SYLLABUS

(With effect from 2018-19)

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(±ÉÊPÀëtÂPÀªÀµÀð 2018-19)

V & VI Semester

BACHELOR DEGREE

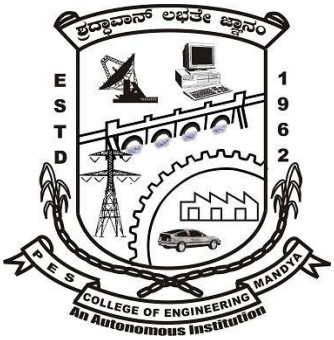
IN

COMPUTER SCIENCE & 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)

Accredited by NBA, New Delhi & Approved by AICTE, New Delhi.

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PREFACE

P.E.S. 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 recently 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

P.E.S. College of Engineering, Mandya

VISION

"PESCE shall be a leading institution imparting quality Engineering and Management education developing creative and socially responsible professionals

MISSION

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

Department of Computer Science and Engineering

The Vision of the department is:
"The Department of Computer Science and Engineering shall create professionally competent and socially responsible engineers capable of working in global environment.*"*

The mission of the department is:
DM1: Enforce best practices in teaching-learning, with dedicated faculty and supportive infrastructure to impart the knowledge in emerging technologies.
{Required to create professionally competent engineers}
DM2: Improve Industry-Institute relationship for mutual benefit.
{Required to create professionally competent engineers}
DM3: Inculcate ethical values, communication and entrepreneurial skills.
{Required to create professionally competent and socially responsible engineers}
DM4: Sensitize social, legal, environmental and cultural diversity issues through professional training and balanced curriculum.
{Required to create engineers capable of working in global environment}

Program Educational Objectives (PEOs)

Graduates of the program shall
1. Have Successful computer professional career in IT industry and related areas.
2. Pursue higher education in engineering or management with the focus on intensive research and developmental activities.
3. Develop computing systems in a responsible, professional and ethical manner to serve the society**.**

The National Board of Accreditation (NBA) has defined twelve Program Outcomes for Under Graduate (UG) engineering programs as listed below.

Program Outcomes (POs)

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problem.
2. **Problem analysis**: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **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 public health and safety, and cultural, societal, and environmental considerations.
4. **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.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling to complex engineering activities, with an understanding of the limitations.
6. **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.
7. **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.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with the 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.
11. **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.
12. **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.

The Under Graduate (UG) of B.E Computer Science & Engineering Program has defined **Program Specific Outcomes (PSO**) which are listed below.

The students shall have the

1. Ability to design and develop network based systems in emerging technology environments like Cloud Computing, Security, Internet of Things and embedded systems.
2. Ability to develop knowledge based data management system in the areas like data analytics, data mining, business intelligence, pattern recognition and knowledge discovery in solving engineering problems.

P.E.S. COLLEGE OF ENGINEERING, MANDYA
(An Autonomous Institution, Under VTU)
Scheme of Teaching and Examination **(**CBCS with OBE) for B.E. Computer Science & Engg.

V – Semester

Sl. No.	Course Code	Course Title	Teaching Department	Hrs / Week			Credits	Examination Marks		
				L	T	P		CIE	SEE	Total
1	P18CS51	Management and Entrepreneurship	CS	4	-	-	4	50	50	100
2	P18CS52	Operating System	CS	4	-	-	4	50	50	100
3	P18CS53	Computer Networks	CS	4	-	-	4	50	50	100
4	P18CS54	Software Engineering	CS	4	-	-	4	50	50	100
5	P18CS55X	Professional Elective - I	CS	2	2	-	3	50	50	100
6	P18CSL56	AVR Micro Controller Laboratory	CS	-	-	3	1.5	50	50	100
7	P18CSL57	Networks Laboratory	CS	-	-	3	1.5	50	50	100
8	P18CSL58	Skill Oriented Laboratory - I Android Application Development Laboratory	CS	-	-	2	1	50	50	100
9	P18HU59	Technical Skills-I Android Application Development	CS	-	2	-	1	50	50	100
10	P18HU510	Aptitude and Reasoning Development – Advance (ARDI)	HM	-	2	-	1	50	50	100
Total							**25**	**500**	**500**	**1000**

Professional Elective - I

Sl. No	Course Code	Course title
1.	P18CS551	Advanced Java
2.	P18CS552	Web Technologies
3.	P18CS553	Artificial Intelligence
4.	P18CS554	Data Mining & Ware Housing

VI – Semester

Sl. No.	Course Code	Course Title	Teaching Department	Hrs / Week			Credits	Examination Marks		
				L	T	P		CIE	SEE	Total
1	P18CS61	Computer Architecture	CS	4	-	-	4	50	50	100
2	P18CS62	Compiler Design	CS	4	-	-	4	50	50	100
3	P18CS63	Data Analytics	CS	4	-	-	4	50	50	100
4	P18CS64X	Professional Elective - II	CS	2	2	-	3	50	50	100
5	P18CSO65X	Open Elective-I	CS	3	-	-	3	50	50	100
6	P18CSL66	Data Analytics Lab.	CS	-	-	3	1.5	50	50	100
7	P18CSL67	Operating System & Compiler Design Lab.	CS	-	-	3	1.5	50	50	100
8	P18CSL68	Python Programming Lab (Skill Oriented Laboratory)	CS	-	-	2	1	50	50	100
9	P18HU69	Technical Training Program (Technical Skills – II)	CS	2	-	-	1	50	50	100
Total							**23**	**450**	**450**	**900**

List of Electives

Professional Elective - II

Sl. No	Course Code	Course title
1.	P18CS641	Block Chain Technology
2.	P18CS642	Cloud Computing Platform
3.	P18CS643	Mobile Computing
4.	P18CS644	Wireless sensor Networks

Open Elective – I

Sl. No.	Course Code	Course title
1.	P18CSO651	Python Programming
2.	P18CSO652	Data Base Management Systems
3.	P18CSO653	Web Technologies
4.	P18CSO654	Internet of Things

Course Title : Management and Entrepreneurship			
Course Code : P18CS51	**Semester : 5**	**L :T:P : 4:0:0**	**Credits: 4**
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit-1

Management : Importance of management, definition, management functions, roles of a manager, levels of management, managerial skills, management and administration, management –a science or art, management – a profession, professional management v/s family management. Development of management thought. Early classical approaches, Neo classical approaches

Self Study Component : Modern approaches.

10 Hours

Unit-2

Planning : Nature, Importance of planning, forms, types of plans, steps in planning, limitations of planning, making planning effective, planning skills, strategic planning in Indian industry. **Organization:** Meaning, process of organizing, span of management principles of organizing, Departmentation, Organization structure, committees.

Self Study Component : Teams.

10 Hours

Unit-3

Direction and supervision: Requirements of effective direction, giving orders, motivation, job satisfaction, morale, organizational commitment, first level supervision or front line supervision. **Controlling**: Meaning and steps in controlling, Essential of a sound control system.

Self Study Component : Methods of establishing control.

10 Hours

Unit-4

Entrepreneurship: Meaning of Entrepreneur; Evolution of the Concept, Functions of an Entrepreneur, Types of Entrepreneur, Entrepreneur – an emerging Class. Concept of Entrepreneurship – Evolution of Entrepreneurship, Development of Entrepreneurship, Stages in entrepreneurial process; Role of entrepreneurs in Economic Development.

Self Study Component : Entrepreneurship in India; Entrepreneurship – its Barriers.

11 Hours

Unit-5

Small scale industries: Definition; Characteristics; Need and rationale; Objectives; Scope; role of SSI in Economic Development. Advantages of SSI, Steps to start and SSI - Government policy towards SSI; Different Policies of SSI; Government Support for SSI during 5 year plans. Impact of Liberalization, Privatization, Globalization on SSI Effect of WTO/GATT Supporting Agencies of Government for SSI, Meaning, Nature of support; Objectives; Functions; Types of Help.

Self Study Component : Ancillary Industry and Tiny Industry.

11 Hours

Text Books:

1. **Principles of Management**, P C Tripathi, P N Reddy, 5th edition, TataMcGraw Hill, 2012
2. **Management and Entrepreneurship,** N V R Naidu,T Krishna Rao 4th reprint 2010.

Reference Book:

1. **Dynamics of Entrepreneurial Development & Management**, Vasant Desai, Himalaya publishing house, 2009

Course Outcomes : Upon completion of this course, students will be able to

1. Describe the basic principles and concepts of management.
2. Distinguish different plans and List steps in Planning .
3. Interpret the concept of directing and controlling .
4. Demonstrate the meaning, functions, types and role of Entrepreneur and describe various industrial supports.
5. Explain in detail about small scale industries and prepare the project report

CO-PO Mapping

CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS 01	PS 02
CO1	Describe the basic principles and concepts of management	1							1						1
CO2	Distinguish different plans and List steps in Planning	1					1			1	1	1	1		1
CO3	Interpret the concept of directing and controlling	2	1						1	1	1	1	1		1
CO4	Demonstrate the meaning, functions, types and role of Entrepreneur and describe various industrial supports	2					1			1	1	1	1		1
CO5	Explain in detail about small scale industries and prepare the project report	2	1	1			1	1	1		1	1	1		1

Course Title : Operating System			
Course Code : P18CS52	**Semester : 5**	**L :T:P : 4:0:0**	**Credits: 4**
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit–1

INTRODUCTION TO OPERATING SYSTEMS : Overview: Need of operating systems, Computer System organization, Computer System architecture, Operating System structure, Operating System operations, Process management, Memory management, Storage management, Protection and security, Distributed system, computing environments.

System structure: Operating System Services, User- Operating System interface, System calls, Types of system calls, System programs, Operating System design and implementation, Operating System structure, , System boot.
Self-study component: Virtual machines

10 Hours

Unit-2

PROCESS MANAGEMENT: Process concepts: Overview, Process scheduling, operations on processes, Inter-process communication.
Multi-Threaded Programming: Overview, Multi-threading models, Thread Libraries, threading issues.
Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple-Processor scheduling
Self-study component: Thread scheduling

11 Hours

Unit-3

PROCESS SYNCHRONIZATION : Synchronization: Background, The Critical section problem, Peterson's solution, Synchronization hardware, Semaphores, Classical problems of synchronization, Monitors
Deadlocks: Deadlocks: System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance,
Self-study component: Deadlock detection and recovery from deadlock

10 Hours

Unit-4

MEMORY MANAGEMENT AND PROTECTION : Memory Management Strategies: Background, Swapping, Contiguous memory allocation, Paging, Structure of page table, Segmentation.
Virtual Memory Management: Background, Demand paging, Copy-on-write, Page replacement, Allocation of frames,
Self-study component: Thrashing.

10 Hours

Unit-5

STORAGE MANAGEMENT AND CASE STUDY : File system: File concept, Access methods, Directory structure, File system mounting, File sharing, Protection.
Implementing File System: File system structure, File system implementation, Directory implementation, Allocation methods, Free space management.
Secondary storage structures: Mass storage structures, Disk structure, Disk attachment, Disk scheduling,
Self-study component: Disk management, Swap space management.

11 Hours

Text Book:

1. Operating System Principles – Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 9th edition, Wiley-India, 2012.

Reference Books:

1. Operating Systems: A Concept Based Approach – D.M Dhamdhere, 2nd Edition, Tata McGraw- Hill, 2006.
2. Operating Systems – William Stallings, 6th Edition, PHI, 2009.
3. Operating Systems – Harvey M Deital, 3rd Edition, Addison Wesley, 1990

Course outcomes

1. **Explain** operating system structure, services, types, design and implementation of OS
2. **Apply** the various algorithms of process scheduling.

