

Program Structure

for

B. E

CSE(Artificial Intelligence and Machine Learning)

Scheme of Instruction and Syllabus

Scheme of Instruction & Examination
B. E. CSE (Artificial Intelligence and Machine Learning)

AIML Semester - I

S. No.	Course Code	Course Title	Scheme of Instruction				Duration in Hrs	Scheme of Examination		Credits
			Hours Per Week			CIE		SEE		
			L	T	P / D					
Theory Courses										
1	7BS101HS	Engineering Mathematics - 1	3	1	0	4	40	60	4	
2	7BS104HS	Applied Physics	3	1	0	4	40	60	4	
3	7ES101CS	Programming for Problem Solving	3	0	0	3	40	60	3	
4	7ES101EE	Elements of Electrical and Electronics Engineering	3	0	0	3	40	60	3	
5	7MC101CE	Environmental Science	2	0	0	2	40	60	0	
Practical / Laboratory Courses										
6	7BS151HS	Applied Physics Lab	0	0	3	3	40	60	1.5	
7	7ES151CS	Programming for Problem Solving Lab	0	0	2	2	40	60	1	
8	7ES151EE	Elements of Electrical and Electronics Engineering Lab	0	0	2	2	40	60	1	
9	7ES151CE	Engineering Graphics Lab	1	0	4	5	40	60	3	
Total Credits						28	360	540	20.5	

AIML Semester - II

S. No.	Course Code	Course Title	Scheme of Instruction				Duration in Hrs	Scheme of Examination		Credits
			Hours Per Week			CIE		SEE		
			L	T	P / D					
Theory Courses										
1	7BS202HS	Engineering Mathematics – II	3	1	0	4	40	60	4	
2	7BS206HS	Chemistry	3	1	0	3	40	60	4	
3	7HS201HS	English	2	0	0	4	40	60	2	
4	7ES202CS	Data Structures	3	0	0	3	40	60	3	
Practical / Laboratory Courses										
5	7BS253HS	Chemistry Lab	0	0	3	3	40	60	1.5	
6	7HS251HS	English Lab	0	0	2	2	40	60	1	
7	7ES252CS	Data Structures lab	0	0	2	2	40	60	1	
8	7ES252ME	Engineering Workshop Practice	0	0	4	5	40	60	2	
9	7MC251SP	Yoga / NSS / Sports	0	0	2	2	40	-	0	
Total Credits						28	360	480	18.5	

Scheme of Instruction & Examination
B. E. CSE(Artificial Intelligence and Machine Learning)

AIML Semester - III									
S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination		Credits
			L	T	P / D	Contact Hours / week	CIE	SEE	
Theory Courses									
1	7PC301ML	Database Management Systems	4	0	0	4	40	60	4
2	7PC302ML	Computer Networks	4	0	0	4	40	60	4
3	7PC303ML	Discrete Mathematics	3	0	0	3	40	60	3
4	7ES301EC	Logic Design and Computer Architecture	4	0	0	4	40	60	4
5	7HS303HS	Human Values and Professional Ethics	3	0	0	3	40	60	2
Practical / Laboratory Courses									
6	7PC351ML	Database Management Systems Lab	0	0	2	2	40	60	1
7	7PC352ML	Python Programming Lab	0	0	2 *2	2*2	40	60	2
8	7PW353ML	Skill Development Course- I	0	0	2	2	40	60	1
Total Credits						26	320	480	21

AIML Semester - IV									
S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination		Credits
			L	T	P / D	Contact Hours / week	CIE	SEE	
Theory -Courses									
1	7BS405HS	Probability and Statistics	3	1	0	4	40	60	4
2	7PC404ML	Operating Systems	4	0	0	4	40	60	4
3	7PC405ML	Data Warehousing and Data Mining	4	0	0	4	40	60	4
4	7PC406ML	Statistical Analytics and Computing	4	0	0	4	40	60	4
5	7MC402HS	Essence of Indian Traditional Knowledge	2	0	0	2	40	60	0
Practical / Laboratory Courses									
6	7PC454ML	Operating Systems Lab	0	0	2	2	40	60	1
7	7PC455ML	Statistical Analytics and Computing using Python Lab	0	0	2	2	40	60	1
8	7PC456ML	Data Warehousing and Data Mining Lab	0	0	2	2	40	60	1
9	7PW457ML	Skill Development Course – II	0	0	2	2	40	60	1
Total Credits						26	360	540	20

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AIML Semester - V

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination		Credits
			L	T	P / D	Contact Hours / week	CIE	SEE	
Theory Courses									
1	7PC507ML	Design and Analysis of Algorithms	3	1	0	4	40	60	4
2	7PC508ML	Artificial Intelligence	4	0	0	4	40	60	4
3	7PC509ML	Cloud Computing	4	0	0	4	40	60	4
4	7PE5(01 to 05) ML	Professional Elective – I	3	0	0	3	40	60	3
5	7MC503HS	Indian Constitution	2	0	0	2	40	60	0
Practical / Laboratory Courses									
6	7PC558ML	Artificial Intelligence Lab	0	0	2	2	40	60	1
7	7PC559ML	Java Programming Lab	0	0	2*2	2*2	40	60	2
8	7HS553HS	Soft Skills Lab - I	0	0	2	2	40	60	1
9	7PW560ML	Skill Development Course - III	0	0	2	2	40	60	1
Total Credits						27	360	540	20

