theory of reading comprehension:

Solving RC passages is an exact science, tackling RC on the basis of evaluation of support, All passages have a topic, purpose and a plan, Other things to pick up while reading the passage– The tonality and other software related the author's viewpoint in the passage, specific details and their use in the passage, Types of questions asked in reading comprehension passage.

8 hrs

Unit – II

Averages and Alligations mixtures:

Average: relevance of average, meaning of average, properties of average, deviation method, concept of weighted average. **Alligation method:** situation where allegation technique, general representation of alligations, the straight line approach, application of weighted average and alligation method in problems involving mixtures. Application of alligation on situation other than mixtures problems.

6 Hrs



Unit – III

Permutation and Combination: Understanding the difference between the permutation and combination, Rules of Counting-rule of addition, rule of multiplication, factorial function, Concept of step arrangement, Permutation of things when some of them are identical, Concept of 2^n , Arrangement in a circle.

Probability: Single event probability, multi event probability, independent events and dependent events, mutually exclusive events, non-mutually exclusive events, combination method for finding the outcomes. **6 Hrs**

Unit -IV

Progression:

Arithmetic Progression: sum of given number of terms in an A.P., arithmetic mean, to insert a given number of arithmetic means between two given quantities, nth term of an A.P., finding common difference of an A.P. given 2 terms of an A.P., types of A.P.s– increasing A.P.s and decreasing A.P. s

Geometric: to find, the geometric mean between two given quantities, to insert a given number of geometric means between two given quantities, sum of a number of terms in a G.P. Types of G.P.s— increasing G. P. s type one and two , decreasing G. P. s type one and two.

Harmonic Progression: to find the harmonic mean between two given quantities, theorems related with progressions, solved examples sample company questions. **4 Hrs**

Unit -V

Coding Decoding: Letter Coding, Number Coding, symbol coding

Crypt arithmetic: Basic concepts , addition , subtraction, multiplication of coded alphabets, Types of cryptarithm

Data Interpretation: Approach to interpretation - simple arithmetic, rules for comparing fractions, Calculating (approximation) fractions, short cut ways to find the percentages, Classification of data– Tables, Bar graph, line graph, Cumulative bar graph, Pie graph, Combination of graphs. Combination of table and graphs. **8 Hrs**

Reference books:

1. The Trachtenberg speed system of basic mathematics, published by Rupa publications.
2. CAT Mathematics by Abhijith Guha. published by PHI learning private limited.
3. Quantitative aptitude by Dr. R. S Agarwal, published by S.Chand private limited.
4. Verbal reasoning by Dr. R. S Agarwal , published by S. Chand private limited.
5. Quantitative aptitude for CAT by Arun Sharma, published by McGraw Hill publication.

Course Outcomes (CO)

After learning all the units of the course, the student is able to:

1. Apply the approach of seven dimension to better reading skills. L2
2. Solve the questions under reading comprehension confidently with higher accuracy than random reading. L4
3. Apply the technique of alligation for effective problem solving. L2
4. Interpret the requirement of different methods of calculating average and apply the right method at right scenario. L4
5. Effectively solve problems of profit and loss and problems related to discount, simple interest and compound interest. L5
6. Formulate the equations for summation and other functions for all the kinds of progressions– AP, GP and HP. L1



Professional Elective-I

Course title: Software Testing			
Course Code: P18IS551	Semester: V	L-T-P-H:2-2-0-4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Software Engineering

Course Learning Objectives

This course aims to,

1. Define a software Testing, and understand its different methods of software testing and Ability to explain what a CFG is and how to construct one.
2. Understand the saturation effect, its impact on software reliability, and ways to overcome its shortcoming and Ability to apply equivalence partition technique for software testing.
3. Understand how boundary value analysis technique used for software testing and Recognize and distinguish basic terms Adequacy Coverage.
4. Understand practical uses and limitations of structural testing and Ability to analyse The data flow to build software testing models.
5. Understand the purpose of defining test adequacy criteria, and their limitation and Understand strategies for ordering construction and testing.

Course Content

Unit I

Basics Of Software Testing: Human Errors and Testing; Software Quality; Requirements, Behavior and Correctness; Correctness versus Reliability; Testing and Debugging; Test Metrics. Software and Hardware Testing; Testing and Verification; Defect Management; Execution History; Test generation Strategies, Static Testing. Model-Based Testing and Model Checking; Control-Flow Graph; Types of Testing. **10 Hours**

Self Study: The Saturation Effect.

Unit II

Test Generation From Requirements: Introduction; The Test-Selection Problem; Equivalence Partitioning; Boundary Value Analysis; Category-Partition Method. Cause-Effect Graphing. **10 Hours**

Self Study: Test Generation from Predicates

Unit III

Structural Testing: Overview; Statement testing; Branch testing; Condition testing, Path testing; Procedure call testing; Comparing structural testing criteria; The infeasibility problem. **DEPENDENCE, DATA FLOW MODELS, AND DATA FLOW TESTING:** Definition-Use pairs; Data flow analysis; Classic analyses; From execution to conservative flow analysis; Data flow analysis with arrays and pointers; Inter-procedural analysis; Overview of data flow testing; Definition Use associations; Data flow testing criteria. **12 Hours**

Self Study: Data flow coverage with complex structures; The infeasibility problem.

Unit IV

Test Case Selection And Adequacy, Test Execution: Overview; Test specification and cases; Adequacy criteria; Comparing criteria; Overview of test execution; From test case



specification to test cases; Scaffolding; Generic versus specific scaffolding; Test oracles.

10 Hours

Self Study: Self-checks as oracles; Capture and replay.

Unit V

Process: Test and analysis activities within a software process: The quality process; Planning and monitoring; Quality goals; Dependability properties; Analysis; Testing; Improving the process; Organizational factors. Integration and component-based software testing: Overview; Integration testing strategies; Testing components and assemblies. System, Acceptance and Regression Testing: Overview; System testing; Acceptance testing; Usability; Regression testing; Regression test selection techniques.

10 Hours

Self Study: Test case prioritization and selective execution.

Text books:

1. Foundations of Software Testing - Aditya P Mathur, Pearson Education, 2008.
2. Software Testing and Analysis: Process, Principles and Techniques – Mauro Pezze, Michal Young, John Wiley & Sons, 2008.

Reference Books:

1. Software testing Principles and Practices – Gopaldaswamy Ramesh, Srinivasan Desikan, 2ndEdition, Pearson,2007
2. Software Testing – Ron Patton, 2nd edition, Pearson Education, 2004.

Course Outcomes:

After learning all the units of the course, the student is able to

1. Identify Test cases, Error and fault taxonomies, Levels of testing.
2. Classify different types of testing (Boundary Value Testing, Equivalence Class Testing and Decision Table-Based Testing).
3. Recognize Alternative life - cycle models, recognize Basic concepts for requirements specification, assess context of interaction.
4. Recognize approaches for Test Execution: from test case specifications to test cases, Scaffolding, Generic versus specific scaffolding.
5. Identify and plan strategies to test design specifications document.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	3										2	3		
CO 2	3	3			1							2	3		
CO 3	2	2	3		1							2	3		
CO 4	2	2			1							2	3		
CO 5	2	2	3		1							2	3		



Course title: Unix System Programming			
Course Code: P18IS552	Semester: V	L-T-P-H:2-2-0-4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLO's):

This Course aims to:

1. To provide introduction to UNIX Operating System and its File System
2. To gain an understanding of important aspects related to the SHELL and the process
3. To provide a comprehensive introduction to SHELL programming, services and utilities.
4. To Develop the skills the necessary for systems programming including file system programming, process and signal management and inter-process communication
5. To understand and make effective use of Linux utilities and shell scripting language to solve problems
6. To implement in C some standard Linux utilities.
7. To develop the basic skills required to write network programs using sockets.

Unit I

Introduction to Unix and it's Utilities: Architecture of Unix, Features of Unix , Unix Commands – PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip. Unix Utilities: Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin. Text processing utilities and backup utilities. **10 Hours**

Self-study: tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio.

Unit II

Introduction to Shells and Filters :Unix Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization. **Filters:** Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, Words or Lines, Comparing Files. **Grep:** Operation, grep Family, Searching for File Content. **Sed:** Scripts, Operation, Addresses, commands. **11 Hours**

Self-study: Applications, grep and sed.