3. **Develop** solutions to process synchronization and dead lock problems.
4. **Analyze** various memory management techniques.
5. **Explain** file system implementation and allocation methods

CO-PO Mapping

Semester: 6th		Course code : P18CS52					Title : Operating System								
CO	**Statement**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	**Explain** operating system structure, services, types, design and implementation of OS	1												2	
CO2	**Apply** the various algorithms of process scheduling.	1	1	1										2	
CO3	**Develop** solutions to process synchronization and dead lock problems.	1	1	1										2	
CO4	**Analyze** various memory management techniques	1	1	1										2	
CO5	**Explain** file system impleme-ntation and allocation methods	1												2	

Course Title : Computer Networks			
Course Code: P18CS53	**Semester : 5**	**L:T:P - 4 : 4 : 0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

Unit-1

Network Layer: Network-Layer Services, Packet Switching, Network-Layer Performance, IPv4 Addresses, Forwarding of IP Packets: Forwarding based on Destination Address,Forwarding Based on Label.

Network-Layer Protocols: Internet protocol (IP), ICMPv4, Mobile IP.

Self study component: Network Address Resolution (NAT),Routers as Packet Switches, Insufficiency in Mobile IP.

11 Hours

Unit-2

Unicast Routing: Introduction, Routing Algorithms, Unicast Routing Protocols: Internet Structure, RIP (Routing Information Protocol), Open Shortest Path First (OSPF),

Multicast Routing: Introduction, Multicasting Basics: Multicast Addresses, Delivery at Data Link Layer, Collecting Information about Groups, Multicast Forwarding, IntradomainMulticast Protocols:DVMRP (Distance Vector Multicast Routing Protocol), Multicast Link State (MOSPF), Protocol Independent Multicast (PIM),Internet Group Management Protocol (IGMP).

Self study component: Border Gateway Protocol Version 4(BGP4), Two approaches to Multicasting, Interdomain Multicast Protocols.

10 Hours

Unit-3

Next Generation IP: IPv6Addressing, The IPv6 Protocol, The ICMPv6 Protocol, Transition from IPV4 to IPV6.

Introduction to Transport Layer: Introduction,Transport Layer Protocols: Simple Protocol, Stop and Wait Protocol, Go-Back-N Protocol (GBN), Selective Repeat Protocol,Bidirectional Protocols: Piggybacking.

Self study component: Group Membership Messages, Write a program to simulate the distance vector algorithm, link-state algorithm and path vector algorithm.

10 Hours

Unit-4

Transport Layer Protocols: Introduction, UDP(User Datagram Protocol), Transmission Control Protocol(TCP):TCP Services, TCP Features, Segment, A TCP Connection, State Transition Diagram, Windows in TCP, Flow Control, Error Control, TCP Congestion Control, SCTP(Stream Control Transmission Protocol) : SCTP Services, SCTP features, Packet format, An SCTP Association, Error Control in SCTP.

Introduction to Application Layer: Introduction: Providing Services, Application layer Paradigms, Client - Server Programming: Application Programming Interface (API), Using Services of the Transport Layer, Iterative Communication using UDP,Iterative communication using TCP, Concurrent Communication.

Self study component: TCP Timers,Iterative Programming in C: General Issues, Iterative programming using UDP, Iterative programming using TCP.

10 Hours

Unit-5

Standard Client- Server Protocols: WWW(World Wide Web), HTTP(Hyper Text Transfer Protocol), FTP(File Transfer Protocol),Electronic Mail(e-mail), TELNET, SecureShell(SSH), DNS(Domain Name System):Name Space, DNS in the Internet, Resolution, Catching, Resource Records, DNS messages, Registrars.

Network Management: Introduction, SNMP, ASN.1

Self study component: Security for FTP, E-Mail Security, Security of DNS, Dynamic Domain Name System (DDNS).

11 Hours

Text Book:

1. Behrouz A. Forouzan: Data communication and Networking, 5th ed., Tata McGraw Hill, 2012.

Reference Books:

1. Larry L. Peterson and Bruce S Davie: Computer Networks: A Systems Approach, Fifth Edition, Elsevier, 2011.
2. William Stallings: Data and Computer Communications, 8th Edition, Pearson Education, 2012.
3. James F. Kurose and Keith W. Ross: Computer Networking: A Top-Down Approach, 6th edition, Addison-Wesley, 2009.
4. Tanenbaum : Computer Networks, 5th Edition, Pearson Education/PHI, 2011.

Course Outcomes

1. **Discuss** the services provided by network layer such as Packetizing, Forwarding and Routing, IPV4 addressing for host-to-host communication.
2. **Analyse** and **apply** the routing algorithms such as distance vector, link state, hierarchical & multicast routing for transmitting reliable data through wired/wireless media.

3. **Design** and **Construct** a Network and its Performance can be measured based on various factors such as delay, throughput, and packet loss.
4. **Discuss** the service provided by transport layer such as process to process communication, addressing, multiplexing, de-multiplexing, error control, flow control and congestion control.
5. **Design** and **Implement** client - server paradigm or peer-to-peer paradigm using HTTP, DNS, TELNET, FTP protocols by knowing the importance of application layer in internet.

CO-PO Mapping

Semester: 5th	Course Code: P18CS53					Title: Computer Networks								
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS 01**	**PS 02**
CO1	**Discuss** the services provided by network layer such as Packetizing, Forwarding and Routing, IPV4 addressing for host-to-host communication.	1	1											1	
CO2	**Analyze** and **Apply** the routing algorithms such as distance vector, link state, hierarchical & multicast routing for transmitting reliable data through wired/ wireless media.	2	1	1										1	
C03	**Design** and **Construct** a Network and its Performance can be measured based on various factors such as delay, throughput and packet loss.	-	1	1		2								1	
CO4	**Discuss** the service provided by transport layer such as process to process communication, addressing, multiplexing, de-multiplexing, error control, flow control and congestion control.	1	2											1	
CO5	**Design** and **Implement** client - server paradigm or peer-to-peer paradigm using HTTP, DNS, TELNET, FTP protocols by knowing the importance of application layer in internet.	1	2	1		2								1	
		1.25	1.4	1		2								1	

Course Title : Software Engineering			
Course Code : P18CS54	**Semester : 5**	**L :T:P : 4:0:0**	**Credits: 4**
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		**Weightage: CIE:50%, SEE:50%**	

Prerequisites : Knowledge of process and product software.

Course Content

Unit–1

OVERVIEW: Introduction to Software Engineering, Introduction, Professional software development, Software engineering ethics.

Software processes: Software process models, Process activities, coping with change, The Rational Unified Process.

Self study component : Case studies.

8 Hours

Unit–2

Agile software development: Agile methods, Plan driven and agile development, Extreme programming, Agile project management.

Requirements engineering: Functional and non-functional requirements, the software requirements document Requirements specification, Requirements engineering processes, Requirements elicitation and analysis, Requirements validation, Requirements management.

Self study component : Scaling agile methods.

12 Hours

Unit–3

System modelling: Context models, Interaction models, Structural models, Behavioural models, Model-driven engineering.

Architectural design: Architectural design decisions, Architectural views, Architectural patterns.

Self study component : Application architectures

12 Hours

Unit–4

Design and Implementation: Object-oriented design using the UML Design patterns, Implementation issues.

Software testing: Development testing, Test-driven development, Release testing, User testing.

Self study component : Open source development.

10 Hours

Unit–5

Project management: Risk management, Managing people, Teamwork.

Configuration management: Change management, Release management.

Self study component : Version management System building.

8 Hours

Text book:

1. **Software Engineering** – Ian Somerville, 10th Edition, ©*2016* | ***Pearson*** .

Reference books :

1. **Software Engineering: A Practitioners Approach -** Roger S. Pressman, 7th Edition, McGraw-Hill, 2007.
2. **Software Engineering Theory and Practice -** Shari Lawrence Pfleeger, Joanne M. Atlee, 3rd Edition, Pearson Education, 2006.
3. **Software Engineering Principles and Practice–**Waman S Jawadekar, Tata McGraw Hill, 2004 **Software Engineering** – Pankaj Jalote, Tata McGraw Hill

Course Outcomes : At the end of the course the student should be able

1. **Explore** the various types of software process.
2. **Elaborate** the importance of software development.
3. **Asses** the significance of software engineering.
4. **Compare** different Software Development methods.
5. **Identify** the different forms of Software Development.

CO-PO mapping

Semester: 5th		Course code : P18CS54					Title : Software Engineering								
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
1	Introduction to Software Engineering.	3	2	1	1		1	1							1
2	Describe the process of Software Engineering, the technologies used for Software Engineering, and configuration management of Software Engineering.	3	2	2	1	2	1		1				1		2
3	Apply Architectural Design Architectural design decisions System organization Modular decomposition styles Control styles.	2	2	2		1			1	1					2
4	Understand what Software Testing is.	2	2	3	1			1		1					2
5	Explain Project management Risk management, Managing people, Teamwork, Understand Configuration management	2	1	1		1		1	1	1		1	1		2

Professional Elective - I

Course Title : Advanced Java			
Course Code: P18CS551	**Semester : 5**	**L:T:P - 2 : 2 : 0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

Unit-1

Event Handling and Applets : Event Handling –Introduction, Delegation Event Model, Hierarchy of Event Classes, Types and Sources of Events, Event Listener Interfaces, class ActionEvent, class AdjustmentEvent, changeEvent and ChangeListener, class ComponentEvent, class ContainerEvent, class FocusEvent, class ItemEvent, class KeyEvent, class MouseEvent, class TextEvent, class W;indowEvent, interface WindowListener

Applets-Introduction, Applet Architecture, Applet Class and Methods, Creating Applets, HTML Tags, Simple Applet Display Methods, Passing Parameters to Applets, Passive Applet Programs, Adding Images to Applet Windows, Managing Colours in Applet Window, Interactive Applets with AWT Graphical Components, AWT Text fields in Applets, Animation in Applet Windows

Self Study Component*:* Details of Event Listener Interfaces, Display of Numerical Values on Applet Windows

11 Hours

Unit-2

Multithreaded Programming-Introduction, Need for Multiple Threads, Thread Class, Main Thread, Creation of New Threads, Thread States, Thread Priority, Synchronization, Deadlock and Race Situations, Inter-thread Communication, Suspending, Resuming, and Stopping of Threads, Sample Programs, Application Programs with Threads: Producer–Consumer Problem

Self Study Component*:* Creation of Multiple Threads by Extending Thread Class

10 Hours

Unit-3

Networking :Introduction ,Networking Basics ,Protocols, Classes and Interfaces in java.net, class InetAddress, class URLConnection, TCP/IP Server Socket Programming, Class ServerSocket, Communication through Sockets, Users/Unreliable Datagram Protocol class DatagramPacket, DatagramSocket Class, Programs for Sending and Receiving Datagram

Self Study Component*:* Class URL

12 Hours

Unit-4

Java 2 enterprise edition overview, database access: Overview of J2EE and J2SE.The Concept of JDBC, JDBC Driver Types, JDBC Packages, A Brief Overview of the JDBC process, Database Connection, Associating the JDBC/ODBC Bridge with the Database, Statement Objects, ResultSet, Transaction Processing, Exceptions.

Self Study Component*:* Metadata, Data types

10 Hours

Unit-5

Servlets: Java Servlet and common Gateway Interface Programming, A simple Java Servlet, Anatomy of a Java Servlet, Reading Data from a Client, Reading HTTP Requests Headres, sending Data to a Client and writing HTTP Response Headres, Working with Cookies, Tracking Session.

Java Server Pages: JSP, JSP Tags. Tomcat, Request String, User Sessions, Cookies

Self Study Component*:* Session Objects.

10 Hours

Text Books:

1. Java: One Step Ahead by Anita Seth , B.L. Juneja ,OXFORD University press - First Edition 2017.
2. J2EE The Complete Reference - Jim Keogh, McGraw Hill. 2015.