AIML Semester - VI

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination		Credits
			L	T	P / D	Contact Hours / week	CIE	SEE	
Theory Courses									
1	7PC610ML	Machine Learning	4	0	0	4	40	60	4
2	7PC611ML	Software Engineering	3	0	0	3	40	60	3
3	7PC612ML	Automata Languages and Compiler Design	3	1	0	4	40	60	4
4	7PE6(06 to 10) ML	Professional Elective – II	3	0	0	3	40	60	3
5	OE	Open Elective – I	3	0	0	3	40	60	3
6	7HS652HS	Effective Technical Communication	2	0	0	2	40	60	1
Practical / Laboratory Courses									
7	7PC661ML	Machine Learning Lab	0	0	2	2	40	60	1
8	7PC662ML	Software Engineering Lab	0	0	2	2	40	60	1
9	7PW663ML	Mini Project	0	0	2	2	40	60	1
Total Credits						25	360	540	21

Professional Elective - I

1	7PE501ML	Mobile Computing
2	7PE502ML	Human Computer Interaction
3	7PE503ML	Software requirements and Estimation
4	7PE504ML	Principles of Programming Languages
5	7PE505ML	DevOps

Professional Elective - II

1	7PE606ML	Digital Forensics
2	7PE607ML	Information Retrieval Systems
3	7PE608ML	Software Project Management
4	7PE609ML	Web Technology
5	7PE610ML	Distributed Databases

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AIML Semester - VII

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination		Credits
			L	T	P / D	Contact Hours / week	CIE	SEE	
Theory Courses									
1	7PC713ML	Deep Learning	4	0	0	4	40	60	4
2	7PC714ML	Data Science	4	0	0	4	40	60	4
3	7PE7(11 to 15) ML	Professional Elective – III	3	0	0	3	40	60	3
4	7PE7(16 to 20) ML	Professional Elective – IV	3	0	0	3	40	60	3
5	OE	Open Elective - II	3	0	0	3	40	60	3
Practical / Laboratory Courses									
6	7PC764ML	Deep Learning Lab	0	0	2	2	40	60	1
7	7PW765ML	Project Work – I	0	0	4	4	40	60	2
8	7PW766ML	Summer Internship	-	-	-	-	40	60	2
Total Credits						22	360	540	22

AIML Semester - VIII

S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination		Credits
			L	T	P / D	Contact Hours / week	CIE	SEE	
Theory Courses									
1	7HS802HS	Managerial Economics and Financial Accounting	3	0	0	3	40	60	4
2	7PE8(21 to 25) ML	Professional Elective – V	3	0	0	3	40	60	3
3	OE	Open Elective - III	3	0	0	3	40	60	3
Practical / Laboratory Courses									
4	7PW867ML	Project Work – II				16	50	100	8
Total Credits						25	170	280	17

Professional Elective - III

1	7PE711ML	Ethical Hacking
2	7PE712ML	Reinforcement Learning
3	7PE713ML	Software Architecture and Design Patterns
4	7PE714ML	Scripting Languages
5	7PE715ML	Natural Language Processing

Professional Elective – IV

1	7PE716ML	Cyber security
2	7PE717ML	Computer Vision
3	7PE718ML	Agile Methodologies
4	7PE719ML	Full Stack Development
5	7PE720ML	Blockchain Technology

Professional Elective - V

1	7PE821ML	Cryptography and Network Security
2	7PE822ML	Nature Inspired Computing
3	7PE823ML	Software Testing Methodologies
4	7PE824ML	Digital marketing and E Commerce
5	7PE825ML	Soft Computing

CSE(ARTIFICIAL INTELLIGENCE & MACHINE LEARNING) – CREDIT STRUCTURE

Category	Sem - I	Sem - II	Sem - III	Sem - IV	Sem - V	Sem - VI	Sem - VII	Sem - VIII	Total	OU	AICTE
HS		3	2		1	1		3	11	12	12
BS	9.5	9.5		4					23	25	25
ES	11	6	4						21	26	24
PC			14	15	15	13	9		65	58	48
PE					3	3	6	3	15	18	18
OE						3	3	3	9	9	18
PW			1	1	1	1	4	8	16	13	15
MC	ES	Yoga NSS/ Sports		EITK	IC					0	Non Credit
Total	20.5	18.5	21	20	20	21	22	17	160	166	160

LIST OF PROFESSIONAL ELECTIVES

S. No.	Networks/ Security	Data Science and Machine Intelligence	Software and Technology	Web Applications	Emerging Technologies
1	Mobile Computing	Human Computer Interaction	Software requirements and Estimation	Principles of Programming Languages	DevOps
2	Digital Forensics	Information Retrieval Systems	Software Project Management	Web Technology	Distributed Databases
3	Ethical Hacking	Reinforcement Learning	Software Architecture and Design Pattern	Scripting Languages	Natural Language Processing
4	Cyber security	Computer Vision	Agile Methodologies	Full Stack Development	Blockchain Technology
5	Cryptography and Network Security	Nature Inspired Computing	Software Testing Methodologies	Digital marketing and E Commerce	Soft Computing