Unit – III

Unix Files and APIs: File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, Inodes in UNIX System V, Application Program Interface to Files, UNIX Kernel Support for Files. Directory Files, Hard and Symbolic Links. UNIX File APIs: General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs. **10 Hours**

Self-study: Relationship of C Stream Pointers and File Descriptors

Unit – IV

Unix Processes: The Environment of a UNIX Process: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit, Functions, UNIX Kernel Support for Processes. **PROCESS Control:** Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4



Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times. **11 Hours**
Self-study: I/O Redirection.

Unit – V

Process Relationships and interprocess communication: Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tegetpgrp and tcsetpgrp Functions, Job Control, Shell Execution of Programs, Orphaned Process Groups.
Interprocess communication: Overview of IPC Methods, Pipes, popen, pclose Functions, FIFOs, System V IPC, Message Queues, Semaphores. **10 Hours**

Self-study: Coprocessor

Text Books:

1. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg.Thomson
2. Unix the ultimate guide, Sumitabha Das, TMH. 2nd Edition.
3. Unix System Programming Using C++ - Terrence Chan, PHI, 1999.
4. Advanced Programming in the UNIX Environment - W.Richard Stevens, Stephen A. Rago, 3rd Edition, Pearson Education / PHI, 2005.

Reference Books:

1. Advanced Unix Programming- Marc J. Rochkind, 2nd Edition, Pearson Education, 2005.
2. The Design of the UNIX Operating System - Maurice.J.Bach, Pearson Education / PHI, 1987.
3. Unix Internals - Uresh Vahalia, Pearson Education, 2001.
4. Unix for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson Education.
5. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
6. The Complete Reference Unix, Rosen, Host, Klee, Farber, Rosinski, Second Edition, TMH.

Course Outcomes

After learning all the units of the course, students is able to

1. Understanding the architecture and features of UNIX Operating System, distinguish it from other Operating System and implement various file processing commands and process control commands used in UNIX.
2. Develop shell programs and demonstrate filter commands.
3. Analyse the working of APIs using suitable programs.
4. Understand the environment of a process and its operations by using APIs.
5. Ability to write programs using different IPCs.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2	3	2	2										
CO 2	2	2	3	3	3										
CO 3	3	2	3												
CO 4		2	3												
CO 5		2	3								2				



Course Title: User Interface Design			
Course Code:P18IS553	Semester: V	L-T-P-H : 2:2:0:4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Programming Principles, Software Engineering

Course Learning Objectives (CLOs)

This course aims to

1. Describe basic user interface engineering definitions, concepts, and principles.
2. Discuss, analyze and evaluate a variety of approaches to user interface design.
3. Acquire an understanding of needs analysis of user interactions/interfaces, legal, ethical, and social issues.
4. Design, develop, implement, and present a new user interface for an application.
5. Explain Information Search and data visualization methods.

Course Content

Unit- I

Introduction Usability of Interactive Systems – Introduction, Usability Goals and Measures, Usability Motivations, Goals for Our Profession Universal Usability – Introduction, Variations in Physical Abilities and Physical Workspaces, Diverse Cognitive and Perceptual Ability, Personality Differences, Cultural and International Diversity, Users with Disabilities, Older Adult Users, Children, Guidelines, Principles, and Theories – Introduction, Guidelines, Principles, Theories. **12 Hours**

Self Study: Accommodating Hardware and Software Diversity

Unit- II

Design Processes Design – Introduction, Organizational Support for Design, The Design Process and Design Frameworks, Design Methods, Design Tools, practices and Patterns, Social Impact Analysis, Legal Issues Evaluation and the User Experience– Introduction, Expert Reviews and Heuristics, Usability Testing and Laboratories, Survey Instruments, Acceptance Tests, Evaluation during Active Use and Beyond. **10 Hours**

Self Study: Controlled Physiologically Orientated Experiments.

Unit- III

Interaction Styles – I Direct Manipulation and Immersive Environments – Introduction, What is Direct Manipulation?, Some Examples of Direct Manipulation, 2-D and 3-D Interfaces, Tele-operation and Presence, Fluid Navigation– Introduction, Navigation by Selection, Small Displays, Content Organization, Audio Menus, Form Fill-in and Dialog Boxes. **10 Hours**

Self Study: Augmented and Virtual Reality

Unit- IV

Interaction Styles-II Expressive Human and Command Languages – Introduction, Speech Recognition, Speech Production, Human Language Technology, Devices – Introduction, Keyboards and Keypads, Pointing Devices, Displays **10 Hours**

Self Study: Traditional Command Language

Unit- V

Design Issues Information Search – Introduction, Five-Stage Search Framework, Dynamic Queries and Faceted Search, Command Languages and “Natural” Language Queries, Multimedia Document Search and Other Specialized Search, The Social Aspect of Search Data Visualization– Introduction, Tasks in Data Visualization, Visualization of Data Type. **10 Hours**

Self Study: Challenges of Data Visualization



Text Book:

1. **Designing the User Interface:** Strategies for Effective Human-Computer Interaction, 6th Edition by Ben Shneiderman, Catherine Plaisant, and Steven Jacobs. (2018, Pearson Education Company).

Reference Books:

1. User Interface Design And Evaluation by Debbie Stone, Mark Woodroffe, Caroline Jarrett, ShaileyMinocha, Morgan Kaufmann Publishers, ISBN: 0120884364
2. The Design of Everyday Things: Revised and Expanded Edition by Don Norman, November 5, 2013.

Course Outcomes

After learning all the units of the course, the student is able to

1. Apply basic user interface engineering definitions, concepts, and principles.
2. Analyze and evaluate a variety of approaches to user interface design.
3. Analysis of user interactions/interfaces, legal, ethical, and social issues.
4. Design, develop, implement, and present a new user interface for an application.
5. Apply powerful search and visualization methods.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2		2		1								1	1	1
CO 2	2		2		1								1	1	1
CO 3	2		2		1	1	1	1					1	1	1
CO 4	2		2		1								1	1	1
CO 5	2		2		1								1	1	1



Course Title: Robotic Process Automation			
Course Code:P18IS554	Semester: V	L-T-P-H : 2:2:0:4	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisite: Prior programming knowledge will be useful.

Course Learning Objectives (CLOs)

This course aims to

1. Understand Robotic Process Automation technology
2. Learn UiPath programming techniques to deploy robot configurations
3. Explore various data extraction techniques
4. Learn about integrations with various popular applications such as SAP and MS Office
5. Debug a programmed robot including logging and exception handling
6. Maintain code version and source control
7. Deploy and control Bots with UiPath Orchestrator

Course Contents

Unit - I

What is Robotic Process Automation?: What is Robotic Process Automation? Scope and techniques of automation Robotic process automation, About UiPath, The future of automation.

Record and Play: Record and Play, UiPath stack, Downloading and installing UiPath Studio, Learning UiPath Studio, Task recorder. **10 Hours**

Self-study component: Step-by-step examples using the recorder.

Unit - II

Sequence, Flowchart, and Control Flow: Sequence, Flowchart, and Control Flow, Sequencing the workflow, Activities, Control flow, various types of loops, and decision making, Step-by-step example using Sequence and Flowchart, Step-by-step example, using Sequence and Control flow.

Data Manipulation: Data Manipulation, Variables and scope, Collections, Arguments – Purpose and use, Data table usage with examples, Clipboard management, File operation with step-by-step example. **11 Hours**

Self-study component: CSV/Excel to data table and vice versa (with a step-by-step example).

Unit – III

Taking Control of the Controls: Taking Control of the Controls, Finding and attaching windows, Finding the control, Techniques for waiting for a control, Act on controls – mouse and keyboard activities, Working with UiExplorer, Handling events, Revisit recorder, Screen Scraping, When to use OCR, Types of OCR available, How to use OCR, Avoiding typical failure points.

Tame that Application with Plugins and Extensions: Tame that Application with Plugins and Extensions, Terminal plugin, SAP automation, Java plugin, Citrix automation, Mail plugin, PDF plugin, Web integration, Excel and Word plugins, Credential management. **11 Hours**

Self-study component: Extensions – Java, Chrome, and Firefox.

Unit – IV

Handling User Events and Assistant Bots: Handling User Events and Assistant Bots, What are assistant bots? Monitoring system event triggers, Monitoring image and element triggers, Launching an assistant bot on a keyboard event.