Reference Books:

1. Herbert Schildt, Java The Complete Reference, 9th Edition, Tata McGraw Hill.
2. The J2EE Tutorial, Stephanie Bodoff et ak, 2nd Edition Pearson Education, 2012.

Course Outcomes:

1. Demonstrate the usage of Event handling and Applets
2. Understand and develop programs using thread concepts
3. Implement client side and server side programming for two way communication
4. Develop programs using Java Database Connectivity
5. Gain the knowledge of Server Side programming by implementing Servlet and JSP.

CO-PO Mapping

Semester: 5	Course code : P18CS551						Title : Advanced Java								
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO 1	Demonstrate the usage of Event handling and Applets	1	2	2											1
CO 2	Understand and develop programs using thread concepts	1	2	2	2										1
CO 3	Implement client side and server side programming for two way communication	2	2	2	2		2						1		2
CO4	Develop programs using Java Database Connectivity	2	2	2	2										1
CO 5	Gain the knowledge of Server Side programming by implementing Servlet and JSP	1	2	2											2

Course Title : Web Technologies			
Course Code : P18CS552	**Semester : 5**	**L :T:P : 2:2:0**	**Credits: 3**
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit–1

Fundamentals of Web: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, the Web Programmers Toolbox.

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, HTML5.

Self study Component: Differences between HTML and XHTML

10 Hours

Unit-2

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 tags, Conflict resolution.

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.

Self study Component: Pattern matching using regular expressions.

11 Hours

Unit-3

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.
Self study Component: Dragging and dropping elements.

10 Hours

Unit-4

XML: Introduction; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets; XML processors.
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.
Self study Component**:** Session tracking

11 Hours

Unit-5

Introduction to Ajax: Overview of Ajax, The Basics of Ajax, Return Documents Forms, Ajax Toolkits, Security and Ajax.
Introduction to ASP.NET: Introduction to ASP.NET, ASP.NET Controls,ASP.NET AJAX,
Self study Component**:** Web Services

10 Hours

Text Book:

1. Programming the World Wide Web – Robert W. Sebesta, 7th Ed., Pearson Ed. 2013.

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 Ed., Wiley India, 2006.
3. The Web Warrior Guide to Web Programming – Xue Bai et al,

Course Outcomes

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** simple application using Ajax.

CO-PO Mapping

Semester: 5th		Course code : P18CS552							Title : Web Technologies						
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS 01**	**PS 02**
CO1	**Develop** web pages using various XHTML tags	3	2	3										2	
CO2	**Design** interactive web pages using CSS	2	2	2	3									2	
CO3	**Create** dynamic documents using DOM object model.	2	2	3										2	
CO4	**Develop** web pages using PHP scripts	2	2	3										2	
CO5	**Implement** simple application using Ajax.	2	2	2	3									3	
		2.2	**2**	**2.6**	**3**									**2.2**	

Course Title : Artificial Intelligence			
Course Code : P18CS553	**Semester : 5**	**L :T:P : 2:2:0**	**Credits: 3**
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit-1

Introduction -The Foundations of Artificial Intelligence, The History of Artificial Intelligence, The State of the Art;

Intelligent Agents -Agents and Environments,Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents;

Solving problem by searching -Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions;

Adversarial Search-Alpha – Beta Pruning.

Self Study Component**:** Solving problem by searching - Example Problems

12 Hours

Unit-2

Logical Agents - Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic: A Very Simple Logic;

First-Order Logic - Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic;

Inference in First-Order Logic - Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

Self-Study Component: Inference in First-Order Logic - Propositional vs. First-Order Inference.

10 Hours

Unit-3

Quantifying Uncertainty - Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use;

Probabilistic Reasoning - Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Exact Inference in Bayesian Networks, Approximate Inference in Bayesian Networks, Relational and First-Order Probability Models;

Probabilistic Reasoning over Time – Hidden Markov Models

Self-Study Component: Probabilistic Reasoning –Other Approaches to Uncertain Reasoning

10 Hours

Unit-4

Learning from Examples – Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classification with Linear Models, Artificial Neural Networks, Nonparametric Models, Support Vector Machines, Ensemble Learning.

Self-Study Component: Learning from Examples – Practical Machine Learning

10 Hours

Unit-5

Knowledge in Learning – A Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming;

Learning Probabilistic Models – Statistical Learning, Learning with Complete Data, Learning with Hidden Variables: The EM Algorithm;
Reinforcement Learning-Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search.
Self-Study Component: Reinforcement Learning - Applications of Reinforcement Learning
10 Hours

Text Book :

1. Artificial Intelligence : A Modern Approach, Stuart Russell and Peter Norvig, Prentice Hall, 3rd edition, 2009

Reference Book :

1. Artificial Intelligence : Structures and Strategies for complex problem solving, George F Luger, Pearson Addison Wesley, 6th edition 2008.
2. Demonstrate Natural Language Processing and its application in Natural Language Communication

Course outcomes: At the end of the course the student will be able to:

1. Define Artificial intelligence and identify problems for AI. Characterize the search techniques to solve problems and recognize the scope of classical search techniques
2. Define knowledge and its role in AI. Demonstrate the use of Logic in solving AI problems.
3. Demonstrate handling of uncertain knowledge and reasoning in probability theory.
4. Explain Learning methods in AI
5. Explain Knowledge Learning, probabilistic models and reinforcement learning in AI

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

Course Title : Data Mining &Warehousing			
Course Code: P18CS554	**Semester : 5**	**L:T:P - 2:2:0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

Unit-1

Data warehousing and online analytical processing: Data warehousing: Basic concepts, Data warehouse modeling: Data cube and OLAP, Data warehouse design and usage, Data warehouse implementation, Data generalization by attribute-oriented induction.
Self study component : Three Tier Data warehouse architecture

10 Hours

Unit-2

Introduction and Data Preprocessing :Why data mining, What is data mining, What kinds of data can be mined, What kinds of patterns can be mined, Which Technologies Are used, Which kinds of Applications are targeted. Data Preprocessing: An overview, Data cleaning, Data integration, Data reduction, Data transformation and data discretization.
Self study component :Major issues in data mining

12 Hours

Unit-3

Classification: Basic Concepts: Basic Concepts, Decision tree induction, Bays Classification Methods, Rule-Based classification, Model evaluation and selection.
Self study component :Techniques to improve classification accuracy

10 Hours

Unit-4

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and Methods: Basic Concepts, Frequent Itemset Mining Methods, Which Patterns Are Interesting?—Pattern Evaluation Methods, Pattern Mining in Multilevel, Multidimensional Space.
Self study component :Constraint-Based Frequent Pattern Mining

10 Hours

Unit-5

Cluster Analysis: Basic concepts and methods: Cluster Analysis, Partitioning methods, Hierarchical Methods, Density-based methods, Grid-Based Methods.
Self study component :Evaluation of clustering.

10 Hours

Text Book:

1. Jiawei Han, MichelineKamber, Jian Pei: Data Mining Concepts and Techniques, ELSEVIER (MK) 3rd edition 2012.

Reference Books:

1. Arun K Pujari: Data Mining Techniques 2nd Edition, Universities Press, 2009.
2. Jiawei Han and MichelineKamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.
3. Alex Berson and Stephen J. Smith: Data Warehousing, Data Mining, and OLAP Computing, McGrawHill Publisher, 1997.
4. Insight into Data Mining-Theory and Practice-K.P.Soman, ShyamDiwakar, V.Ajay, PHI, 2006.

Course Outcomes : The students shall able to:

1. **Analyze** different data models used in data warehouse.
2. **Apply** different preprocessing techniques for different attributes.
3. **Determine** frequent item set using association rules.
4. **Apply** different classification techniques to classify the given data set.
5. **Analyze** different clustering techniques.

CO-PO mapping

Semester: 5th		Course code : P18CS554					Title : Data Mining &Warehousing								
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS 01**	**PS 02**
CO1	**Analyze** different data models used in data warehouse.	3	2			1									2
CO2	**Apply** different preprocessing techniques for different attributes.	3	2	2		1									2
CO3	**Determine** frequent item set using association rules.	3	2	2		1									2
CO4	**Apply** different classification techniques to classify the given data set.	3	2	2		1									2
CO5	**Analyze** different clustering techniques.	3	2	2		1									2
		3	**2**	**2**		**1**									**2**

Course Title : AVR Micro Controller Laboratory			
Course Code: P18CSL56	**Semester : 5**	**L:T:P - 0 : 0 : 3**	**Credits: 1.5**
Contact Period : Practical :3 Hr, Exam: 3 Hr		**Weightage :CIE:50% SEE:50%**	

Part-I
PROGRAMMING

1. Data Transfer - Block move, Exchange, Sorting, Finding largest element in anarray.
2. ArithmeticInstructions-Addition/subtraction,multiplicationanddivision,square, Cube – (16 bits Arithmetic operations – bit addressable).
3. Counters.
4. Boolean & Logical Instructions (Bitmanipulations).
5. Conditional CALL &RETURN.
6. Code conversion: BCD – ASCII; ASCII – Decimal; Decimal -ASCII;
7. HEX - Decimal and Decimal -HEX.
8. Programs to generate delay, Programs using serial port and on-Chip timer/Counter.

Part-II
INTERFACING

9. Write C programs to interface ATmega32 chip to Interfacing modules to develop single chip solutions.
10. Simple Calculator using 6 digit seven segment displays and Hex Keyboard interface to ATmega32.
11. Alphanumeric LCD panel and Hex keypad input interface to ATmega32.
12. External ADC and Temperature control interface toATmega32.
13. Generate different waveforms Sine, Square, Triangular, Ramp etc. using DAC interface to ATmega32; change the frequency andamplitude.
14. Stepper and DC motor control interface to ATmega32.
15. Elevator interface toATmega32.

Course Title : Networks Laboratory			
Course Code: P18CSL57	**Semester : 5**	**L:T:P - 0 : 0 : 3**	**Credits: 1.5**
Contact Period : Practical :3 Hr, Exam: 3 Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

Part - A

Simulation Exercises:

Note: Simulate the following programs using Cisco Packet tracer

1) Simulate the given topology and observe the working of each devices
   a) LAN 1 have three devices connected to a hub1.
   b) LAN 2 have two devices connected to a hub2.
   c) Both the hubs are connected to a switch which is intern connected to a server.
2) Simulate a topology with 2 LAN's each having two devices connected to switches. Switches are connected to a common router. Observe the packet flow.
3) Simulate the topology where two networks are connected via two routers. Both the routers are in tern connected. Each LAN has only one device. Use static routing and observe the routing table at the end of simulation.
4) Simulate a topology where 3 routers are fully connected and a single device is connected to each router. Observe the flow of ICMP packets from one network to other.
5) Configure a network for browsing.

Part – B

Implement the following in C/C++:

1) Write a program for error detecting code using CRC.
2) Write a program for distance vector algorithm to find suitable path for transmission.
3) Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.
4) Implement the above program using as message queues or FIFOs as IPC channels.
5) Write a program for simple RSA algorithm to encrypt and decrypt the data.
6) Write a program for Hamming code generation for error detection and correction.
7) Write a program for congestion control using leaky bucket algorithm

Course Outcomes

1. **Analyse** the working principles of various network components such as Hub, Switch, Router, Gateways etc., before construct any network.
2. **Design** and **Implement** the given problems using a Cisco Packet Tracer tool.
3. **Design** and **Construct** a Network (Wired or Wireless) and its performance can be measured based on various factors such as delay, throughput, and packet loss.
4. **Design** and **Implement** RSA, Hamming code, Leaky bucket, CRC, Distance Vector algorithm using C/C++ language.
5. **Design** and **Implement** Client – Server program using TCP/IP sockets and FIFOs (or Message Queues) as IPC channels.