OPEN ELECTIVES OFFERED BY CSE(AIML)

Open Elective - I

1	7OE501ML	Artificial Intelligence
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Open Elective - II

1	7OE602ML	Deep Learning
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Open Elective - III

1	7OE703ML	Machine Learning
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Open Elective - IV

1	7OE804ML	Big Data Analytics
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SYLLABUS

B. E.CSE (Artificial Intelligence and Machine Learning)

AIML Semester - III									
S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination		Credits
			L	T	P / D	Contact Hours / week	CIE	SEE	
Theory Courses									
1	7PC301ML	Database Management Systems	4	0	0	4	40	60	4
2	7PC302ML	Computer Networks	4	0	0	4	40	60	4
3	7PC303ML	Discrete Mathematics	3	0	0	3	40	60	3
4	7ES301EC	Logic Design and Computer Architecture	4	0	0	4	40	60	4
5	7HS303HS	Human Values and Professional Ethics	3	0	0	3	40	60	2
Practical / Laboratory Courses									
6	7PC351ML	Database Management Systems Lab	0	0	2	2	40	60	1
7	7PC352ML	Python Programming Lab	0	0	2*2	2*2	40	60	2
8	7PW353ML	Skill Development Course- I	0	0	2	2	40	60	1
Total Credits						25	320	480	21

Course Code	Course Title				Core / Elective		
7PC301ML	DATABASE MANAGEMENT SYSTEMS				PC		
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	4	-	-	-	40	60	4

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To get familiar with fundamental concepts of database management which includes database design, database languages, and database-system implementation.
2. To get familiar with data storage techniques and indexing.
3. To impart knowledge in transaction Management, concurrency control techniques and recovery techniques.
4. To master the basics of SQL and construct queries using SQL.
5. To become familiar with database storage structures and access techniques

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Develop the knowledge of fundamental concepts of database management and Designing a database using ER modelling approach.
2. Implement storage of data, indexing, and hashing.
3. Apply the knowledge about transaction management, concurrency control and recovery of database systems.
4. Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data
5. Apply the knowledge to retrieve database from multiple table using Sql and Pl/Sql

UNIT I

Introduction to Database and System Architecture: Database Systems and their Applications, Database Vs File System, View of Data, Data Models, Database Languages- DDL and DML, Transaction Management, Database users and Administrators, Database System Structure. Introduction to Database Design: ER Diagrams, Entities, Attributes and Entity sets, Relationships and Relationship set, Extended ER Features, Conceptual Design with the ER Model, Logical database Design.

UNIT II

SQL Queries and Constraints: SQL Data Definition, Types of SQL Commands, Form of Basic SQL Query, SQL Operators, Set Operators, , Aggregate Operators, NULL values ,Functions, Integrity Constraints Over Relations, Joins, Nested Queries, Introduction to Views, Destroying / Altering Tables and Views, PL/SQL Functions and Stored procedures ,Cursors, Triggers and Active Databases.

UNIT III

Relational Model: Introduction to Relational Model, Basic Structure, Database Schema, Keys, Relational Algebra and Relational Calculus. Storage and Indexing: File Organizations and

Indexing-Overview of Indexes, Types of Indexes, Index Data Structures, Tree structured Indexing, Hash based Indexing.

UNIT IV

Schema Refinement and Normal Forms: Introduction to Schema Refinement, Functional Dependencies, Reasoning about FD, Normal Forms and Normalization: 1NF,2NF,3NF, BCNF,4NF,5NF, Properties of Decomposition

UNIT V

Transaction Management: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability. Concurrency Control: Lock based Protocols, Timestamp based protocols, Recovery System: Recovery and Atomicity, Log based recovery, Shadow Paging, Recovery with concurrent Transactions, Buffer Management.

TEXTBOOKS

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, III Edition, TATA McGraw Hill.
2. Data base System Concepts, Silberschatz, Korth, V Edition, McGraw Hill.
3. Introduction to Database Systems, C.J.DatePearsonEducation.

REFERENCE BOOKS

1. Database Management System, ElmasriNavate, PearsonEducation.
2. Database Management System, Mathew Leon,Leo

Course Code	Course Title					Core / Elective	
7PC302ML	COMPUTER NETWORKS					PC	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	4	-	-	-	40	60	4

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To provide a conceptual foundation for the study of data communications using the open Systems interconnect (OSI) model for layered architecture.
2. To study the principles of network protocols and internetworking
3. To understand the Network security and Internet applications.
4. To understand the performance of data link layer protocols for error and flow control.
5. To understand various routing protocols and network security.