Exception Handling, Debugging, and Logging: Exception Handling, Debugging, and Logging, Exception handling, Common exceptions and ways to handle them, Logging and taking screenshots, Debugging techniques, Collecting crash dumps. **10 Hours**

Self-study component: Error reporting.

Unit – V

Managing and Maintaining the Code: Managing and Maintaining the Code, Project organization, Nesting workflows, Reusability of workflows, Commenting techniques, State Machine, When to use Flowcharts, State Machines, or Sequences.

Deploying and Maintaining the Bot: Deploying and Maintaining the Bot, Publishing using publish utility, Overview of Orchestration Server, Using Orchestration Server to control bots, Using Orchestration Server to deploy bots, License management. **10 Hours**

Self-study component: Publishing and managing updates.

Text Book:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool – UiPath by Alok Mani Tripathi, Packtpub, March 2018.

Reference Books:

1. Learning ServiceNow by Tim Woodruff, Packtpub, March 2017.
2. ServiceNow Automation by Ashish Rudra Srivastava, Packtpub.

Course Outcomes

After learning all the units of the course, the student is able to

1. Illustrate Robotic Process Automation technology with simple examples using UiPath Studio.
2. Apply UiPath programming techniques and explore various data manipulation techniques.
3. Explore various data extraction techniques and Integrate with various popular applications such as SAP and MS Office.
4. Debug a programmed robot including logging and exception handling.
5. Maintain code version, source control and deploy & control Bots with UiPath Orchestrator.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)											PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1				2							1			1
CO 2	2	1	1		2							1			1
CO 3	2	1	1		2							1			1
CO 4	2	1	1		2							1			1
CO 5	2	1	1		2							1			1



Course title: Machine Learning			
Course Code: P18IS61	Semester: VI	L-T-P-H:4-0-0-4	Credit:4
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course learning objectives (CLOs)

This course aims to cover

1. Machine learning and its types.
2. Various supervised learning algorithms and its implementation.
3. Unsupervised learning algorithm and its implementation.
4. Approaches for building good data sets and model evaluation.
5. Applying Machine learning algorithms for real world problems.
6. Introduction to tensorflow and its implementation

Course Content

Unit-I

Introduction to Machine Learning and its types - supervised learning, unsupervised learning, and reinforcement learning, A roadmap for building machine learning systems

Classification Algorithms: Choosing a classification algorithm, Logistic Regression, Training a logistic regression model with scikit-learn(sklearn), overfitting and underfitting, Tackling overfitting via regularization, Support Vector Machines, Logistic regression versus support vector machines.

10 Hours

Self study: Python Packages for scientific computing, data science, and machine learning

Unit-II

Classification Algorithms (Continued): Decision tree learning, Building a decision tree and its implementation in sklearn, K-nearest neighbors and its implementation in sklearn, Naive Bayes algorithm and its implementation.

Building Good Training Sets – Data Preprocessing: Dealing with missing data - Identifying missing values in tabular data, Eliminating samples or features with missing values, Imputing missing values, Understanding the scikit-learn estimator API; Handling categorical data - Nominal and ordinal features, Mapping ordinal features, Encoding class labels, Performing one-hot encoding on nominal features; Partitioning a dataset into separate training and test sets, Bringing features onto the same scale, Selecting meaningful features, L1 regularization

Self Study: Random Forest Algorithm.

11 Hours

Unit-III

Compressing Data via Dimensionality Reduction: Principal component analysis and its implementation in scikit-learn, Linear Discriminant Analysis (LDA) and its implementation in scikit-learn, Principal component analysis versus linear discriminant analysis

Model Evaluation and Hyper parameter Tuning: Streamlining workflows with pipelines, Using k-fold cross-validation to assess model performance, Debugging algorithms with learning and validation curves, different performance evaluation metrics, Dealing with class imbalance

Applying Machine Learning to Sentiment Analysis: Preprocessing the movie dataset into more convenient format, bag-of-words model - Transforming words into feature vectors, Assessing word relevancy, Cleaning text data, Processing documents into tokens; Training a logistic regression model for document classification.

11 Hours

Self Study: Using kernel principal component analysis for nonlinear mappings



Unit-IV

Regression analysis: Simple linear regression, multiple linear regression, Exploring the Housing dataset, Implementing an ordinary least squares linear regression model, Evaluating the performance of linear regression models

Unsupervised learning: K-means clustering and implementation using scikit-learn, Hard versus soft clustering, Using the elbow method to find the optimal number of clusters

Artificial Neural Networks: Modeling complex functions with artificial neural networks - Single-layer neural network, multi-layer neural network, Activating a neural network via forward propagation

Self Study: Embedding a Machine Learning Model into a Web Application. **10 Hours**

Unit-V

Deep Learning: Introduction, Convolution Neural Network, Building blocks of convolutional neural Networks - Understanding CNNs and learning feature Hierarchies, Performing discrete convolutions; Subsampling

TensorFlow: Introduction and need, TensorFlow ranks and tensors, Understanding TensorFlow's computation graphs, Placeholders in TensorFlow, Variables in TensorFlow, Building a regression model, Executing objects in a TensorFlow graph using their names

Self Study: Implementing a deep convolutional neural network using TensorFlow **10 Hours**

Textbook:

1. Python Machine Learning - Second Edition, Sebastian Raschka, Vahid Mirjalili, Packt Publishers, 2017

Reference Books:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education
2. EthemAlpaydın, Introduction to machine learning, second edition, MIT press.

Course Outcomes

After learning all the units, the student is able to

1. Understand types of Machine learning algorithms.
2. Implement various classification algorithms using Python and apply techniques for building a good data set.
3. Implement dimensionality reduction techniques using Python and perform model evaluation.
4. Implement Linear Regression, k-means and artificial neural network methods using Python.
5. Understand fundamentals of Deep learning and Tensor flow.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2										1			
CO 2	2	2	2	1	1							1			2
CO 3	2	2	2	1	1							1			2
CO 4	2	2	2	1	1							1			2
CO 5	2				1							1			1



Course Title: Object Oriented System Development			
Course Code:P18IS62	Semester: VI	L-T-P-H : 4:0:0:4	Credit:4
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites:

A good understanding of object oriented technologies and a basic understanding of analysis and design.

Course learning objectives (CLOs)

This course aims to

1. Describe Unified Modeling Language (UML) notations, the concepts and notations involved in OO modeling.
2. Explain the models for Object Oriented System Development.
3. Analyze and Design a solution to the real world problem.
4. Understand the basics of how to prepare OO models.
5. Apply the design patterns to solve problems.
6. Apply software metrics to the improve software design.

Course Content

Unit - I

Introduction, Modeling Concepts, Class Modeling and Advanced Class Modeling: What is Object Orientation? What is OO development? OO themes; *Modeling as Design Technique*: Modeling; Abstraction; The three models. **Class Modeling:** Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models. **Advanced Class Modeling:** Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance.

Self Study: Reification; Constraints; Derived data; Packages.

11 Hours

Unit - II

State Modeling, Advanced State Modeling, And Interaction Modeling: State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior. **Advanced State Modeling:** Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model;

Interaction Modeling: Use case models; Sequence models; Activity models.

Advanced Interaction Modeling: Use case relationships; Procedural sequence models; Special constructs for activity models.

Self Study: Relation of class and state models

10 Hours

Unit - III

System conception, domain analysis, application analysis: System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement. **Domain Analysis:** Overview of analysis; Domain class model; Domain state model; Domain Interaction model; Iterating the analysis **Application Analysis:** Application interaction model; Application class model; Application state model.

Self Study: Adding operations.

10 Hours

Unit - IV

System Design, Class Design: System design: Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the



example. **Class Design:** Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance.

Self Study: Organizing a class design; ATM example.

11 Hours

Unit - V

Design Patterns: What is a pattern and what makes a pattern? Pattern categories; Relationships between patterns; Pattern description Communication Patterns: Forwarder-Receiver; Client-Dispatcher-Server; Publisher-Subscriber, Management Patterns: Command processor; View handler.