CO-PO Mapping

CO	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P0 10	P0 11	P0 12	PS O1	PS O2
CO1	**Analyse** the working principles of various network components such as Hub, Switch, Router, Gateways etc. before construct any network.	1	1			1								1	
CO2	**Design** and I**mplement** the given problems using a Cisco packet tracer tool.		1	2		2								1	
CO3	**Design** and **Construct** a Network (Wired or Wireless) and its performance can be measured based on various factors such as delay, throughput, and packet loss.	1	1	2		2								1	
CO4	**Design** and I**mplement** RSA, Hamming code, Leaky bucket, CRC, Distance Vector algorithm using C/C++ language.		1	1		2								1	
CO5	**Design** and **Implement** Client–Server program using TCP/IP sockets and FIFOs (or Message Queues) as IPC channels.	1	1	1		2								2	
	Average	1	1	1.5		1.5								1.2	

Course Title: Android Application Development Laboratory (Skill Oriented Laboratory -I)			
Course Code : P18CSL58	**Semester : 5**	**L :T:P : 0:0:2**	**Credits: 1**
Contact Period: Practical: 3 Hr/Week, Exam: 3 Hr		**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 colors.
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 Outcomes	Program Outcomes (PO's)												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2		2		2								1	1
CO2	2		2		3								1	1

Course Title : Android Application Development (Technical Skills-I)			
Course Code: P18HU59	**Semester : 5**	**L:T:P - 0:2:0**	**Credits: 1**
Contact Period : Lecture :26 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

Unit-1

Preliminary considerations: Why you might be here? Cost of development, Importance of mobile strategies, Why is mobile development difficult? Mobile development today, Mobile Myths, Third party Frameworks.

Diving into mobile: app or website? Mobile Web Presence, Mobile Applications, Marketing.

Creating consumable web services for mobile devices: What Is a Web Service? Web Services Languages (Formats), Creating an Example Web Service, Debugging Web Services.

6 Hours

Unit-2

Getting Started with Android Programming : What is Android?, Features of Android, Architecture of Android, Android Devices in the Market, The Android Developer Community, Creating Your First Android Application, Anatomy of an Android Application. **Activities, Fragments, And Intents :** Understanding Activities, Linking Activities Using Intents, Fragments, Calling Built-In Applications Using Intents, Displaying Notifications.

5 Hours

Unit-3

Getting To Know The Android User Interface : Understanding the Components of a Screen**:** Views and ViewGroups, LinearLayout, AbsoluteLayout, TableLayout, Relative-Layout, FrameLayou, ScrollView. Adapting to Display Orientation **:** Anchoring Views, Resizing and Repositioning. Managing Changes to Screen Orientation : Persisting State Information during Changes in Configuration, Detecting Orientation Changes, **Controlling the Orientation of the Activity.** Utilizing the Action Bar: Adding Action Items to the Action Bar, Customizing the Action Items and Application Icon. Creating the User Interface Programmatically , Listening for UI Notifications : Overriding Methods Defined in an Activity, Registering Events for Views.

5 Hours

Unit-4

Designing Your User Interface With Views : Using Basic Views : TextView View, Button, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, and RadioGroup

Views,ProgressBar View, AutoComplete TextView View. **Using Picker Views:** TimePicker View, DatePicker View, Using List Views to Display Long Lists: ListView View, Using the Spinner View, Understanding Specialized Fragments : Using a ListFragmen, Using a DialogFragment, Using a PreferenceFragment.

Displaying Pictures And Menus With Views: Using Image Views to Display Pictures: Gallery and ImageView Views, ImageSwitcher, GridView, **Using Menus with Views:** Creating the Helper Methods, Options Menu, Context Menu.

5 Hours

Unit- V

Data Persistence : Saving and Loading User Preferences: Accessing Preferences Using an Activity, Programmatically Retrieving and Modifying the Preferences Values, Changing the Default Name of the Preferences File, **Persisting Data to Files:** Saving to Internal Storage, Saving to External Storage (SD Card), Choosing the Best Storage Option, Using Static Resources, **Creating and Using Databases:** Creating the DBAdapter Helper Class, Using the Database rogrammatically, Pre-Creating the Database.

Messaging : SMS Messaging: Sending SMS Messages Programmatically, Getting Feedback after Sending a Message, Sending SMS Messages Using Intent, Receiving SMS Messages, Caveats and Warnings, Sending E-mail.

5 Hours

Text Books:

1. Wei-Meng Lee, Beginning Android™ 4 Application Development, John Wiley & Sons, Inc. 1st edition.
2. Jeff McWherter, Scott Gowell, Professional Mobile Application Development,WROX, 2012

Reference Books:

1. Neuburg, Programming iOS8, 5th edition, Shroff/O'Reilly Publications, 2014.
2. Chryssa, Android Programming Cookbook, 2016.

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

1. Develop simple consumable web services for mobile devices
2. Apply Java programming concepts to Android application development.
3. Design and Develop Android application by setting up Android development environment
4. Implement adaptive and responsive graphical user interfaces that work across a wide range of devices.
5. Create mobile application to persist data in Android 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
CO 1	2		1											
CO 2	2		1											
CO 3	2	1	2											
CO 4	2	1	3											
CO 5	2	1	3										1	

Course Title: Aptitude and Reasoning Development – Advanced (ARDA)			
Course Code : P18HU510	**Semester : 5**	**L :T:P : 0:2:0**	**Credits: 1**
Contact Period: Theory: 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-1

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 Hours

Unit-2

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 Hours

Unit-3

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 Hours

Unit-4

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 Hours

Unit-5

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 Hours

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

After learning all the topics of Unit-1, the student is able to

1. Explain the importance of reading skills. L1
2. Interpret the importance of vocabulary in solving Reading comprehension questions. L4
3. Identify the main idea and supporting details in the paragraph. L2
4. Identify purpose and tone of the author.L2
5. Interpret the use of transition and idea organization pattern. L4
6. Recognize and evaluate arguments and their common structures. L1
7. Solve RC questions methodologically.L5
8. Classify types of questions asked in the RC passages. L2
9. Apply flow chart or mind map to solve RC questions. L4

After learning all the topics of Unit-2, the student is able to

1. Analyze the properties of average and apply them in the right scenarios.L5
2. Apply the mean deviation method in certain set of questions. L2
3. Distinguish between the usage of simple average and weighted average.L1
4. Apply weighted average concept and formula to solve the problems of mixtures.L2
5. Compare the weighted average method with the alligation method and understand their strengths and limitations. L4
6. Apply the technique of alligation to solve problems in very less duration of time. L2
7. Understand the concept of homogeneity and other properties of mixtures. L4
8. Apply the basic properties of mixtures while solving the problems under the concept of removal and replacement. L2
9. Extend the application of alligation technique to solve the problems of other topics such as Profit and loss, time speed and distance, ratio and comparison etc..L6

After learning all the topics of Unit-3, the student is able to

1. Apply the fundamental principle of counting to solve basic level problems and apply its logic in complex problems.L2
2. Distinguish between permutation and combination. L4
3. Combine the principles of counting with combination to solve the problems on permutation.L4
4. Select and arrange “r” objects out of “n” objects under different constraints.L4
5. Criticize the restricted use of ${}^{n}P_{r}$.L6
6. Analyze the concept of step arrangement and apply its principles in problem solving.L5
7. Analyze the permutation of things when some of them are identical.L5
8. Apply the concepts of combination.L2
9. Describe the applications of the concept of 2^{n}.L1
10. Solve the problems under division of things into groups.L3
11. Differentiate between linear arrangement and circular arrangement.L3
12. Recognize the importance of probability. L4
13. Use the conjunction AND tool and OR tool.L2
14. Define an event and solve it under specific constraints.L1
15. Develop the ability to apply the concepts of probability and its applications in real file scenarios.L6

After learning all the topics of Unit-4, the student is able to

1. Interpret the series of numbers in Arithmetic, Geometric & Harmonic Progression. L1
2. Summarize the basic concepts of progressions, i.e., arithmetic mean, nth term of a progression. L6

3. Predict the missing terms of the given progression. L5
4. Compare AM, HM and GM. L4
5. Compute the sum or product of n terms in the given progression. L4
6. Differentiate between increasing and decreasing progression and solve application based problems accordingly. L1
7. Understand the theorems governing progressions. L4
8. Identify the similarity and difference between AP, HP and GP. L1
9. Analyze application problems involving combination of concepts of AP, HP and GP or all the three. L5
10. Create own problems based on creative progressive patterns and it's combinations. L6
11. Solve problems based on average speed using concept of HP and AP. L6

After learning all the topics of Unit-5, the student is able to

1. Understand the concept of coding decoding and will be able to solve various types of examples. L1
2. Understand the concept of crypt arithmetic or verbal arithmetic and solve examplesof various types. L1
3. Demonstrate better interpretation and representation of data.L1
4. Discover various forms of data representation their advantages and disadvantages.L1
5. Analyze the data provided in the form of tabular column, pie graph, bar graph, line graph, combination of two or more. L5
6. Understand the concept of angles and area swept in a pie chart. L5
7. Apply simple arithmetic and shortcuts to solve problems based on given graph. L2
8. Identify percentage hacks and use shortcuts to find the actual value when percentage is given.L4
9. Convert ratios to percentages and vice versa. L4
10. Analyze case studies based on statistical data. L5
11. Identify the limitations of each data representation technique. L6
12. Choose better, the correct method to represent statistics in corporate presentations. L2

Lesson Plan

Unit-1

1. Importance of reading skills. L1
2. Importance of vocabulary in solving Reading comprehension questions. L4
3. Identifying the main idea and supporting details in the paragraph. L2
4. Purpose and tone of the author.L2
5. Use of transition and idea organization pattern. L4
6. Arguments and their common structures. L1
7. Solving RC questions. L5
8. Classification of types of questions asked in the RC passages. L2
9. Flow chart or mind map to solve RC questions. L4

Unit-2

1. Properties of average.
2. Mean deviation.
3. Simple average.
4. Weighted average concept and formula to solve the problems of mixtures.
5. Comparison of the weighted average method with the alligation method.
6. Application of the technique of alligation to solve problems in very less duration of time.
7. Homogeneity and other properties of mixtures.

8. Basic properties of mixtures while solving the problems under the concept of removal and replacement.
9. Application of alligation technique to solve the problems of other topics such as Profit and loss, time speed and distance, ratio and comparison etc..

Unit-3

1. Fundamental principle of counting to solve basic level problems.
2. Differences between permutation and combination.
3. Principles of counting with combination to solve the problems on permutation.
4. Selection and arrangement of "r" objects out of "n" objects under different constraints.
5. Restricted use of ${}^{n}P_{r}$.
6. Step arrangement and its principles in problem solving.
7. Permutation of things when some of them are identical.
8. Concepts of combination.
9. Applications of the concept of 2^{n}.
10. Problems under division of things into groups.
11. Differences between linear arrangement and circular arrangement.
12. Importance of probability.
13. Conjunction AND tool and OR tool.
14. Defining an event and solving it under specific constraints.
15. Concepts of probability and its applications in real file scenarios.

Unit-4

1. Arithmetic, Geometric and Harmonic Progression.
2. Arithmetic mean, nth term of a progression.
3. Predicting the missing terms of the given progression.
4. Comparison of AM, HM and GM.
5. Sum or product of n terms in the given progression.
6. Differences between increasing and decreasing progression and solve application based problems accordingly.
7. Theorems governing progressions.
8. Differences between AP, HP and GP.
9. Combination of concepts of AP, HP and GP or all the three.
10. Progressive patterns and it's combinations.
11. Average speed using concept of HP and AP.