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Understand and explain the concept of Data Communication and networks, layered architecture and their applications
2. Evaluate data communication link considering elementary concepts of data link layer protocols for error detection and correction
3. Interpret the network layer, routing protocols and analyse how to assign the IP addresses for the given network
4. Examine the Transport layer services and protocols.
5. Comprehend the functionality of application layer

UNIT I

Introduction to Data communication: Representation of data communication, flow of networks, Network Types: LAN, WAN, MAN. Network Topologies: Bus, Star, Ring, Hybrid. Line configurations. Reference Models: OSI, TCP/IP, Transmission media

Techniques for Bandwidth utilization: Multiplexing –Frequency division, time division and wave division, Asynchronous and synchronous transmission

UNIT II

Data Link Layer: Framing, Error Detection and Correction: Fundamentals, Block coding, Hamming Distance, CRC

Flow Control and Error Control Protocols: Stop and Wait, go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, HDLC

Multiple Access Protocols: ALOHA, CSMA, CSMA/CD, CSMA/CA.

UNIT III

Network Layer: Switching Techniques (Circuit and Packet) concept, Network layer Services, Sub-netting concepts

Routing algorithms: Shortest Path Routing, Flooding, Hierarchical routing, Broadcast, Multicast, Distance Vector Routing, and Congestion Control Algorithms.

UNIT IV

Internet Networking: Tunnelling, Fragmentation, Congestion Control (Leaky Bucket and Token Bucket Algorithm), Internet control protocols: ARP, RARP and DHCP

The Network Layer in Internet: IPV4, IPV6, IP Addressing, NAT.

UNIT V

Transport Layer: Transport Services, Elements of Transport Layer, Connection management, TCP and UDP protocols, QoS improving techniques.

Application Layer: Domain Name System, SNMP, SMTP, HTTP, Bluetooth

TEXTBOOKS

1. "Computer Networks," Andrew S Tanenbaum, V Edition, Pearson Education, 2011.
2. "Data Communication and Networking," Behrouz A. Forouzan, IV Edition, TMH, 2008.
3. "Data and Computer Communications," William Stallings, VIII Edition, PHI, 2004.

REFERENCE BOOKS

1. "Computer Networks and Internet", Douglas E Comer, Pearson Education Asia, 2000.
2. "Data Communications and Computer Networks", Prakash C. Gupta, PHI learning, 2013

Course Code	Course Title					Core / Elective	
7PC303ML	DISCRETE MATHEMATICS					PC	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	3	-	-	-	40	60	3

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To understand the concepts of Logic, Rules of inference and Quantifiers
2. To explain with examples, the basic terminology of functions, relations, and sets.
3. To impart the knowledge on Groups, Normal subgroups, Rings and Field
4. To relate the ideas of mathematical induction to recursion and recursively defined structures.
5. To develop Graph Algorithms by using the concepts of Graphs and Trees

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Apply mathematical logic to solve problems
2. Illustrate by examples the basic terminology of functions, relations, and sets and demonstrate knowledge of their associated operations.
3. Identify structures of algebraic nature and apply basic counting techniques to solve combinatorial problems.
4. Formulate problems and solve recurrence relations.
5. Apply Graph Theory in solving computer science problems

UNIT I

Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Well-formed formulas, Truth Tables, tautology, equivalence implication, Quantifiers, universal quantifiers. Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

UNIT II

Set Theory and Relations: Basic Concepts of Set Theory, Relations and Ordering, Properties of Binary Relations, equivalence, transitive closure, compatibility and partial ordering relations Hasse Diagram,

Functions: Composition of functions, Inverse Functions, Recursive Functions, Lattice and its Properties

UNIT III

Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism, Fields, Rings, Integral domains, Lattices as Partially Ordered Sets, Boolean Algebra

UNIT IV

Elementary Combinatory: Basis of counting, Combinations & Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion. Pigeon hole principles and its application.

UNIT V

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.

Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees,, Fundamental Cut Sets and Circuits, Max flow –Min Cut Theorem (Transport Network). Applications of Graph Theory

TEXT BOOKS

1. Discrete Mathematics and its Applications, Kenneth H. Rosen, V Edition. TMH
2. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, I Edition, McGraw-Hill, 2002.
3. 3. Discrete Mathematics for Computer Scientists & Mathematicians: Joe I. Mott, Abraham Kandel, Theodore P. Baker, II Edition, Prentis Hall of India.

REFERENCE BOOKS

1. Discrete Mathematical Structures Theory and Application- Malik & Sen, I Edition, Cengage Learning.
2. Discrete Mathematics with Applications, Thomas Koshy, I Edition, Elsevier
3. Discrete and Combinatorial Mathematics - an applied introduction, Ralph. P. Grimaldi, V Edition, Pearson education.

Course Code	Course Title					Core / Elective	
7ES301EC	LOGIC DESIGN AND COMPUTER ARCHITECTURE					ES	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	4	-	-	-	40	60	4

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To understand basic number systems, logical gates, Boolean algebra & k map to minimize the Boolean expressions.
2. To understand design of combinational and sequential circuits.
3. To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design.
4. To be familiarized with the hardware components and concepts related to the memory organization.
5. To be familiarized with the hardware components and instruction set related to 8086 microprocessor

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Understand the number systems, binary codes logic gates, Boolean algebra and k- map method to minimize the Boolean expressions.
2. Design the combinational and sequential circuits.
3. Understand the basic concept of block diagram of computer (CPU) with Microprocessor processor unit (MPU)
4. Understand the internal architecture and register organization of 8086
5. Categorize memory organization and explain the function of each element of a memory hierarchy

UNIT I

Binary Systems, Boolean algebra and Logic Gates: Number Base Conversions- Binary, Decimal, Octal and Hexadecimal, Complements, Digital Logic gates, Boolean algebra, Boolean Functions. Canonical and Standard Forms

Gate Level Minimization: The K Map Method. Four-Variable Map, Product of Sums Simplification. Don't-Care Conditions.