Idioms: Introduction, what can idioms provides? Idioms and style, Where to find idioms

Self Study: Counted Pointer example

10 Hours

Text Books

- 1.Object-Oriented Modeling and Design with UML - Michael Blaha, James Rumbaugh , 2nd Edition, Pearson Education.
- 2.Pattern-Oriented Software Architecture, A System of Patterns: Frank Buschmann, RegineMeunier, Hans Rohnert, Peter Sommerlad, Michael Stal:, Volume 1, John Wiley and Sons.

Reference Books

1. Object-Oriented Analysis and Design with Applications – Grady Booch et al, 3rd edition, Pearson education.
2. Object-Oriented Analysis, Design, and Implementation, Brahma Dathan, SarnathRamnath, Universities Press.

Course Outcomes

After learning all the units of the course, the student is able to

1. Describe the object oriented modeling concepts and class model.
2. Apply state model and interaction model with UML notations to solve problems.
3. Analyze to build domain and application model.
4. Design the solutions for real world problems.
5. Apply design patterns to solve real world problems.

Course Articulation Matrix															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	3	1											2
CO 2	2	2	3	2											2
CO 3	2	3	3	2						1			2		2
CO 4	2	2	2	2						2	1		1		2
CO 5	2	2	3	2						1			1		2



Course Title: Internet of Things			
Course Code: P18IS63	Semester : VI	L- T – P - H - 4 : 0 : 4	Credit : 4
Contact period : Lecture: 52 Hrs, Exam:3 hrs		Weightage: CIE: 50; SEE:50	

Course Learning Objectives: The students will be able to

1. To assess the vision and introduction of IoT.
2. Understand what Internet of Things and its applications of IOT in the different environment
3. Understand the Need of IoT System Management with NETCONG
4. Understand the Radio Frequency Identification Technology.
5. Apply IoT on different areas.
6. Explain resources in the IoT and deploy of resources into business.
7. Demonstrate data analytics for IoT

Course Content

Unit-I

Introduction & Concept: Introduction to Internet of Things, Introduction, physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates, IoT and M2M: Introduction, M2M, difference between IoT and M2M, SDN and NFV for IoT.

Self Study: Identify the levels of various real time IoT applications **10 Hours**

Unit-II

Domain Specific IoTs: Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Lifestyle, IoT System Management with NETCONF-YANG: Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator Requirements, NETCONF, YANG, IoT System Management with NETCONF-YANG.

Self Study: Study of Various Applications of IoT **10 Hours**

Unit-III

Radio Frequency Identification Technology Overview Introduction, Principals of RFID, Components of RFID system, Reader, RFID tag, RFID Middleware, RFID Applications, and Related Research Issues: introduction, Concepts and Terminology, Radio Frequency Identification, Transponder classes, standards, RFID system architecture, other related technologies, RFID applications, logistic and supply chain, production, monitoring and maintenance, product safety, quality and information, access control and tracking and tracing of individuals, ongoing research projects, hardware issues, protocols, product safety, quality and information, access control and tracking and tracing of individuals, ongoing research projects, hardware issues, protocols.

Self Study: Study of various RFID applications. **12 Hours**

Unit-IV

IoT Platforms Design Methodology: Introduction, IoT Design Methodology, IoT Physical Servers & Cloud Offerings, Introduction to Cloud Storage Models & Communication APIs, WAMP - AutoBahn for IoT, Xively Cloud for IoT, Designing a RESTful Web API, Amazon Web Services for IoT.

Self Study: Case Study on IoT System for Weather Monitoring **10 Hours**



Unit-V

Data Analytics for IoT – Introduction, Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Real-time Data Analysis.

Self Study: Structural Health Monitoring Case Study

10 Hours

Text Books:

1. Arshdeep Bahga, Vijay Madiseti, "Internet of Things: A Hands on Approach" Universities Press., 2015
2. Hakima Chaouchi, " The Internet of Things Connecting Objects to the Web" ISBN : 978 – 1 – 84821 - 140 - 7, Willy Publications

Reference Books:

1. NPTEL MOOC materials for Introduction to Internet of Thing: <http://nptel.ac.in/courses/106105166>
2. NPTEL MOOC Certification Course: https://onlineCourses.nptel.ac.in/noc18_cs46/
3. Daniel Minoli , " Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications " , ISBN: 978–81–265–5823–0 , Wiley Publications, 2016.
4. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things: Key Applications and Protocols", ISBN: 978–81–265–5765–3,Wiley Publications, 2015.

Course Outcomes:

After completing the course, the students will be able to

1. Able to identify the basic concepts, the different levels of IOT applications from a present and a futuristic view point
2. Understand the practical knowledge through different case studies and develop multiple node IOT system with YANG network Configuration
3. Understand the working knowledge related to enabling technologies like RFID
4. Design a methodology for various IOT applications and Model the Internet of things to business
5. Understand data sets received through IoT devices and tools used for analysis

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3				1			2						1	
CO 2	3	1		1	2			2							2
CO 3	3							2						2	
CO 4	3		3	2	3	1	1	2						2	
CO 5	3				3			3							3



Course title: Machine Learning Lab			
Course Code: P18ISL66	Semester: VI	L-T-P-H:0-0-3-3	Credit:1.5
Contact Period: Lecture: 39 Hr, Exam: 3 Hr		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs):

This course aims to cover

1. Implementation of machine learning algorithms using Python.
2. Model selection and evaluation process with a project

Lab Components

Part A: Implementing various machine learning algorithms in Python using datasets.

Algorithms include:

- Linear Regression.
- Logistic Regression.
- Decision Tree.
- SVM.
- Naive Bayes.
- kNN.
- K-Means.
- ANN

Part B: Carry out a mini project using Python choosing an appropriate data set.

References:

- Virtual Labs – IIT Bombay, http://vlabs.iitb.ac.in/vlabs-dev/labs/machine_learning/labs/index.php

Course Outcomes

After learning all programs of the course, the student is able to,

1. Implement supervised and unsupervised machine learning algorithms using Python
2. Design and Development of a project using suitable dataset.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1	1	2		2										1
CO 2	1	2	2		2				2	1	2				2



Course title: Internet of Things Lab			
Course Code: P18ISL67	Semester: VI	L-T-P-H:0-0-3-3	Credit:1.5
Contact Period: Lecture: 39 Hr, Exam: 3 Hr		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to

1. To develop simple Internet of Things Applications
2. To Implement Data and Knowledge Management and use of Devices in IoT Technology.
3. Usage of cloud infrastructure and services in Internet of Things

PART-A Course Content

1. Design a Smart Traffic Light System using Arduino UNO which includes a crosswalk button
2. Develop an application using Arduino UNO to modulate an LED using an LDR and PIR sensor
3. Design a Smart dustbin system using Arduino UNO and ultrasonic sensor
4. Develop an application using RasberyPi to detect an object using IR sensor and send the message using SMTP protocol
5. a) Write a Program to interface temperature sensor to Arduino UNO and read the values of temperature and humidity in the given environment and turn On the LED if temperature value met the threshold value
b) Using XCTU software, connect two different motes wirelessly and establish a duplex communication.
6. Write a Program to interface LPG sensor to Arduino UNO and read the values of a sensor in the given environment and turn On the buzzer if petroleum gas is detected value.
7. Write a program to interface soil sensor to RasberyPi and transmit received data to cloud using Ethernet/WiFi

PART-B

Develop any Internet of Things Applications as a simple project using different sensors and devices.

Course Outcomes

After learning all programs of the course, the student is able to,

1. Ability to Design and Develop simple Internet of Things Applications.
2. Compare and Contrast the use of Devices, Gateways and Data Management in Internet of Things.
3. Ability to deployment and management of various data received from Internet of Things devices to cloud applications.



Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)											PSO's			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	3	2	2		2			2	2					1	2
CO 2	3	2	2		2			2	2					2	
CO 3	3	2	2		2	1	1	2	2	2	1	1		2	2



Course title: Skill Oriented Lab-II (Mobile Application Development Lab)			
Course Code: P18ISL68	Semester: VI	L-T-P-H: 0 - 0 - 0 -2 - 2	Credit:1
Contact Period: Lecture: 24 Hr, Exam:		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs):

This course aims to

1. Access and work with the Android APIs.
2. Design, implement and deploy mobile applications using an appropriate software development environment.