Unit-5

1. Concepts of coding decoding
2. Types of questions in coding decoding
3. Concepts of crypt arithmetic
4. Methods to solve crypt arithmetic questions
5. Demonstrate better interpretation and representation of data.L1
6. Various forms of data representation and their advantages and disadvantages.
7. tabular column, pie graph, bar graph, line graph, combination of two or more.
8. Concept of angles and area swept in a pie chart.
9. Simple arithmetic and shortcuts to solve problems based on given graph.
10. Identification of percentage hacks and use shortcuts to find the actual value when percentage is given.
11. Conversion of ratios to percentages and vice versa.
12. Case studies based on statistical data.
13. Limitations of each data representation technique.
14. Correct methods to represent statistics in corporate presentations.

Review Questions

Unit-1

Seagulls live on the beach. They eat small fish, bread, and seaweed. Seagulls run quickly on the sand and fly quickly in the sky. Seagulls will run or fly away if you try to catch them. There are many seagulls on the beach. Crabs also live on the beach. They eat shrimp, ocean plants, and small fish. Crabs crawl quickly on the sand and in the ocean. Crabs will crawl away if you try to catch them. There are many crabs on the beach, but it is not always easy to see them. Starfish live on the beach, too. They eat clams, oysters, and small fish. Starfish move slowly on the sand and in the ocean. Starfish will not move away if you try to catch them. There are few starfish on the beach.

1) Seagulls, crabs, and starfish all eat
A. clams B. bread C. fish
2) Which animal does not move quickly?
A. starfish B. seagulls C. crabs
3) Based on information in the passage, which sentence is false?
A. Starfish are hard to catch.
B. Crabs eat shrimp and ocean plants.
C. Seagulls move quickly on the sand and in the air.
4) The passage does not talk about
A. what starfish eat
B. how crabs catch food
C. how fast beach animals move
5) According to the passage, seagulls
I. live on the beach
II. move quickly in the ocean
III. eat bread only
A. I only B. I and II only C. I, II, and III

Unit-2

1. A vessel is filled with liquid, 3 parts of which are water and 5 parts syrup. How much of the mixture must be drawn off and replaced with water so that the mixture may be half water and half syrup?
2. Tea worth Rs. 126 per kg and Rs. 135 per kg are mixed with a third variety in the ratio 1 : 1 : 2. If the mixture is worth Rs. 153 per kg, the price of the third variety per kg will be:
3. A can contains a mixture of two liquids A and B is the ratio 7 : 5. When 9 litres of mixture are drawn off and the can is filled with B, the ratio of A and B becomes 7 : 9. How many litres of liquid A was contained by the can initially?
4. A milk vendor has 2 cans of milk. The first contains 25% water and the rest milk. The second contains 50% water. How much milk should he mix from each of the containers so as to get 12 litres of milk such that the ratio of water to milk is 3 : 5?
5. In what ratio must a grocer mix two varieties of pulses costing Rs. 15 and Rs. 20 per kg respectively so as to get a mixture worth Rs. 16.50 kg?
6. A dishonest milkman professes to sell his milk at cost price but he mixes it with water and thereby gains 25%. The percentage of water in the mixture is:
7. How many kilogram of sugar costing Rs. 9 per kg must be mixed with 27 kg of sugar costing Rs. 7 per kg so that there may be a gain of 10% by selling the mixture at Rs. 9.24 per kg?
8. A container contains 40 litres of milk. From this container 4 litres of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?

9. A jar full of whisky contains 40% alcohol. A part of this whisky is replaced by another containing 19% alcohol and now the percentage of alcohol was found to be 26%. The quantity of whisky replaced is:
10. In what ratio must water be mixed with milk to gain 16% on selling the mixture at cost price?

Unit-3

1. From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done?
2. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?
3. In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together?
4. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?
5. In how many ways can the letters of the word 'LEADER' be arranged?
6. In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there?
7. How many 3-digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9, which are divisible by 5 and none of the digits is repeated?
8. In how many ways a committee, consisting of 5 men and 6 women can be formed from 8 men and 10 women?
9. A box contains 2 white balls, 3 black balls and 4 red balls. In how many ways can 3 balls be drawn from the box, if at least one black ball is to be included in the draw?
10. In how many different ways can the letters of the word 'DETAIL' be arranged in such a way that the vowels occupy only the odd positions?

Unit-4

1. Common difference of sequence 5,8,11,14,… is
2. 2,4,6,8,10,12,… is
3. Second term of sequence with general term n2 - 4/2 is
4. 1,8,15,22,29,36,… is
5. A.P whose nth term is 2n-1 is
6. How many terms are there in 20, 25, 30..... 140
7. Find the first term of an AP whose 8th and 12th terms are respectively 39 and 59.
8. Find the 15th term of the sequence 20, 15, 10....
9. The sum of the first 16 terms of an AP whose first term and third term are 5 and 15 respectively is
10. How many terms are there in the GP 5, 20, 80, 320..... 20480?

Unit-5

1. In a certain code 'MISSIONS' is written as 'MSIISNOS'. How is 'ONLINE' written in that code?

A. OLNNIE
B. ONILEN
C. NOILEN
D. LNOENI
E. ONNLIE

2.In certain code 'TIGER' is written as 'QDFHS'. How is 'FISH' written in that code?

A. GERH
B. GRHE
C. GREH
D. GHRE
E. GEHR

3.In certain code 'FROZEN' is written as 'OFAPSG'. Then how would 'MOLTEN' be written in that code?

A. OFPOMN
B. OFSMPN
C. OFUMPN
D. OFUNPM

4. If AA + BB = ABC, then what is the value of A+B+C= ?

A. 1.15
B. 2.18
C. 3.21
D. 4.12

5. HERE = COMES – SHE, (Assume S = 8). Find the value of R + H + O.

A. 15
B. 18
C. 14
D. 12

6. N O + G U N + N O = H U N T, find the value of HUNT.

A. 1082
B. 1802
C. 1208
D. 1280

The following table gives the sales details for text books and reference books at Primary / Secondary/ Higher Secondary/ Graduate Levels

7. What is the growth rate of sales of books at primary school level from 1975 to 1980?

A. 29% B. 51%
C. 63% D. 163%

8. Which of the categories shows the lowest growth rate from 1975 to 1980?

A. Primary B. Secondary
C. Higher secondary D. Graduate Level

9. Which category had the highest growth rate in the period?

A. Primary B. Secondary
C. Higher secondary D. Graduate Level

10. Which of the categories had either a consistent growth or a consistent decline in the period shown?

A. Primary B. Secondary
C. Higher secondary D. Graduate Level

Course Articulation Matrix (CAM)												
Course Outcome (CO)		Program Outcome (ABET/NBA-(3a-k))										
		a	b	c	d	e	f	g	h	i	j	k
Apply the approach of seven dimension to better reading skills.	L2	-	-	-	-	-	-	-	-	M	-	-
Solve the questions under reading comprehension confidently with higher accuracy than random reading.	L4	-	-	-	-	-	-	M	-	M	-	-
Apply the technique of alligation for effective problem solving.	L2	H	-	-	-	-	-	-	-	-	-	-
Effective solve the problems of permutation and combination. Predict different possibilities by the principle of probability.	L4	M	-	-	-	-	-	-	-	M	-	-
Formulate the equations for summation and other functions for all the kinds of progressions– AP<GP and HP.	L5	H	-	-	-	-	-	-	-	M	-	-
Effective solve the problems of coding decoding and crypt arithmetic and Interpret the data given in the graphical format and infer the results.	L1	M	-	-	-	-	-	-	-	-	-	-
L- Low, M- Moderate, H-High												

Course Title : Computer Architecture			
Course Code : P18CS61	**Semester : 6**	**L :T:P : 4:0:0**	**Credits: 4**
Contact Period: Lecture: 52 Hr, Exam: 3 Hr		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit-1

Fundamentals of Computer Design: Introduction, Classes of Computers, Defining Computer Architecture, Trends in Technology, Dependability, Measuring, Reporting and Summarizing Performance, Quantitative Principles of Computer Design.

Self Study Component: Trends in Power in Integrated Circuit, Trends in Cost, System Inter-connect Architecture.

10 Hours

Uni-2

Pipelining : **Basic and Intermediate Concepts:** Introduction, The major hurdle of Pipeling – pipeline hazards, How is pipelining implemented, What makes pipelining hard to implement, Extending the MIPS pipeline to handle Multicycle operations.

Self Study Component: Linear Pipeline Processors: Asynchronous and Synchronous Models, Non-linear Pipeline Processors: Reservation and Latency Analysis, Collision free scheduling.

10 Hours

Unit-3

Instruction-Level parallelism and its Exploitation: Instruction –Level Parallelism: Concepts and Challenges, Basic Complier Techniques for Exposing ILP, Reducing Branch costs with Prediction, Overcome Data Hazards with Dynamic Scheduling, Dynamic Scheduling: Examples and the Algorithm.

Self Study Component: Instruction Set Architectures, Hardware based Speculation, Studies of the Limitations of ILP

11 Hours

Unit-4

Multiprocessor and Thread Level Parallelism: Introduction, Symmetric shared- memory architectures, Distributed Shared Memory and Directory based Coherence, Synchronization-The Basic, Models of Memory Consistency – An Introduction

Self Study Component: Performance of Symmetric Shared–Memory Multiprocessors, Crossbar Switch

10 Hours

Unit-5

Parallel Programs: The Parallelization Process: Steps in The Process, Parallelization Computation Versus Data, and Parallelization of an Example Program: The Equation Solver Kernel, Decomposition, Assignment, Orchestration under the Shared address Space Model, Orchestration under the Message –Passing Model.

Self-study component: Scalable Multiprocessors: Scalability, Bandwidth scaling, Latency scaling, Cost Scaling, Physical Scaling, Realizing Programming Model: Primitive Network Transaction, Shared address Space, Message Passing.

11 Hours

Text Books:

1. John L. Hennessy and David A. Patterson : Computer Architecture, A quantitative approach, Fourth Edition, Morgan Kaufmann Publishers, Elsevier 2010
2. David E Culler Jaswinder Pal Singh with Anoop Gupta, "Parallel Computer Architecture" A Hardware/Software Approach, Morgan Kaufmann Publications Elsevier 2012.

Reference Books:

1. Kai Hwang & Naresh Jotwani," Advanced Computer Architecture", Parallelism, scalability, Programmability 2 nd edition McGraw Hill 2012.
2. John P Hayes, Computer Architecture & Organization 3rd Ed. McGraw Hill 1998.

Course Outcomes:

1. Describe the evolution of computers.
2. Analyze the basic properties of pipelining.
3. Understand the Instruction Level Parallelism and Its Exploitation.
4. Discuss system architecture of multiprocessor and Thread Level Parallelism.
5. Analyze the steps to perform parallelization of computation.

CO-PO Mapping

Semester: 6th	Course code : P18CS61	Title : Computer Architecture													
CO	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS 01	PS 02
CO1	Describe the evolution of computers	3	1	1										3	
CO2	Analyze the basic properties of pipelining	2	3	2	1									2	
CO3	Understand the Instruction Level Parallelism and Its Exploitation.	2	2	1										2	
CO4	Discuss system architecture of multiprocessor and Thread Level Parallelism.	3	2	2										3	
CO5	Analyze the steps to perform parallelization of computation	2	3	2	1									2	
		2.4	2.2	1.6	1									2.4	

Course Title : Compiler Design			
Course Code: P18CS62	**Semester : 6**	**L:T:P - 4 : 0 : 0**	**Credits: 4**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Prerequisites : Knowledge of theory of computation.