UNIT II

Combinational Logic Design: NAND and NOR Implementation, Exclusive-OR Function, Design Procedure for Binary Adder, Subtractor, Decoders, Encoders, Multiplexer, Demultiplexer.

Sequential Logic Design: Latches, Flip-Flops and conversion

UNIT III

Registers and Counters: Registers, Shift Registers and Counters

Basic Computer Organization: Functions of CPU, I/O Units, Memory.

Instruction Formats- One address, two addresses, zero addresses and three addresses, addressing modes with numeric examples, Instruction cycle

UNIT IV

Input-Output Organizations Programmed I/O, Interrupt Initiated I/O, DMA

Memory Organizations: Memory hierarchy, Main Memory, Cache Memory, Miss and Hit ratio, Virtual memory

UNIT V

8086 Architecture: General purpose registers, Segment register, concept of pipelining, 8086 Flag register, addressing modes, Instruction set, Simple Assembly Language Programs.

TEXTBOOKS

1. Digital Design, M. Morris Mano, III Edition, Pearson Education, Inc, 2002
2. Microprocessor 8086: Architecture, Programming and Interfacing , Sunil Mathur PHI 2010
3. Computer Organization V. Carl Hamacher, Safwat G. Zaky, Zvonko Vranesic, Zvonko G Vranesic, V Edition, Mc Graw Hill 2002

REFERENCE BOOKS

1. Fundamentals of Digital Circuits, A. Anand Kumar, PHI, 2002
2. The Intel Microprocessors: 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 - Architecture, Programming, and Interfacing by Barry B Brey, VIII Edition, Pearson 2009
3. Computer Organization and 8086 Microprocessor, Er Sandeep Ravikanti, Notion Press, 2021

Course Code	Course Title					Core / Elective	
7HS303HS	HUMAN VALUES AND PROFESSIONAL ETHICS					HS	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	3	-	-	-	40	60	2

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To create an awareness on Human Values and Engineering Ethics.
2. To move from discrimination to commitment.
3. To understand social responsibility of an engineer.
4. To appreciate ethical dilemma while discharging duties in professional life.
5. To encourage students to discover what they consider valuable in life

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Understand the significance of value inputs in a classroom and start applying them in their life and profession
2. Assess their own ethical values and the social context of problems
3. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
4. Understand the role of a human being in ensuring harmony in society and nature.
5. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work

Unit-I: Introduction to Value Education (6 Hrs)

1. Value Education, Definition, Concept and Need for Value Education
2. The Content and Process of Value Education
3. Self-Exploration as a means of Value Education
4. Happiness -Sukh, Suvidha, Sanyam&Swasthya.

Unit-II: Harmony in the Human Being (6 Hrs)

1. Human Being is more than just the Body
2. Harmony of the Self ('I') with the Body
3. Understanding Myself as Co-existence of the Self and the Body
4. Understanding Needs of the Self and the Needs of the Body

Unit-III: Harmony in the Family and Society and Harmony in Nature (7 Hrs)

1. Family as a basic unit of Human Interaction and Values in Relationships
2. The Dynamics of Mutual respect in Today's World – Affection, Care, Guidance,
3. Reverence, Gratitude and Love.
4. Comprehensive Human Goals: The Five dimensions of Human Endeavour – Justice, Trust, Competence, Right Attitude and Mutual Tolerance

Unit-IV: Social Ethics (6 Hrs)

1. The Basics for Ethical Human conduct
2. Challenges to ethical conduct in existence
3. Holistic perception of Harmony in existence
4. Social Hierarchy - Ethical Conduct and Mutual Co-existence

Unit-V: Professional Ethics (6 Hrs)

1. Sanctity of Human values
2. Definitiveness of Ethical Human Conduct
3. Basics for Humanistic Education

TEXT BOOKS

1. A.N Tripathy, "Human Values", New Age International Publishers, 2003.
2. Bajpai. B. L., Indian Ethos and Modern Management, New Royal Book Co., Lucknow, Reprinted, 2004
3. Bertrand Russell Human Society in Ethics & Politics, Taylor and Francis, 2007

REFERENCE BOOKS

1. Corliss Lamont, Philosophy of Humanism, Humanist Press, 1997
2. Gaur. R.R. , Sangal. R, Bagaria. G.P, A Foundation Course in Value Education, Excel Books, 2009.
3. Gaur. R.R., Sangal. R, Bagaria. G.P, Teachers Manual Excel Books, 2009.
4. Mortimer. J. Adler, – Whatman has made of man, Hardcover, 2007.