List of Programs

1. Develop an application that uses GUI components, font and colours.
2. Develop an application that uses layout manager and event listener.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen in android.
5. Develop an application that makes uses of database.
6. Implement an application that implements multi-threading.
7. Develop a native application that uses GPS location information.
8. Develop an application that writes data to the SD card.
9. Develop an application that creates an alert upon receiving a message.
10. Develop a mobile application that creates alarm clock.

Course Outcomes

After learning all programs of the course, the student is able to,

1. Access and work with the Android APIs.
2. Design, implement and deploy mobile applications using an appropriate software development environment.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2		2		2								1	1	2
CO 2	2		2		3								1	1	2



Course Title : Technical Skills-II (Internals of C Programming)			
Course Code: P18HU691	Semester : 6	L:T:P – 2:0:0	Credits: 1
Contact Period : Lecture :26 Hr, Practical : 24 Hr		Weightage :CIE:50% SEE:50%	
Exam: 3Hr Methodology: Blended (Classroom & lab)			

To enable students to:

1. Strengthen their understanding of **how Computer works, C, and Data Structures**
2. Write effective codes on **C Programming** and to debug.

OVERALL SYLLABUS BREAKUP:				
Sl. No.	Module name	Classroom (Hours)	Lab (Hours)	Total duration (Hours)
1.	Working of Computer	6	0	6
2.	C Programming	0	16	16
3.	Introduction to Data Structures	2	2	4
Total Hours		08	18	26

Learning Outcomes:

After undergoing training in this course, the students will be in a position to –

1. Deep understanding of Computer components and working of its components.
2. Write complete program based on the requirements and to debug.
3. Frame effective programs using C programming and Data Structures.

Assessments:

All of the modules will have two types of assessments

1. Multiple-choice assessment for programming logic, concepts and debugging
2. Coding



Course Plan

C Programming:

Sl. No.	Topics covered	Learning outcome	Type of learning	Duration
1.	Working of Computer: <ul style="list-style-type: none"> • Booting. Loading of O.S., Dual Booting • How a computer executes a Program. • What happens inside the computer when programs run? • Difference between running and executing states of a process in the Operating System • The Fetch and Execute Cycle: Machine Language. • Discussion of Basic Electronics, Logic design, Computer organization, Computer architecture, Compilers, System Programming, Linux Internals. 	<ul style="list-style-type: none"> • Understand the basics of computer working and operation of peripherals. • The purpose of Operating System, Basic Electronics, Logic design, Computer organization, Computer architecture, Linux Internals. 	Class - 6	6
1.	C Programming Language: <ul style="list-style-type: none"> • Difficult level of Snippets for <ul style="list-style-type: none"> ○ Understanding basic syntax ○ If - else statement ○ Switch case ○ Struct ○ For loop ○ While and do - while loop ○ Array ○ Strings ○ Pointers ○ Function ○ String ○ File handling ○ Preprocessing 	<ul style="list-style-type: none"> • Understand the concepts of snippets in a programming term for a small region of re-usable source code, machine code, or text. In C it could be part of the program - A Function, typedef or a part of the algorithm or code. • Understand the concepts of programs as sequences or machine instructions. 	Lab - 16	16
2.	Introduction to Data Structures: <p>Data Structures Basics: Structure and Problem Solving, Data structures, Data structure Operations, Algorithm: complexity, Time- space tradeoff.</p> <ul style="list-style-type: none"> ○ Linked List ○ Stack and Queue ○ Searching and Sorting Techniques 	<ul style="list-style-type: none"> • Understand common data structures and the algorithms that build and manipulate them including various sorting and searching algorithms. Data structures include arrays, linked lists, stacks, queues, features, properties, applications, enumerators, and performance issues. 	Class -2 Lab - 2	04



Professional Elective – II

Course Title: Cloud Computing			
Course Code: P18IS641	Semester : VI	L- T – P -H: 2 – 2 – 0 -4	Credit :4
Contact period : Lecture: 52 Hr, Exam:3 Hr		Weight age: CIE: 50, SEE:50	

Course Learning Objectives

This course aims to

- 1) To understand Cloud Infrastructure of different service providers
- 2) To explain Virtualization, Layering and virtualization and performance of virtual machines
- 3) To describe the different modes of Cloud Resource Management and Scheduling
- 4) To understand google cloud platform and services
- 5) To implement google cloud platform and services

Course contents

Unit -I

Cloud Resource Virtualization: Virtualization, Layering and virtualization, Virtual machine monitors, Virtual Machines, Performance and Security Isolation, Full virtualization and paravirtualization, Hardware support for virtualization, Case Study: Xen a VMM based paravirtualization, Optimization of network virtualization, vBlades, Performance comparison of virtual machines.

Self study component: The dark side of virtualization, Exercises and problems **10 Hours**

Unit -II

Cloud Resource Management and Scheduling: Policies and mechanisms for resource management, Application of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-based Web services, Resourcing bundling: Combinatorial auctions for cloud resources, Scheduling algorithms for computing clouds, Fair queuing, Start-time fair queuing, Borrowed virtual time, Cloud scheduling subject to deadlines, Scheduling MapReduce applications subject to deadlines

Self study component: Resource management and dynamic scaling, Exercises and problems **11 Hours**

Unit -III

Introduction, Cloud Infrastructure: Cloud computing, Cloud computing delivery models and services, Ethical issues, Cloud vulnerabilities, Cloud computing at Amazon, Cloud computing the Google perspective, Microsoft Windows Azure and online services, Open-source software platforms for private clouds, Cloud storage diversity and vendor lock-in, Service level agreements, User experience and software licensing. Exercises and problems.

Self study component: Energy use and ecological impact **11 Hours**

Unit -IV

Google Cloud Platform Overview: GCP resource- [Google data centers](#), Accessing resources through services, Global, regional, and zonal resources, Projects, interact with the services, GCP services-Computing and hosting services, Serverless computing, Cloud Functions, Application platform, Containers, Virtual machines, **Cloud services** -Combining computing and hosting options, Storage services. **Lab sessions on services includes all google cloud services**



Self study component: Database services.

10 Hours

Unit -V

Cloud services-: Networking services-Networks, firewalls, and routes, Load balancing, Cloud DNS, Advanced connectivity, Big data services-Data analysis, Batch and streaming data processing, Asynchronous messaging, Machine learning services- Machine learning APIs.

Self study component: AI Platform Lab sessions on services includes all google cloud services

10 Hours

Text Books

1. Cloud Computing Theory and Practice, Author: Dan C Marinescu

Reference books

1. Cloud Computing Implementation, Management and Security , Author : John W Rittinghouse, James F Ransome
2. Links of materials:
 - a)<https://eclass.uoa.gr/modules/document/file.php/D416/CloudComputingTheoryAndPractice.pdf>
 - b)<http://cloud.google.com/docs/>

Course Outcomes

After learning all the units of the course, the student is able to

1. Understand Cloud Infrastructure of different service providers.
2. Explain Virtualization, Layering and virtualization and performance of virtual machines.
3. Describe the different modes of Cloud Resource Management and Scheduling.
4. Understand google cloud platform and services.
5. Implement google cloud platform and services.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1	2												2	
CO 2		1	2			1								1	
CO 3	2		2		2									1	
CO 4	2		2			2								2	
CO 5	2		2	2										1	



Course Title: Compiler Design			
Course Code: P18IS642	Semester : VI	L- T – P -H: 2 – 2 – 0 -4	Credit :4
Contact period : Lecture: 52 Hr, Exam:3 hr		Weight age: CIE: 50, SEE:50	

Prerequisites: The student should have undergone the course on System Software, have knowledge about finite automata and any one programming language.

Course learning objectives

This course aims to

1. Describe the various phases of a compiler, software tools to build compiler and know the technique used to implement lexical analyzer.
2. Apply an algorithm for top down parsing.
3. Apply an algorithm for bottom-up parsing.
4. Create a syntax-directed definition and explain the role of a semantic analyzer and type checking.
5. Apply the transformation of abstract syntax tree to intermediate code.
6. Analyze various issues in allocation strategies and design of code generator.
7. Implement the phases for set of instructions.
8. Apply the knowledge of LEX tool & YACC tool to develop a scanner & parser.
9. Design & conduct experiments for Intermediate Code Generation in compiler.
10. Acquire the knowledge of modern compiler & its features.
11. Learn & Use the new tools and technologies used for designing a compiler

Course contents

Unit– I

Language processors; The structure of a Compiler; Language processors; The evolution of programming languages. Applications of compiler technology; Programming language basics. Lexical analysis: The Role of Lexical Analyzer;

Input Buffering; Specifications of Tokens; Recognition of Tokens.