Course Content

Unit-1

Introduction, Lexical analysis, Syntax analysis: Various phases of a compiler,Grouping of phases; Lexical analysis: The Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens.
Self study component : Compiler-Construction tools

10 Hours

Unit-2

Syntax Analysis–: Role of parser; Context-free grammars; Top-down Parsing.
Self study component : Error handling

11 Hours

Unit-3

Syntax Analysis : Bottom-up Parsing, LR parsers.
Self study component : Using ambiguous grammars

10 Hours

Unit-4

Syntax-Directed Translation: Syntax-directed definitions; Construction of syntax tree ;Evaluation orders for SDDs; Syntax-directed translation schemes. **Type checking**-Type Systems; Specification of a simple type checker; Equivalence of type expression.
Run-Time Environments: Source language issues; Storage Organization; Storage allocation strategies; parameter passing; Symbol tables; dynamic storage allocation techniques.
Self study component : Type conversions.

11 Hours

Unit-5

Intermediate Code Generation: Intermediate languages; declaration; Assignment statements; Boolean expressions; Case statements; Back patching ;Procedure calls.

Code Generation: Issues in the design of Code Generator; basic blocks and flow graphs; A simple code generation; Register allocation and assignment.
Self study component : DAG representation of basic blocks.

10 Hours

Text Book:

1. Alfred V Aho, Monica S.Lam, Ravi Sethi, Jeffrey D Ullman: Compilers- Principles, Techniques and Tools, 2nd Edition, Pearson Education, 2007.

Reference Books:

1. Charles N. Fischer, Richard J. leBlanc, Jr.: Crafting a Compiler with C, Pearson Education, 1991.
2. Andrew W Apple: Modern Compiler Implementation in C, Cambridge University Press, 1997.
3. Kenneth C Louden: Compiler Construction Principles & Practice, Cengage Learning, 1997

Course Outcomes

1. **Design** simple lexical analyzer
2. **Construct** simple top down parser for a given context free grammar
3. **Construct** simple bottom up parser for a given context free grammar
4. **Apply** different syntax directed translation schemes
5. **Generate** intermediate and machine dependent code

CO-PO Mapping

Semester: 6th		Course code : P18CS62					Title : Compiler Design								
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	**Design** simple lexical analyzer	3	3	2	2	1								3	2
CO2	**Construct** simple top down parser for a given context free grammar	3	3	3	3	1								3	3
CO3	**Construct** simple bottom up parser for a given context free grammar	3	3	3	3	1								3	3
CO4	**Apply** different syntax directed translation schemes	3	3	2	1									3	2
CO5	**Generate** intermediate and machine dependent code	3	3	2	2									3	1
		3	**3**	**2.4**	**2.2**	**1**								**3**	**2.2**

Course Title : Data Analytics			
Course Code : P18CS63	**Semester : 6**	**L :T:P : 4:0:0**	**Credits: 4**
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit-1

Introduction To Data Analytics: What is Data? A Short Taxonomy of Data Analytics, Examples of Data Use, Breast Cancer in Wisconsin, Polish Company Insolvency Data, A Project on Data Analytics, The KDD Process, The CRISP-DM Methodology **Descriptive**

Statistics: Scale Types, Descriptive Univariate Analysis, Descriptive bivariate Analysis. **Multivariate Analysis:** Multivariate Frequencies, Multivariate Data Visualization, Multivariate Statistics.
Self study component : Operationalize, Case study : Global innovation network and analysis.

10 Hours

Unit-2

Data Quality and Pre-processing: Data Quality, Missing Values, Redundant Data, Inconsistent Data, Noisy Data Outliers, Converting to a Different Scale Type, Converting to a Different Scale, Data Transformation, Dimensionality Reduction: Attribute Aggregation: Principal Component Analysis. Attribute selection: filters, wrappers. **Review of Basic Data Analytic Methods using R:** Introduction to R: Data types , Data import and Export, Descriptive statistics. **Exploratory Data Analysis**: Visualization tools for single and multivariable: Bar chart, Histogram, line graph, box plot and scatter plot and scatter plot matrix.
Self study component : Search strategies.

10 Hours

Unit-3

Clustering : Distance Measures, Difference between Values of Common Attribute Types, Distance Measures for Objects with Quantitative Attributes, Distance Measures for Non-conventional Attributes, Clustering Validation, Clustering Techniques, K-means, Centroids and Distance Measures, How K-means Works, Density-based spatial clustering of applications with
noise (DBSCAN), **Frequent Pattern Mining:** Frequent Item sets, Setting the min_sup Threshold, Apriori – a Join-based Method, Eclat, FP-Growth, Maximal and Closed Frequent Item sets, Association Rules.
Self study component : Other types of pattern.

11 Hours

Unit-4

Regression: Predictive Performance Estimation, Generalization, Model Validation, Predictive Performance Measures for Regression, Finding the Parameters of the Model, Linear Regression, **Classification** : Binary Classification , Predictive Performance Measures for Classification, Distance-based Learning Algorithms ,K-nearest Neighbor Algorithms, Case-based Reasoning, Logistic Regression Algorithm, Naive Bayes Algorithm.
Self study component : Empirical error.

11 Hours

Unit-5

Additional Predictive Methods: Search-based Algorithms, Decision Tree Induction Algorithms, Decision Trees for Regression **Optimization-based Algorithms:** Support Vector Machines **Applications for Text, Web and Social Media:** Working with Texts, Recommender Systems.
Self study component : Social network analysis.

10 Hours

Textbook:

1. A General Introduction to Data Analytics, João Mendes Moreira, André C.P.L.F. deCarvalho, © 2019 John Wiley & Sons, Inc
2. Data Science & Big Data Analytics , Discovering, Analyzing, Visualizing and Presenting Data, Published by John Wiley & Sons, Inc.

Reference Books:

1. Big Data and Data Analytics by Seema Acharya & Subhashini Chellappan by Wiley India Pvt Ltd.

Course Outcomes:

1. Students can able to Understanding the Data Analytics Life Cycle & Taxonomy.
2. Students can Analyze Preprocessing of the Data & Analytical Methods with data system With R Tool.
3. Students can able to build and Perform Clustering & Frequent Pattern Mining.
4. Student can able to Implement Additional Predictive Methods including Applications of Text, Web & Social Media.
5. Design and Implement real time applications in data analytics

CO-PO Mapping

Semester : 6	**Course code : P18CS63**														
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO -1	Students can able to Understanding the Data Analytics Life Cycle & Taxonomy	2	2												2
CO-2	Students can Analyze Preprocessing of the Data & Analytical Methods with data system With R Tool.	1	1	1	1	2									2
CO-3	Students can able to build and Perform Clustering & Frequent Pattern Mining.	1	1	1	1	1	1								2
CO -4	Student can able to Implement Additional Predictive Methods including Applications of Text, Web & Social Media	1	1	1	1	1	1								2
CO-5	Design and Implement real time applications in data analytics	2	2	2	2	2	2								2

Professional Elective - II

Course Title : Block Chain Technology			
Course Code: P18CS641	**Semester : 6th**	**L:T:P: H - 2 : 2 : 0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

Unit-1

Introduction: Basic Cryptographic primitives used in Blockchain – Secure, Collison-resistanthash functions, digital signature, public key cryptosystems, zero-knowledge proof systems. Needfor Distributed Record Keeping, Modelling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems.

Self Study Component: Why Nakamoto Came up with Blockchain based cryptocurrency?

11 Hours

Unit-2

Technologies Borrowed in Blockchain – hash pointers, Consensus, Byzantine Models of fault tolerance, digital cash etc. Bitcoinblockchain - Wallet - Blocks - Merkley Tree - hardness of mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bitcoin.

Self Study Component: Bitcoin challenges and solutions.

11 Hours

Unit-3

Abstract Models for BLOCKCHAIN - GARAY model - RLA Model - Proof of Work (PoW) as random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains - Hybrid models (PoW + PoS).

Self Study Component: Bitcoin scripting language and their use.

10 Hours

Unit-4

Ethereum - Ethereum Virtual Machine (EVM) - Wallets for Ethereum - Solidity – Smart Contracts - The Turing Completeness of Smart Contract Languages and verification challenges, Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts.

Self Study Component: Some attacks on smart contracts.

10 Hours

Unit-5

Hyperledger fabric, the plug and play platform and mechanisms in permissioned blockchain. Beyond Cryptocurrency – applications of blockchain in cyber security, integrity of Information, E-Governance and other contract enforcement mechanisms. Limitations of blockchain as a technology.

Self Study Component**:** myths vs. reality of blockchain technology.

10 Hours

Text Books :

1. Blockchain Technology: Cryptocurrency and Applications, S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, Oxford University, Press, 2019
2. Bitcoin and cryptocurrency technologies : a comprehensive introduction, Arvind Narayanan et. Al., Princeton University press, 2016

Reference Book :

1. Blockchain : The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming, Josh Thompson, Create space independent publishing platform, 2017.

Course Outcomes :

1. Define and Explain the fundamentals of Blockchain
2. Illustrate the technologies of blockchain
3. Describe the models of blockchain
4. Analyze and demonstrate the Ethereum
5. Analyze and demonstrate Hyper ledger fabric

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

Course Title : Cloud Computing Platform			
Course Code : P18CS642	**Semester : 6**	**L :T:P : 2:2:0**	**Credits: 3**
Contact Period: Lecture: 52 Hr, Exam: 3 Hr		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit-1

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, Energy use and ecological impact, User experience and software licensing. Exercises and problems.

Self Study Component**:** Service level agreements

11 Hours

Unit-2

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, The dark side of virtualization, Exercises and problems

Self Study Component**:** Performance comparison of virtual machines.

10 Hours

Unit-3

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, Exercises and problems.

Self Study Component**:** Resource management and dynamic scaling

11 Hours

Unit-4

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, , Containers, Virtual machines, **Cloud services** -Combining computing and hosting options, Storage services, Database services. **Lab sessions on services includes all cloud services**

Self Study Component**:** Cloud Functions, Application platform

10 Hours

Unit-5

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, **Lab sessions on services includes all Google cloud services**

Self Study Component**:** AI Platform.

10 Hours

Text Book :

1. Cloud Computing Theory and Practice, Dan C Marinescu, Elsevier(MK), 2013

Reference Book :

1. Cloud Computing Implementation, Management and Security, John W Rittinghouse, James F Ransome, CRC Press, 2013

Links of materials:

1. https://eclass.uoa.gr/modules/document/file.php/D416/CloudComputingTheoryAndPractice.pdf
2. http://cloud.google.com/docs/

Course Outcomes : At the end of the course the student will be able to:

1. Understand Cloud Infrastructure of different service providers
2. Explain Virtualization, Layering & 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 (CO's)	**Program Outcomes(PO's)**												**PSO's**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
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 : Mobile Computing			
Course Code : P18CS643	**Semester : 6**	**L :T:P : 2:0:0**	**Credits: 3**
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit–1

Mobile Computing Architecture: Architecture for Mobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing. Emerging Technologies: Wireless broadband (WiMAX), Mobile IP: Introduction, discovery, Registration, Tunneling, Cellular IP, Wireless Networks : Global Systems for Mobile Communication (GSM): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Short Service Messages (SMS): Introduction to SMS, SMS Architecture, SMMT, SMMO, SMS as Information bearer, applications.

Self Study Component**:** Mobile IP with IPv6, GSM Addresses and Identities.

10 Hours

Unit-2

GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Billing and Charging in GPRS.IS-95, CDMA versus GSM, Wireless Data, Third Generation Networks, Applications on 3G, Mobile Client: Moving beyond desktop, Mobile handset overview, PDA, Design Constraints in applications for handheld devices.

Self Study Component**:** Spread Spectrum technology, Mobile phones and their features.

10 Hours

Unit-3

Mobile OS and Computing Environment: Smart Client Architecture, The Client: User Interface, Data Storage, Performance, Messaging. The Server: Enterprise Data Source, Messaging. Mobile Operating Systems: WinCE, Palm OS, Symbian OS, Linux, Proprietary OS Client Development: The development process, Need analysis phase, Design phase, Implementation and Testing phase, Deployment phase, Development Tools, Device Emulators.