Course Code	Course Title				Core / Elective		
7PC351ML	DATABASE MANAGEMENT SYSTEMS				PC		
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
C Language	-	-	-	2	40	60	1

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To practice various DDL, DML commands in SQL
2. To write simple and Complex queries in SQL
3. To practice various Functions, Jons&sub queries in SQL
4. To write PL/SQL using cursors and collections
5. To write PL/SQL using Stored Procedures

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Design and implement a database schema for a given problem
2. Develop the query statements with the help of structured query language.
3. Populate and query a database using SQL and PL/SQL
4. Develop multi-user database application
5. Design and implement E-R model for the given requirements

List of Programs:

1. Creation of database Tables (exercising the all SQL commands)
2. Simple and complex condition query creation using SQL Plus
3. Creation of database Tables using Integrity constraints and Functions
4. Simple and complex condition query creation using Joins
5. Simple and complex condition query creation using Sub queries and set operators
6. Creation of Views (exercising the all types of views)
7. Writing PL/SQL function and cursors
8. Writing PL/SQL stored procedure and triggers
9. Creation of Forms and reports for student Information, library information, Pay roll etc.
10. Case Study: Design Database for Bank
 - => Collect the information Related with Bank organization
 - => Draw E-R Diagrams for Bank
 - => Reduce E-R Diagrams to tables
 - => Normalize your Database up to 3rd Normal form
 - => Retrieve Bank information using SQL commands

Course Code	Course Title					Core / Elective	
7PC352ML	PYTHON PROGRAMMING LAB					PC	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	-	-	-	4	40	60	2

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To learn how to design and program using lists, tuples, and dictionaries.
2. To learn how to use indexing and slicing to access data in Python programs.
3. To learn structure and components of Python and to read and write files.
4. To learn how to design object-oriented programs with Python classes and Exception handling techniques.
5. To learn how to design and build the GUI applications using python

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Demonstrate solutions to computational problems using python programs.
2. Solve complex problems using python functions and control structures.
3. Use Python lists, tuples, and dictionaries for representing compound data.
4. Develop object-oriented programs with python classes.
5. Develop Python programs for GUI applications

List of Experiments:

1. Develop program to demonstrate different number datatypes in python.
2. Develop program to understand the control structures of python.
3. Develop program on String manipulation.
4. Develop program to perform various operations on files.
5. Develop programs to learn different types of structures (list, dictionary, tuples) in python.
6. Develop programs to learn concept of functions scoping, recursion, and list mutability.
7. Develop program to demonstrate classes and OOP principles.
8. Develop programs to understand the working of exception handling and assertions.
9. Develop event driven GUI programs.
10. Investigate a Dataset: Case Study in Python
11. Develop program to use built-in functions to manipulate data in Python programs.
12. Develop program to build and package Python modules for reusability.

TEXTBOOKS

1. The Fundamentals of Python: First Programs, Kenneth A. Lambert, II Edition, 2017, Cengage Learning
2. Introduction to Computation and Programming Using Python, John V Guttag, Prentice Hall of India

REFERENCE BOOKS

1. Mark Summerfield. —Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009.
2. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist,,,,, 2nd edition, Updated for Python 3, Shroff/O,,Reilly Publishers, 2016
3. NPTEL Course, Programming, Data Structures and Algorithms using Python,
Link: <https://nptel.ac.in/courses/106106145>

SKILL DEVELOPMENT COURSE-I

Semester III	L	T	P	Credits
Subject code – 7PW353ML	0	0	2	1

Guidelines for Evaluation of Skill Development

1. Continuous Evaluation method is adopted for skill development courses of all semesters and 40 marks are allocated for CIE

At the end of the module, the student is evaluated by allocating marks are given under observation -10 marks.

Continuous Performance and Execution -20 marks

Viva-Voce-10marks

Average of marks obtained in all experiments is considered as the marks obtained in CIE

2. The Semester End Examination shall be conducted with an external examiner and the internal examiner for 60 marks. The external examiner shall be appointed by the Principal from the panel of examiners recommended by Controller of Evaluation and Board of Studies.

Quiz/ Skill Test/Assignment/ Mini Project- 40 marks Viva-voce-20 marks

Course Code	Course Title				Core / Elective		
7PW353ML	CISCO INTRODUCTION TO INTERNET OF THINGS (IoT)				PW		
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	-	-	-	2	40	60	1

COURSE OBJECTIVES:

The objective of this course is to make the student to

- 1.Learn how digital transformation turns information into action, creating unprecedented economic opportunity.
- 2.Understand how the IoT brings together operational technology and information technology systems.
- 3.Discover how business processes for evaluating and solving problems are being transformed.
- 4.Learn the security concerns that must be considered when implementing IoT solutions.
- 5.Practice what you learn using Cisco Packet Tracer, a network configuration simulation tool

COURSE OUTCOMES:

After the completion of course the students will be able to:

- 1.Explain the meaning and impact of Digital Transformation.
- 2.Apply basic programming to support IoT devices.
- 3.Explain how data provides value to Digital Business and Society.
- 4.Explain the benefits of automation in the digitized world.
- 5.Explain the need for enhanced security in the digitized world and discover opportunities provided by digital transformation

MODULE 1: Everything is Connected

Digital Transformation: Explain how digital transformation affects business, industry, and our daily lives, explain how digital transformation enables innovation, explain how networks provide the platform for Digital Business and society.