10 Hours

Self Study: The science of building a Compiler

Unit – II

Syntax Analysis – 1: Introduction; Context-free Grammars; Writing a Grammar. Recursive decent parsing, FIRST set, FOLLOW set, LL (1) Grammar, Non-recursive predictive parsing, **Self Study:** Error recovery in predictive parsing.

10 Hours

Unit – III

Syntax Analysis – 2: Reduction, Handle pruning, Shift reduce parsing, Conflicts during shift reduce parsing, Introduction to LR Parsing: Simple LR; LR parsing algorithm, Constructing SLR parsing tables, Constructing SLR parsing tables, Using ambiguous grammars.

Self Study: Parser Generators.

10 Hours

Unit – IV

Syntax-Directed Translation and Intermediate Code Generation Syntax-directed definitions; Evaluation orders for SDDs; Applications of syntax-directed translation. **Intermediate Code Generation:** Variants of syntax trees; Three-address code; Translation of expressions; Control flow; Back patching; Switch statements; Procedure calls.

Self Study: Syntax-directed translation schemes.

11 Hours



Unit - V

Run-Time Environments and Code Generation Storage Organization; Stack allocation of space; Access to non-local data on the stack; Heap management **Code Generation:** Issues in the design of Code Generator; The Target Language; Addresses in the target code; Basic blocks and Flow graphs; Optimization of basic blocks; A Simple Code Generator.

Self Study: Introduction to garbage collection.

11 Hours

Text Books:

1. Alfred V Aho, Monica S.Lam, Ravi Sethi, Jeffrey D Ullman: Compilers- Principles, Techniques and Tools, 2nd Edition, Pearson Education, 2011.

Reference Books:

1. Charles N. Fischer, Richard J. Leblanc, Jr.: Crafting a Compiler with C, Pearson Education, 2009.
2. Andrew W Apple: Modern Compiler Implementation in C, Cambridge University Press, 2009.
3. Kenneth C Loudon: Compiler Construction Principles & Practice, Cengage Learning, 2011.

Course outcomes

After learning all the units of the course, the student is able to

1. Identify the tools used in various phases of compiler.
2. Apply different top down parsing techniques for context free grammar.
3. Apply different bottom up parsing techniques for context free grammar.
4. Develop syntax directed definition and convert the abstract syntax tree to intermediate code.
5. Analyze different code generation techniques for code optimization.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	1	1										2		1
CO 2	2	3	3	1									2		2
CO 3	2	3	3	1									2		2
CO 4	2	2	2										2		1
CO 5	2	3	2	1									2		2



Course Title: Web Technologies			
Course Code:P18IS643	Semester: VI	L-T-P-H : 2:2:0:4	Credit:4
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives

This course aims to

1. This course is intended to provide an exposure to fundamental concepts of WWW, Internet, Browsers, Servers, URL, MIME, and HTTP
2. To present competent technologies for the design of Web using XHTML and CSS.
3. To provide knowledge of scripting languages such as JavaScript and design dynamic XHTML documents using DOM and JavaScript
4. To create XML documents using DTD/ XML schema and XSLT style sheets and create cookies using PHP, Implement session tracking using PHP
5. To develop Rails application using Ajax.

Course content

Unit - I

Fundamentals of Web: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, **Introduction to XHTML:** Origins and evolution of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables, Forms, Frames, Syntactic differences between HTML and XHTML.

10 Hours

Self Study: The Web Programmers Toolbox.

Unit - II

CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The Box model, Background images, The and <div> tags. **JAVASCRIPT:** Overview of JavaScript, Object orientation and JavaScript, General syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructor, Pattern matching using regular expressions

10 Hours

Self Study: Errors in scripts, Examples.

Unit - III

JAVASCRIPT AND HTML DOCUMENTS: The JavaScript execution environment; The Document Object Model; Element access in JavaScript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements

DYNAMIC DOCUMENTS WITH JAVASCRIPT: Introduction to dynamic documents; Positioning elements; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click; Slow movement of elements.

11 Hours

Self Study: Dragging and dropping elements

Unit-IV

XML: Introduction; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets. **PHP:** Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, Operations and expressions, Output, Control statements, Arrays,



Functions, Pattern matching, Form handling, Files, Cookies, Session tracking. **11 Hours**

Self Study: XML processors; Web services

Unit-V

Introduction to Rails: Overview of Rails, Document requests, processing forms,
Introduction to Ajax: Overview of Ajax, Basics of Ajax, Rails with Ajax. **10 Hours**

Self Study: Rails applications with databases,

Text book:

1. **Programming the World Wide Web** – Robert W. Sebesta, 8th Edition, Pearson Education, 2015.

Reference books:

1. **Internet & World Wide Web How to program** – M. Deitel, P.J Deitel, A. B. Goldberg, 3rd Edition, Pearson Education / PHI, 2004.
2. **Web Programming Building Internet Applications** – Chris Bates, 3rd Edition, Wiley India, 2006.
3. **The Web Warrior Guide to Web Programming** – Xue Bai et al,

Course Outcomes

After learning all the units of the course, the student is able to

1. Develop web pages using various XHTML tags.
2. Design interactive web pages using java script.
3. Create dynamic documents using DOM object model.
4. Develop web pages using PHP scripts.
5. Implement a simple Rails application using Ajax.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2	2	1										2	1
CO 2	2	3	3	1										2	2
CO 3	2	3	3	1										2	1
CO 4	2	2	2	1										2	2
CO 5	2	2	2	1										2	2



Course Title: Supply Chain Management			
Course Code:P18IS644	Semester: VI	L-T-P-H : 2:2:0:4	Credit:4
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives

This course aims to

1. Build a strategic framework to analyze supply chains.
2. Design the supply chain network.
3. Plan demand and supply in a supply chain.
4. Plan and manage inventories in a supply chain.
5. Manage cross-functional drivers in a supply chain.

Course Contents

Unit - I

Building A Strategic Framework To Analyze Supply Chains

Understanding the Supply chain: introduction to Supply Chain, The Objective of a Supply Chain, The Importance of Supply Chain Decisions, Decision Phases in a Supply Chain, Process View of a Supply Chain; **Supply Chain Performance: Achieving Strategic Fit and Scope:** Competitive and Supply Chain Strategies, Achieving Strategic Fit, Expanding Strategic Scope. **10 Hours**

Self-study component: Examples of Supply Chains.

Unit - II

Designing the supply chain network

Designing Distribution Networks and Applications to e-Business: The Role of Distribution in the Supply Chain, Factors Influencing Distribution Network Design, Design Options for a Distribution Network, e- Business and the Distribution Network, Distribution Networks in Practice; **Network Design in the Supply Chain:** The Role of Network Design in the Supply Chain, Factors Influencing Network Design Decisions, Framework for Network Design Decisions, Models for Facility Location and Capacity Allocation, The Role of IT in Network Design. **10 Hours**

Self-study component: Making Network Design Decisions in Practice.

Unit - III

Planning demand and supply in a supply chain

Demand Forecasting in a Supply Chain: The Role of Forecasting in a Supply Chain, Characteristics of Forecasts, Components of a Forecast and Forecasting Methods, Basic Approach to Demand Forecasting, Time-Series Forecasting Methods, Measures of Forecast Error, Forecasting Demand at Tahoe Salt, The Role of IT in Forecasting, Risk Management in Forecasting; **Planning Supply and Demand in a Supply Chain: Managing Predictable Variability:** Responding to Predictable Variability in a Supply Chain, Managing Supply, Managing Demand, Implementing Solutions to Predictable Variability in Practice. **11 Hours**

Self-study component: Forecasting in Practice.

Unit - IV

Planning and managing inventories in a supply chain

Managing Economies of Scale in a Supply Chain: Cycle Inventory: The Role of Cycle Inventory in a Supply Chain, Economies of Scale to Exploit Fixed Costs, Economies of Scale to Exploit Quantity Discounts, Short-Term Discounting: Trade Promotions, Managing Multiechelon Cycle Inventory, Estimating Cycle Inventory-Related Costs in Practice; **Managing Uncertainty in a Supply Chain: Safety Inventory:** The Role of Safety Inventory



in a Supply Chain, Determining Appropriate Level of Safety Inventory, Impact of Supply Uncertainty on Safety Inventory, Impact of Aggregation on Safety Inventory, Impact of Replenishment Policies on Safety Inventory, Managing Safety Inventory in a Multiechelon Supply Chain, The Role of IT in Inventory Management. **11 Hours**

Self-study component: Estimating and Managing Safety Inventory in Practice.