Self Study Component**:** Data Synchronization.

10 Hours

Unit-4

Building Wireless Internet Applications: Thin client overview: Architecture, the client, Middleware, messaging Servers, Processing a Wireless request, Protocol (WAP) Overview, Wireless Languages: Markup Languages, HDML, WML, HTML, cHTML, XHTML, Voice XML.

Self Study Component**:** Wireless Applications.

10 Hours

Unit-5

J2ME: Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDlet model, Provisioning, MIDlet life-cycle, Creating new application, MIDlet event handling, Low level GUI Components, Communication in MIDP, Security Considerations in MIDP.

Self Study Component**:** GUI in MIDP, Multimedia APIs.

10 Hours

Text Books:

1. Ashok Talukder, Roopa Yavagal, Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2nd Edition, Tata McGraw Hill, 2010.
2. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley India, 2003

Reference Books:

1. Raj Kamal: Mobile Computing, Oxford University Press, 2007.
2. Iti Saha Misra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009

Course Outcomes: The student will be able to :

1. Explain architecture of Mobile Computing, GSM,SMS.
2. Explain state of art techniques in wireless communication.
3. Describe Mobile OS and Data Synchronization.
4. Discover CDMA, Mobile IP, WImax.
5. Demonstrate program for CLDC, MIDP let model and security concerns

CO-PO Mapping

	Semester: 6th	Course code : P18CS643						Title : Mobile Computing							
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS 01**	**PS 02**
CO1	Explain architecture of Mobile computing GSM, SMS.	2	2											2	
CO2	Explain state of art techniques in wireless communication.	2	2											2	
CO3	Describe Mobile OS and Data Synchronization	1	2	2											
CO4	Discover CDMA, Mobile IP, WImax.	1	2	2										1	
CO5	Demonstrate program for CLDC, MIDP let model and security concerns	2	3	2							2			2	

Course Title : Wireless Sensor Networks			
Course Code : P18CS644	**Semester : 6**	**L :T:P : 2:2:0**	**Credits: 3**
Contact Period: Lecture: 52 Hrs, Exam: 3 Hrs		**Weightage: CIE:50%, SEE:50%**	

Course Content

Unit–1

Introduction: The vision of Ambient Intelligence, Application Examples, Types of applications, Challenges for WSNs, Enabling Technologies for wireless sensor networks. **Single-node architecture:** Hardware components, Operating systems: and execution environments: Embedded OS, Programming paradigms and application programming interfaces. **Network Architecture:** Sensor network scenarios, Optimization goals and figures of merit, Design principles for WSNs: Distributed organization, data centricity Gateway concepts.

Self Study Component**:** In-network processing

11 Hours

Unit-2

Physical Layer: Introduction, Spread spectrum communications:, Packet transmissions and synchronization, quality of wireless channels and measures for improvement. **MAC protocols:** Fundamentals of MAC protocols: Requirements and design constraints for wireless MAC protocols, important classes of MAC protocols. MAC Protocols for WSNs: LEACH. IEEE802.15.4 MAC protocol

Self Study Component**:** SMAC protocol

10 Hours

Unit-3

Routing protocols: The many faces of forwarding and routing, Gossiping and agent based unicast forwarding – Basic idea, Randomized forwarding, Random walks, Energy efficient Unicast : Multipath Unicast routing, Broadcast and Multicast : Overview, Mesh-based Protocols, Mobile nodes.

Self Study Component**:** Geographic routing

11 Hours

Unit-4

Data Aggregation in WSN: Challenges in data aggregation, data aggregation techniques, **Localization and Positioning:** Properties of localization and positioning procedures, Possible approaches, Mathematical basics for the lateration problem, Single hop localization
Self Study Component**:** Positioning in multihop environments

10 Hours

Unit-5

Naming and addressing: Fundamentals, Address and name management in wireless sensor networks, Assignment of MAC addresses, Distributed assignment of locally unique addresses: Address assignment algorithm. **Time Synchronization**: Introduction to time synchronization problem, Protocols based on sender/receiver synchronization: Light weight time synchronization protocol
Self Study Component**:** Timing –Sync protocol

10 Hours

Text Book:

1. Holger Karl, Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", 2013, Wiley Publications

Reference Books:

1. Wireless Sensor Network by KazemSohraby, Daniel Minoli, and TaiebZnati P,Wiley
2. Wireless sensor networks Edited by C. S. Raghavendra Pub: Springer
3. C. Siva Ram Murthy & B. S. Manoj, "Ad hoc Wireless, Networks – Architecture and Protocols", Prentice Hall, 2004, ISBN – 013-147-023x

Course Outcomes:

1. Explain Fundamental Concepts, applications and network architectures of WSN.
2. Describe the physical layer and MAC protocol concepts for communication in WSN
3. Discuss the different routing protocols and issues
4. Discuss the different data aggregation techniques and different positioning and localization algorithms
5. Describe the naming, addressing and time synchronization in WSN

CO-PO Mapping

Semester: 6	**Course code : P18CS644**						**Title : Wireless Sensor Networks**								
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS 01**	**PS 02**
CO1	Explain Fundamental Concepts, applications& network architectures of WSN.	1											1	1	
CO2	Explain the physical layer and MAC protocol concepts for communication in WSN	1	1										1	1	
CO3	Analyze the different routing protocols and issues	1	1										1	`1	
CO4	Analyze the different data aggregation techniques and different positioning and localization algorithms	1	1	1									1	1	
CO5	Explain the naming, addressing and time synchronization in WSN	1	1										1	1	
		1	0.8	0.2									1	1	

Open Elective – I

Course Title : Python Programming			
Course Code: P18CSO651	**Semester : 6**	**L:T:P - 3 : 0 : 0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

Unit-1

Why should you learn to write programs, Variables, expressions and statements, Conditional execution, Functions.
Self study component: Fruitful functions and void functions

11 Hours

Unit-2

Iteration, Strings, Files
Self study component: Using try, except, and open, Writing files

10 Hours

Unit-3

Lists, Dictionaries, Tuples, Regular Expressions
Self study component: Bonus section for Unix / Linux users

10 Hours

Unit-4

Object oriented programming, using Databases and SQL
Self study component: Spidering Twitter using a database.

11 Hours

Unit-5

Simple Graphics and Image Processing: "turtle" module; simple 2d drawing - colors, shapes; digital images, image file formats, image processing; Simple image manipulations with 'image' module (convert to bw, greyscale, blur, etc). Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames.
Self study component: Manipulating a Turtle's Screen

10 Hours

Course outcomes: The students should be able to:

1. Develop python programs using modular approach.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Implement Python Programs using data structures.
4. Develop application using object oriented and database concepts.
5. Create graphical user interface for the applications.

Text Books:

1. Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1st Edition, CreateSpace Independent Publishing Platform, 2016. (http://do1.drchuck.com/pythonlearn/EN_us/pythonlearn.pdf)
2. Fundamentals of Python: First Programs- Kenneth Lambert, Course Technology, Cengage Learning, 2012, (module 5 –chapter 7 and 9) (http://www.jgyan.com/courses/uploads/Fundamentals%20of%20Python_%20First%20Programs%20[Lambert%202011-03-22].pdf)

Reference Books:

1. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt. Ltd. ISBN-13: 978-8126556014
2. Mark Lutz, "Programming Python", 4th Edition, O'Reilly Media, 2011.ISBN-13: 978-9350232873
3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, "Data Structures and Algorithms in Python", 1st Edition Wiley India Pvt. Ltd, 2016. ISBN-13: 978-8126562176
5. Reema Thareja, "Python Programming using problem solving approach", Oxford university press, 2017

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
CO1	2	1	2		1									
CO2	2	1	2		1									
CO3	2	1	2		1									
CO4	2	1	2		1									
CO5	2		2		1									

Course Title : Data Base Management System			
Course Code: P18CSO652	**Semester : 6**	**L:T:P: H - 4: 0 : 0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course content

Unit-1

INTRODUCTION : An example: Characteristics of Database approach; Advantages of using DBMS approach; A brief history of database applications; Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment**.**

Self study component: Actors on the scene, workers behind the scene.

10 Hours

Unit-2

ENTITY-RELATIONSHIP MODEL: Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues..

Self study component: Relationship types of degree higher than two.

10 Hours

Unit-3

RELATIONAL MODEL AND RELATIONAL ALGEBRA: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update

Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

Self study component: Rename and Division operation.

11 Hours

Unit-4

STRUCTURED QUERY LANGAUGE : 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.

Self study component: Specifying constraints as assertions and triggers.

11 Hours

Unit-5

DATABASE DESIGN: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form; Multi valued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form.

Self study component: Inclusion dependencies.

10 Hours

Text Books:

1. Fundamentals of Database Systems – Elmasri and Navathe, 6th Edition, Addison-Wesley, 2011

Reference Books:

1. **Data Base System Concepts** – Silberschatz, Korth and Sudharshan, 5th Edition, Mc-GrawHill, 2006.
2. **An Introduction to Database Systems** – C.J. Date, A. Kannan, S.Swamynatham, 8th Edition, Pearson Education, 2006.
3. **Database Management Systems** – Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, McGraw-Hill, 2003.

Course outcomes

At the end of the course the student should be able to

1. **Explain** the characteristics of data base management system
2. **Design** an ER model for a given example from real world description.
3. **Design** relational models for a given application using schema definition and constraints.
4. **Develop** complex queries using SQL to retrieve the required information from database.
5. **Apply** suitable normal forms to normalize the given database

CO-PO Mapping

Semester: 8	Course code P15CS841									Title : DBMS				
Statement	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
Explain the characteristics of data base management system	3	3	3	1					2		2	2		3
Design an ER model for a given example from real world	3	2	3	1					2		2	2		3
Design relational models for a given application using schema definition and constraints	3	3	3		2				2		2			3
Develop complex queries using SQL to retrieve the required information from database	2	2	2						2		2			2
Apply suitable normal forms to normalize the given database.	2	1	1											2

Course Title : Web Technologies			
Course Code: P18CSO653	**Semester : 6**	**L:T:P - 3 : 0 : 0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

Unit-1

Fundamentals of Web: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, the Web Programmers Toolbox.

Introduction to HTML/XHTML: Origins and evolution of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links.

Self-study components: security, The Web Programmers Toolbox

10 Hours

Unit-2

Lists, Tables, Forms, Frames, Syntactic differences between HTML and XHTML.

Cascading Style Sheets: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Colour, Alignment of text, The Box model, Background images, The and tags.

Self-study components: Frames

10 Hours

Unit- 3

The Basics of 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.

Self-study components: Pattern matching using regular expressions, Errors in scripts.

10 Hours

Unit-4

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 colours and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click; Self-study components: Slow movement of elements; Dragging and dropping elements.

12 Hours

Unit-5

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.

Self-study components: Cookies, Session tracking

10 Hours

Text Book:

1. Programming the World Wide Web –Robert W. Sebesta, 8th Ed., Pearson Ed., 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

1. Develop web pages using various XHTML tags.
2. Design effective web pages using various style properties.
3. Design interactive web pages using java script.
4. Create dynamic documents using DOM object model.
5. Implement web pages using PHP scripts.