Devices that Connect to the IoT: Configure an IoT device to connect to the network, describe the exponential growth of connected IoT devices, configure devices to communicate in the IoT

MODULE 2: Everything Becomes Programmable

Apply Basic Programming to Support IoT Devices: Use Python to create programs that accept user input and read and write to external files, Describe basic programming variables and fundamentals. Apply basic programming variables and fundamentals in Blockly. Apply basic programming variables and fundamentals using Python

Prototyping Your Idea: Explain prototyping and its purpose, Describe Prototyping, Describe the various tools and materials to use to prototype.

MODULE 3: Everything Generates Data

Big Data: Explain the concept of Big Data, Describe the sources of Big Data, Explain the challenges and solutions to Big Data storage, Explain how Big Data analytics are used to support Business.

MODULE 4: Everything Can be Automated

What Can be Automated?: Explain how digitization allows business processes to embrace automation, Describe automation Explain how artificial intelligence and machine learning impact automation. Explain how intent-based networking adapts to changing business needs.

MODULE 5: Everything Needs to be Secured

Security in the Digitized World: Explain why security is important in the digitized world. Explain the need for security in the digitized world, explain how to help secure the corporate world, and explain how to secure personal data and devices.

REFERENCES

1. Introduction to IoT by CISCO Network Academy, Version 2.0, July 2018

AIML Semester - IV									
S. No.	Course Code	Course Title	Scheme of Instruction				Scheme of Examination		Credits
			L	T	P / D	Contact Hours / week	CIE	SEE	
Theory -Courses									
1	7BS405HS	Probability and Statistics	3	1	0	4	40	60	4
2	7PC404ML	Operating Systems	4	0	0	4	40	60	4
3	7PC405ML	Data Warehousing and Data Mining	4	0	0	4	40	60	4
4	7PC406ML	Statistical Analytics and Computing	4	0	0	4	40	60	4
5	7MC402HS	Essence of Indian Traditional Knowledge	2	0	0	2	40	60	0
Practical / Laboratory Courses									
6	7PC454ML	Operating Systems Lab	0	0	2	2	40	60	1
7	7PC455ML	Statistical Analytics and Computing using Python Lab	0	0	2	2	40	60	1
8	7PC456ML	Data Warehousing and Data Mining Lab	0	0	2	2	40	60	1
9	7PW457ML	Skill Development Course – II	0	0	2	2	40	60	1
		Total Credits				26	360	540	20

Course Code	Course Title					Core / Elective	
7BS405HS	PROBABILITY AND STATISTICS					BS	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	3	1	-	-	40	60	4

COURSE OBJECTIVES:

The objective of this course is to make the student to

The objective of this course is to make the student to

1. Study the concepts of Probability and random variables
2. To provide the knowledge of discrete probability Distributions
3. To learn theoretical continuous probability distributions.
4. To provide the knowledge of correlation and regression.
5. To learn the concept of small sample tests and curve fitting

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. To understand concepts of probability and random variables
2. Apply various probability distributions to solve practical problems, to estimate unknown parameters of populations
3. Find Mean, variance, moment generating function and statistical parameters of continuous probability distributions
4. To perform a regression analysis and to compute and interpret the coefficient of correlation
5. Evaluate t-distribution, F-distribution and chi-square distributions. Fitting of straight line, parabola and exponential curves.

UNIT I

Introduction of Probability, Conditional probability, Theorem of Total probability, Baye's Theorem and its applications, Random variables, Types of random variables, Probability mass function and Probability density function, Mathematical expectations.

UNIT II

Discrete probability distributions: Binomial and Poisson distributions, Mean, variance, moment generating function and evaluation of statistical parameters for these distributions, Moments, skewness and Kurtosis.

UNIT III

Continuous probability distributions, Uniform, Exponential and Normal distributions, Mean, variance, moment generating function and evaluation of statistical parameters for these distributions

UNIT IV

Correlation, regression and Rank correlation. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

UNIT V

t-Test for single mean, difference of means, f-test for ratio of variances, Chi-square test for goodness of fit and independence of attributes. Curve fitting by the method of least squares: fitting of straight lines, second degree parabolas and more general curves,

TEXT BOOKS

1. Higher.EngineeringMathematics by Dr.B.S. Grewal, KhannaPublicatins,43 Edition,2014. (unit 1-5)
2. Advance Engineering Mathematics by R.K.Jain and Iyengar, V Edition, Narosa Publications (unit 1-5)
3. EngineeringMathematics,P.Sivaramakrishna Das & C. Vijaya Kumar,Pearson India Education Services Pvt.Ltd.