Unit - V

Managing cross-functional drivers in a supply chain

Sourcing Decisions in a Supply Chain: The Role of Sourcing in a Supply Chain, In-House or Outsource, Third- and Fourth-Party Logistics Providers, Supplier Scoring and Assessment, Supplier Selection-Auctions and Negotiations, Contracts and Supply Chain Performance, Design Collaboration; **Pricing and Revenue Management in a Supply Chain:** The Role of Pricing and Revenue Management in a Supply Chain, Pricing and Revenue Management for Multiple Customer Segments, Pricing and Revenue Management for Perishable Products, Pricing and Revenue Management for Seasonal Demand, Pricing and Revenue Management for Bulk and Spot Contracts. **10 Hours**

Self-study component: The Procurement Process.

Text book:

1. Chopra Sunil and Peter Meindl - Supply chain management, Pearson, 6th edition, 2013.

Reference books:

1. A Logistic approach to Supply Chain Management – Coyle, Bardi, Longley, Cengage Learning,
2. Supply Chain Logistics Management, Donald J Bowersox, Dand J Closs, M Bixby Coluper, TMH.

Course Outcomes

After learning all the units of the course, the student is able to

1. Build a strategic framework to analyze supply chains.
2. Design the supply chain network.
3. Plan demand and supply in a supply chain.
4. Plan and manage inventories in a supply chain.
5. Manage cross-functional drivers in a supply chain.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2											1			1
CO 2	2	1	1									1			1
CO 3	2	2										1			1
CO 4	2	2	1									1			1
CO 5	2	2	1									1			1



Open Elective – I

Course Title: Python Programming			
Course Code:P18ISO651	Semester: VI	L-T-P-H : 3:0:0:3	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs	Weightage: CIE:50%, SEE: 50%		

Prerequisites:

- Experience with a high level language (C/C++, Java) is suggested.
- Prior knowledge of a scripting language (Perl, UNIX/Linux shells).
- An object-oriented concept is helpful but not mandatory.

Course Learning Objectives (CLOs)

This course aims to:

1. To understand why Python is a useful scripting language for developers.
2. To learn how to design and program Python applications.
3. To learn how to use lists, tuples, and dictionaries in Python programs.
4. To learn how to identify Python object types.
5. To learn how to use indexing and slicing to access data in Python programs.
6. To define the structure and components of a Python program.
7. To learn how to write loops and decision statements and functions and pass arguments in Python.
8. To learn how to build and package Python modules for reusability.
9. To learn how to read and write files in Python.
10. To learn how to design object-oriented programs with Python classes.
11. To learn how to use class inheritance and exception handling in Python for reusability.

Unit – I

Basics of Python Programming: Features of Python, History of Python, The future of Python, Writing and Executing First Python Program, literal Constants, Variables and Identifiers, Data Types, Input Operation, Comments, Reserved Words, Operators and Expressions, Expressions in Python, Operations on strings, Other Data types, and Type conversion. **Decision Control Statements:** introduction to Decision Control Statements, Selection/Conditional branching statements, Basic Loop Structure / Iterative statements, Nested Loops, The Break statement, The Continue statement, The Pass statement, The else statement used with loops.

Self Study: Installing Python, Testing and Debugging, Simple Calculator, Generating a calendar. **10 Hours**

TextBook:1

Unit – II

Functions and Modules: Introduction, Function Definition, Function call, variable scope and lifetime, The return statement, More on defining functions, Lambda function, Documentation strings, Good Programming practices, Recursive functions, Modules, Packages in python, standard library modules, Globals(), locals(), and reload(). **Python strings revisited:** Introduction, Concatenating, appending and multiplying strings, strings are immutable, strings formatting operator, built-in string methods and functions, slice operation, ord() and chr() functions, in and not in operators, comparing strings, iterating strings, the string module.

Self Study: Function redefinition, Function as Objects, Regular functions, Meta characters in regular expression Tower of Hanoi. **11 Hours**

TextBook:1



Unit – III

Data structure: sequence, Lists, Functional Programming, Tuples, Sets, Dictionaries.

Self Study: Iterator and Generator.

10 Hours

TextBook:1

Unit – IV

NumPy Basics: Arrays and Vectorized Computation: The NumPy ndarray: A Multidimensional Array Object, Universal Functions: Fast Element-Wise Array Functions, Array-Oriented Programming with Arrays, File Input and Output with Arrays, Linear Algebra, Pseudorandom Number Generation.

Self Study: simulate a random walks by providing an illustrative application of utilizing array operations.

11 Hours

TextBook:2

UNIT - V

Pandas: Introduction to pandas Data Structures, Series, DataFrame, Index Objects, Essential Functionality, Reindexing, Dropping Entries from an Axis, Indexing, Selection, and Filtering, Integer Indexes, Arithmetic and Data Alignment, Function Application and Mapping, Sorting and Ranking, Axis Indexes with Duplicate Labels

Self Study: Implement Computing Descriptive Statistics using pandas.

10 Hours

TextBook:2

Text Books:

1. “Python Programming” using problem solving approach by Reema Thareja Oxford University, 2017.
2. “Python for data Analysis: Data Wrangling with Pandas, NumPy, and Ipython”, by Wes McKinney O’RWILLY Publication, 2nd edition,

Reference Books:

1. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
2. Learning Python, Fourth Edition, Mark Lutz, O’Reilly publication

Course Outcomes (COs)

At the end of this course, the students will be able to

1. Understand and comprehend the basics of python programming.
2. Understand and implement modular approach using python
3. Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc
4. Understands the usage of Numpy libraries and to develop various applications of utilizing Numpy.
5. Ability to implement computing descriptive statics using pandas.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO’s)												PSO’s		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	2	2	2								2			
CO 2	2	1	3									1			
CO 3	2	2	1	2					2						
CO 4	1	1	2						2						
CO 5	2	1	2	3	2					2		2			



Course Title: Internet Programming			
Course Code:P18ISO652	Semester: VI	L-T-P-H : 3:0:0:3	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Prerequisites: Basics of Internet

Course Learning Objectives

This course aims to

1. Understand the World Wide Web and XHTML related tags.
2. Describe visual design using CSS and logic design using JavaScript.
3. Describe dynamic documents using DOM with elements.
4. Recognize extended tags by XML.
5. Understand a server-side scripting language using PHP.

Course Contents

Unit - I

Fundamentals: A Brief Introduction to the Internet, The World Wide Web, Web Browsers, Web Servers, Uniform Resource Locators, Multipurpose Internet Mail Extensions, The Hypertext Transfer Protocol, Security.

Introduction to HTML/XHTML: Origins and Evolution of HTML and XHTML, Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5, Syntactic difference between HTML and XHTML.

10 Hours

Self-study component: The Web Programmer's Toolbox.

Unit - II

Cascading Style Sheets: Introduction, Levels of Style Sheets, Selector Forms, Property-Value Forms, Font Properties, List Properties, Alignment of Text, Color, The Box Model, Background Images, The and <div> Tags, Conflict Resolution.

The Basics of JavaScript: Object Orientation and JavaScript, General Syntactic Characteristics, Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, An Example, Constructors, Pattern Matching Using Regular Expressions, Another Example. **11 Hours**

Self-study component: Errors in Scripts.

Unit - III

JavaScript and HTML Documents: The JavaScript Execution Environment, The Document Object Model, Elements Access in JavaScript, Events and Event Handling, Handling Events from Body Elements, Handling Events from Button Elements, Handling Events from Text Box and Password Elements.

Dynamic Documents with JavaScript: Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements. **11 Hours**

Self-study component: Dragging and Dropping Elements.



Unit - IV

Introduction to XML: Introduction, The Syntax of XML, XML Document Structure, Document Type Definitions, Namespaces, XML Schemas, Displaying RAW XML Documents, Displaying XML Document with CSS, XSLT Style Sheets, XML Processors.