CO-PO Mapping

Semester: 6		**Course code : P18CSO653**										**Title : Web Technologies**		
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	Develop web pages using various XHTML tags.	2	2	2									1		
CO2	Design effective web pages using various style properties	2	2	2									1		
CO3	Design interactive web pages using java script.	2	1	1									1		1
CO4	Create dynamic documents using DOM object model	2	1	1								1	1		1
CO5	Implement web pages using PHP scripts.	2	1	1								1	1		1
		2.0	1.4	1.4								1.0	1.0		1.0

Course Title :Internet of Things			
Course Code: P18CSO654	**Semester : 6**	**L:T:P - 3 : 0 : 0**	**Credits: 3**
Contact Period : Lecture :52 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

Unit-1

Introduction to Internet of Things: What is the Internet of Things?: Overview and Motivations, Examples of Applications, IPv6 Role, Area of Development and Standardization, Scope of Present Investigation. **Internet of Things Definitions and Frame works:** IoT Definitions, IoT Frameworks.

Self study component: Basic Nodal Capabilities

10 Hours

Unit-2

Internet of Things Application Examples: Overview, Smart metering, Advanced Metering Infrastructure, e-Health, Body Area Networks, City Automation, Automotive applications, Home Automation, Smart Cards, Tracking, Over-The-Air-Passive surveillance, Ring of steel.

Self study component: Control application examples, Myriad other applications

10 Hours

Unit-3

Fundamental and key technologies of IOT: Identification of IoT Objects and Services, Structural Aspects of the IoT: Environment Characteristics, Traffic Characteristics, Scalability, Interoperability, Security and Privacy, Open Architecture. Key IoT Technologies: Device Intelligence, Communication Capabilities, Mobility Support, Device Power, Sensor Technology, RFID Technology, Satellite Technology. **EVOLVING IOT STANDARDS:** Overview and Approaches, IETF IPv6 Routing Protocol for RPL Roll, Constrained Application Protocol (CoAP).

Self study component: Representation State Transfer (REST), ETSI M2M, Third-Generation Partnership Project, CENELEC, IETF IPv6 Over Lowpower WPAN, ZigBee IP (ZIP), IP in Smart Objects (IPSO).

12 Hours

Unit-4

Mobility, Clouds, and Digital Tools Usher in a Connected World: The Rise of the Global Village, Into Thin Air, How Mobile Technology Changes Everything, A Clearer View through Clouds, Things Get Social, Following the Crowd, Big Data = Big Results, Focus on the Future. **The Industrial Internet Emerges**: A New Model Takes Shape, Data Matters, Sensing Gains.

Self study component: A Connected World Changes Everything, A Connected Military, Making Connections Count.

10 Hours

Unit-5

Putting the Internet of Things to Work: The IoT Meets the Real World, It's a Matter of Standards, Tackling the Adoption Curve, building a Better Sensor, Reliability Is Paramount, Putting Data into Context, The IoT: An Open Frontier.

Self study component: **A Networked Future Emerges**: A New Frontier of Technology Takes Shape, Forward Thinking, 2025: A Day in the Life, Left to Our Devices.

10 Hours

Text Books:

1. 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
2. Samuel Greengard , "The Internet of Things (MIT Press Essential Knowledge series) Kindle Edition

Reference Books:

1. Olivier Hersent, David Boswarthick, Omar Elloumi ,"The Internet of Things: Key Applications and Protocols", ISBN: 978–81–265–5765–3,WileyPublications, 2015.
2. HakimaChaouchi, "The Internet of Things Connecting Objects to the Web" ISBN : 978 – 1 – 84821 - 140 - 7, Willy Publications
3. Daniel Kellmereit, Daniel Obodovski, " The Silent Intelligence: The Internet of Things ",. Publisher: Lightning Source Inc; 1 edition (15 April 2014). ISBN-10: 989973700, ISBN-13: 978-0989973700.
4. Fang Zhaho, Leonidas Guibas, " Wireless Sensor Network: An information processing approach ",Elsevier, ISBN: 978-81-8147-642-5
5. Bernd Scholz - Reiter, Flori an Michahelles , " Architecting the Internet of Things " , ISBN 978 – 3 – 642 – 19156 - 5 e - ISBN 978 – 3 – 642 – 19157 - 2, Springer

Course Outcomes: At the end of the course the student will be able to:

1. Able to Identify and understand the basic concepts and Frameworks of Internet of Things
2. Understand the practical knowledge through different case studies of various levels of IOT applications examples
3. Understand the key technologies and application of different protocols on various applications
4. Understand the working knowledge related to enabling technologies like WSN
5. Demonstrating the applications of Mobile IPv6 Technologies and 6LoWPAN on IoT

CO-PO Mapping

Semester : 6	**Course code : P18CSO654**						**Title : Internet of Things**								
CO	**Statement**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	Able to Identify and understand the basic concepts and Frameworks of Internet of Things	2	3	1		1	1	1						1	1
CO2	Understand the practical knowledge through different case studies of various levels of IOT applications examples	2	3	1		1	1	1						1	1
CO3	Understand the key technologies and application of different protocols on various applications	2	2	3	3	1	1	2		1				1	1
CO4	Understand the working knowledge related to enabling technologies like WSN	2	3	3	3	3	2	3	2	3			2	1	1
CO5	Demonstrating the applications of Mobile IPv6 Technologies and 6LoWPAN on IoT	2	3	3	3	3	3	3	3	3			2	1	1
		2	**1.8**	**1.4**		**1**		**1**						**1**	**1**

Course Title :Data Analytics Laboratory			
Course Code: P18CSL66	**Semester : 6**	**L:T:P - 0 : 0 : 3**	**Credits: 1.5**
Contact Period : Practical :3 Hr/Week, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

1. Introduction to R & Getting started with Installation of R
2. Execute the R commands for
   a) Entering Inputs, Evaluation, R objects & Numbers
   b) Attributes, Creating Vectors, Mixing Objects,
   c) Explicit Correction, Matrices, List
   d) Factors, Missing Vales, Data frames
3. Write R Code for bellow functions
   a. write.table, for writing tabular data to text files (i.e. CSV) or connections
   b. writeLines, for writing character data line-by-line to a file or connection
   c. dump, for dumping a textual representation of multiple R objects
   d. dput, for outputting a textual representation of an R object
   e. save, for saving an arbitrary number of R objects in binary format (possibly compressed) to a file.
   f. serialize, for converting an R object into a binary format for outputting to a connection (or file).
4. Write a R Program to extract the subsets of R object
   a. The [operator always returns an object of the same class as the original. It can be used to select multiple elements of an object
   b. The [[operator is used to extract elements of a list or a data frame. It can only be used to extract a single element and the class of the returned object will not necessarily be a list or data frame.
   c. The $ operator is used to extract elements of a list or data frame by literal name. Its semantics are similar to that of [[
5. Perform Vector Operations & Vectorized Matrix Operations & also perform Date & time operations
6. Write R code AND Implement Managing Data Frames with the dplyr package
7. Write an R code for implementation of bellow control strictures
   a. if and else: testing a condition and acting on it
   b. for: execute a loop a fixed number of times
   c. while: execute a loop while a condition is true
   d. repeat: execute an infinite loop (must break out of it to stop)
   e. break: break the execution of a loop
   f. next: skip an interation of a loop
8. Write R Code for implement the following functions
   a. Functions can be passed as arguments to other functions. This is very handy for the various apply funtions, like lapply() and sapply().
   b. Functions can be nested, so that you can define a function inside of another function
9. Write R code for implementing of bellow
   R has some functions which implement looping in a compact
   a. lapply(): Loop over a list and evaluate a function on each element
   b. sapply(): Same as lapply but try to simplify the result

c. apply(): Apply a function over the margins of an array
d. tapply(): Apply a function over subsets of a vector
e. mapply(): Multivariate version of lapply

10. Implement R code for following conditions
    a. message: A generic notification/diagnostic message produced by the message() function; execution of the function continues
    b. warning: An indication that something is wrong but not necessarily fatal; execution of the function continues. Warnings are generated by the warning() function
    c. error: An indication that a fatal problem has occurred and execution of the function stops. Errors are produced by the stop() function.
    d. condition: A generic concept for indicating that something unexpected has occurred; Programmers can create their own custom conditions if they want.

Reference:

1. R Programming for Data Science by Roger D. Peng, Lenpub Publishing 20/7/2015

Course Title :Operating System & Compiler Design Laboratory			
Course Code: P18CSL67	**Semester : 6**	**L:T:P - 0 : 0 : 3**	**Credits: 1.5**
Contact Period : Practical :3 Hr/Week, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

1. a) Given the list of processes and their CPU burst times, write a program to compute and print the average waiting time and average turnaround time using FCFS algorithm.
   b) Write a LEX program to count the number of characters, words, spaces and lines in a given input file.
2. a) Given the list of processes, their CPU burst times, write a program to compute and print the average waiting time and average turnaround time using SJF algorithm.
   b) Write a LEX program to count the number of comment lines in a given C program. Also eliminate them and copy that program into separate file.
3. a) Given the list of processes, their CPU burst times and time slice, write a program to compute and print the average waiting time and average turnaround time for Round robin scheduling policy.
   b) Write a LEX program to recognize a valid arithmetic expression and identity the identifiers and operators present. Print them separately.
4. a) Write a program to implement the FIRST FIT allocation technique.
   b) Write a LEX program to recognize whether a given sentence is simple or compound.
5. a) Write a program to implement the BEST FIT memory allocation technique.
   b) Write a YACC program to recognize a valid variable, which starts with a letter, followed by any number of letters or digits.
6. a) Write a program to implement the FIFO page replacement algorithm.
   b) Write a YACC program to evaluate an arithmetic expression involving operators +, -, * and /.
7. a) Write a program to implement the Optimal page replacement algorithm.
   b) Write a YACC program Program to recognize strings ‘aaab’, ‘abbb’, ‘ab’ and ‘a’ using the grammar ($a^n b^n$ n>=0).
8. a) Write a program to implement the FCFS Disk scheduling algorithm.
   b) Write a YACC Program to recognize a valid arithmetic expression that uses operators +, -, * and /.

Course Title : Python Programming Laboratory (for Image processing) (Skill oriented Laboratory)			
Course Code: P18CSL68	**Semester : 6**	**L:T:P - 0 : 0 : 2**	**Credits: 1**
Contact Period : Practical :2 Hr, Exam: 3Hr		**Weightage :CIE:50% SEE:50%**	

Course Content

1. To study the Image Processing concept.
2. To obtain histogram equalization image.
3. To perform smoothing and sharpening of the image
4. To find the region of interest for the image.
5. Image compression
6. Color image processing
7. Image segmentation
8. Image morphology
9. Edge detection

Course Outcomes

1. Learn to apply preprocessing methods on the images
2. Design image processing application using packages in python.

CO-PO Mapping

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
CO1	1	2	2		3									
CO2	2	2	3		3									

Course Title : Technical Training Program (Technical Skills-II)			
Course Code: P18HU69	**Semester : 6**	**L:T:P – 2:0:0**	**Credits: 1**
Contact Period : Lecture :12 Hr, Practical : 24 Hr Exam: 3Hr Methodology: Blended (Classroom & lab)		**Weightage :CIE:50% SEE:50%**	

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	9	0	9
2.	C Programming	0	21	21
3.	Introduction to Data Structures	3	3	6
	Total Hours	12	24	36

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:** • 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.	• 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 - 9	9
1.	**C Programming Language:** • **Difficult level** of Snippets for o Understanding basic syntax o If - else statement o Switch case o Struct o For loop o While and do - while loop o Array o Strings o Pointers o Function o String o File handling o Preprocessing	• 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 - 21	21
2.	**Introduction to Data Structures:** Data Structures Basics: Structure and Problem Solving, Data	• Understand common data structures and the algorithms that build and	Class –3 Lab - 3	06

	structures, Data structure Operations, Algorithm: complexity, Time- space tradeoff. o Linked List o Stack and Queue o Searching and Sorting Techniques	manipulate them including various sorting and searching algorithms. Data structures include arrays, linked lists, stacks, queues, features, properties, applications, enumerators, and performance issues.		

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