10 Hours

Self-study component: Web Services.

Unit - V

Introduction to PHP: Origins and Uses of PHP, Overview of PHP, General Syntactic Characteristics, Primitives, Operations, and Expressions, Output, Control Statements, Arrays, Functions, Pattern Matching, Form Handling, Cookies.

10 Hours

Self-study component: Session Tracking.

Text Book:

1. Robert W. Sebesta: Programming the World Wide Web, Seventh Edition, Pearson Education, 2014.

Reference Books:

1. Deitel and Deitel and Nieto, "Internet and World Wide Web - How to Program", Prentice Hall, 5th Edition, 2011.
2. Uttam K.Roy, "Web Technologies", Oxford University Press, 2011.

Course Outcome

After learning all the units of the course, the student is able to

1. Explain the World Wide Web and HTML / XHTML related tags.
2. Develop visual design using CSS and logic design using JavaScript.
3. Develop dynamic documents using DOM with elements.
4. Write well-formed extended tags for a given problem statements with XML & CSS style.
5. Develop server-side scripts using PHP.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1											1			
CO 2	2	1	1		2				1	1		1			1
CO 3	2	1	1		2				1	1		1			1
CO 4	1	1	1		2							1			1
CO 5	2	1	1		2				1	1	1	1			1



Course Title: Database Management System			
Course Code:P18ISO653	Semester: VI	L-T-P-H : 3:0:0:3	Credit:3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives:

After completing this course, the student should be able to:

1. An ability to State the importance of DBMS and explain how DBMS is better than traditional File Processing Systems.
2. An ability to analyze the basic structure of Database and recognize the different views of the database.
3. An ability to draw and Investigate Data Flow and Entity Relationship Diagrams.
4. An ability to analyze and use Relational Data Model, while comparing with other data models.
5. An ability to formulate data retrieval queries in SQL and the Relational Algebra and Calculus.
6. An understanding and explain the terms like Transaction Processing and Concurrency Control.

Course Content

Unit- I

Introductory concepts of DBMS: Introduction and example of DBMS, Characteristics of the database, Actors on the scene and Workers behind the scene in DBMS, Database System- Concepts and Architecture: Data models, Schemas and Instances, Three Schema architecture and Data Independence, Database language and interfaces, The Database System Environment.

Data modelling using the Entity Relationship Model: using high level conceptual data models for database design, Entity, Entity types, Entity sets, Attributes and keys, Relationship types, Relationship sets, Roles and structural constraints, an example Database Application, Refining the ER design for the company database.

Self Study: ER diagrams, naming conventions and design issues, Advantages of Using the DBMS Approach.

12 Hours

Unit- II

Relational Data Model and Relational Database Constraints: Relational Model concepts, Relational Model constraints and Relational Database schemas, Update operations, Transactions, dealing with constraint violations. Basic SQL: Data Definition and Data Types; Specifying basic constraints in SQL, Basic Retrieval Queries in SQL, INSERT, DELETE, and UPDATE Statements in SQL, More Complex SQL Retrieval Queries, Schema Change Statements in SQL, Specifying Constraints as Assertions and Actions as Triggers.

Self study: Views (Virtual Tables) in SQL.

10 Hours

Unit- III

Relational Algebra and Relational Calculus: Unary relational operations, Relational Algebra operations from set theory, Binary relational operations, Additional relational operations, example of queries in relational algebra. Database Design-1: Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of First and Second Normal Forms;

Self study: Informal Design Guidelines for Relation Schemas

10 Hours



Unit– IV

Database Design-2: Third Normal Form, Boyce-Codd Normal Form; NoSQL Data Management: introduction to NoSQL, why NoSQL? Characteristics of NoSQL, History of NoSQL, Types of NoSQL data models, schema-less databases, Materialized Views, Distribution Models, CAP Theorem, Sharding

Self study: Difference between SQL and NoSQL.

10 Hours

Unit– V

Transaction processing concepts: Introduction to Transaction processing; Transactions and System concepts; Desirable properties of transactions; Characterizing Schedules based on Serializability. Concurrency control and recovery techniques: Two-phase locking techniques for concurrency control, concurrency control based on timestamp ordering;

Self study: Characterizing Schedules based on Recoverability, shadow paging,

10 Hours

Textbooks:

1. Fundamentals of Database Systems Elmasri and Navathe Addison-Wesley 6th Edition 2011
2. Black Book- Big Data (Covers Hadoop 2, MapReduce, Hive, Yarn, PIG, R, Data visualization) DT Editorial Services Dream tech Press edition 2016

Reference Books:

1. Data Base System Concepts Silberschatz, Korth and Sudharshan Mc-Graw Hill 5th Edition 2006
2. An Introduction to Database Systems C.J. Date, A. Kannan, S.Swamynatham Pearson Education 8th Edition 2006
3. Database Management Systems Raghu Ramakrishna and Johannes Gehrke McGraw-Hill Education 3rd Edition 2014

Course outcomes:

The students should be able to:

1. Understand and explore the needs and concepts of relational database management, non-relational database, transaction processing and related relational database facilities.
2. Apply the knowledge of logical database design principles to real time issues.
3. Analyze and design relational and document-based data model concepts.
4. Develop applications using Relational database and NoSQL database.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	2	1							1	1		2	1		
CO 2	2	2	2	1	1		1		1	2		2	2		
CO 3	2	2	2	2	2		1		2	3	1	1	2		
CO 4	2	2	3	2	3			2	3	3	2	1	2		



Course Title: Data Structures			
Course Code:P18ISO654	Semester: VI	L-T-P-H : 3:0:0:4	Credit: 3
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		Weightage: CIE:50%, SEE: 50%	

Course Learning Objectives (CLOs)

This course aims to

1. Analyze the need for data structuring techniques,
2. Design and Implement standard data structures like stack using recursion.
3. Learn the different types of linked list
4. Design and implement operations on SLL, DLL, and Circular SLL
5. Learn the Basic operations on - Linear queue, Circular queue, Priority Queue
6. Design and Implement different types of queues Using SLL.
7. Identify the different tree traversal techniques
8. Design and implement different tree traversal techniques using iteration and recursion.

Course Content

Unit – I

Structures and Pointers: structure definition, initialization, pointers to a structure.

Stacks: Representing stack in C- Implementation of Push, Pop and display operations using arrays and pointers. Example of Stacks: Infix, Postfix, Prefix, Infix to postfix, Evaluation of postfix.

Recursion: Definition, Writing Recursive programs-Factorial Numbers, Fibonacci Numbers and Tower of Hanoi Problem. **10 Hours**

Self Study: Infix to prefix

Unit – II

Queues: Definition, Representation, operations, implementation using arrays and linked lists. Different types of queues, Basic operations on - Linear queue, Circular queue, Priority Queue, Applications of Queues. **11 Hours**

Self Study: Deque

Unit – III

Linked Lists: Static Memory Allocation and Dynamic Memory Allocation, Basic operations on SLL, DLL and Circular SLL: insertion, deletion and display. **11 Hours**

Self Study: Adding two polynomials

Unit – IV

Trees: Introduction-Definition, Tree Representation, Properties of Trees, Operations on Binary tree, Binary Search Tree [BST] - Definition, searching BST, Insertion to BST, Deletion from BST, Display BST. **10 Hours**

Self Study: Threaded binary tree

Unit – V

Sorting Techniques: Insertion sort, Quick sort, Heap sort, Merge sort.

10 Hours

Self Study: Binary tree sort

Text Books:

1. “Data Structures using C and C++”, YedidyahLangsam and Moshe J. Augenstein and Aaron M.Tenanbaum , 2nd Edition , PHI.

Reference Books:

1. “Fundamentals of Data Structures in C”, Horowitz, Sahani, Anderson-Freed, Second Edition, University Press.



Course Outcomes

After learning all the units of the course, the student is able to

1. Solve the given problems using the concepts of stacks
2. Apply the concepts of linked list
3. Design an application using the concepts of queues
4. Design different types of trees for a given problem
5. Demonstrate the sorting and searching techniques for a given set of Numbers.

Course Articulation Matrix (CAM)															
Course Outcomes	Program Outcomes (PO's)												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO 1	1	3	3										1		
CO 2	1	3	2												2
CO 3	1	3	2										1		
CO 4	2	3	2										2	2	
CO 5	2	3	2										2		