REFERENCE BOOKS

1. Fundamentals of Mathematical Statistics, S.C.Gupta&V.K.Kapoor, S.Chand Pub.
2. An Introduction to Probability Theory and its Applications by W. Feller, Vol. 1, Wiley, 1968

Course Code	Course Title				Core / Elective		
7PC404ML	OPERATING SYSTEMS				PC		
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	4	-	-	-	40	60	4

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication.
3. To learn the mechanisms involved in memory management in contemporary OS.
4. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection.
5. To know the components and management aspects of concurrency management

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Describe the concepts of OS structure and Process synchronization
2. Evaluate and design different process scheduling algorithms
3. Identify the rationale behind various memory management techniques along with issues and challenges of main memory and virtual memory
4. Compare different file allocation methods and decide appropriate file allocation strategies
5. Describe the mechanisms available in OS to control access to resources and provide system security.

UNIT I

Operating Systems Overview: Introduction, operating system operations, process management, memory management, storage management, protection and security, distributed systems.

Operating Systems Structures: Operating system services and systems calls, system programs, operating system structure- Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine, and operating systems generations.

UNIT II

Process Management: Process concepts, process state, process control block, scheduling queues, process scheduling, multithreaded programming, threads in UNIX, comparison of UNIX and windows.

Concurrency and Synchronization: Process synchronization, critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of synchronization, readers and writer's problem, dining philosopher's problem, monitors, synchronization examples(Solaris), atomic transactions. Comparison of UNIX and windows.

Case study: System call interface for process management-fork, exit, wait, waitpid, exec.

UNIT III

Deadlocks: System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock banker's algorithm.

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, virtual memory, demand paging, page-replacement algorithms, allocation of frames, thrashing, case study - UNIX.

UNIT IV

File System: Concept of a file, access methods, directory structure, file system mounting, file sharing, protection. File system implementation: file system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance, comparison of UNIX and windows.

Secondary-Storage Structure: Disk structure, Disk scheduling algorithms, Disk Management, RAID structure.

UNIT V

I/O System: Mass storage structure - overview of mass storage structure, disk structure, disk attachment, disk scheduling algorithms, swap space management, stable storage implementation, tertiary storage structure.

I/O: Hardware, application I/O interface, kernel I/O subsystem, transforming I/O requests to hardware operations, streams, performance.

TEXTBOOKS

1. Operating System Concepts Essentials, Abraham Silberschatz, Peter B Galvin, Greg Gagne, IX Edition, Wiley Asia Student Edition, 2017.
2. Operating Systems: Internals and Design Principles, William Stallings, V Edition, Prentice Hall of India, 2016.
3. A Modern Operating Systems, Andrew S. Tanenbaum (2007), II Edition, Prentice Hall of India, India.

REFERENCE BOOKS

1. Design of the Unix Operating Systems, Maurice Bach, VIII Edition, Prentice-Hall of India, 2009.
2. Understanding the Linux Kernel, Daniel P. Bovet, Marco Cesati, III Edition, O'Reilly and Associates.

Course Code	Course Title					Core / Elective	
7PC405ML	DATA WAREHOUSING AND DATA MINING					PC	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Database Management Systems	4	-	-	-	40	60	4

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. Be familiar with mathematical foundations of data mining tools.
2. Understand and implement classical models and algorithms in data warehouses and data mining
3. Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
4. Master data mining techniques in various applications like social, scientific and environmental context.
5. Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Understand the functionality of the various datamining and data warehousing component Knowledge
2. Analyze the strengths and limitations of various data mining and data warehousing models
3. Explain the analyzing techniques of various data
4. Describe different methodologies used in data mining and data ware housing.
5. Compare different approaches of data ware housing and data mining with various technologies

UNIT I

Data Warehousing & Modeling: Basic Concepts: Data Warehousing: A multitier Architecture, Data warehouse models: Enterprise warehouse, Data mart and virtual warehouse

Extraction, Transformation and loading, Data Cube: A multidimensional data model, Stars, Snowflakes and Fact constellations: Schemas for multidimensional Data models

UNIT II

Efficient Data Cube computation. OLAP server Architecture ROLAP versus MOLAP Versus HOLAP.

Introduction: What is data mining, Challenges, Data Mining Tasks. Data: Types of Data, Data Quality, Data Preprocessing, Measures of Similarity and Dissimilarity.

UNIT III

Association Analysis: Association Analysis: Problem Definition, Frequent Item set Generation, Rule generation. Alternative Methods for Generating Frequent Item sets, FP-Growth Algorithm, Evaluation of Association Patterns

UNIT IV

Classification and Prediction: - Issues Regarding Classification and Prediction — Classification by Decision Tree Introduction — Bayesian Classification — Rule Based Classification — Classification by Back propagation — Support Vector Machines — Associative Classification — Lazy Learners — Prediction — Accuracy and Error Measures — Evaluating the Accuracy of a Classifier or Predictor.

UNIT V

Cluster Analysis: - Types of Data in Cluster Analysis — A Categorization of Major Clustering Methods — Partitioning Methods — Hierarchical methods — Density-Based Methods — Grid-Based Methods — Model-Based Clustering Methods — Clustering High-Dimensional Data — Constraint-Based Cluster Analysis — Outlier Analysis.

TEXTBOOKS

1. Data Mining -Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian Pei: III Edition, Morgan Kaufmann Publisher, 2012.
2. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar Pearson, 2014.

REFERENCE BOOKS

1. Data Warehousing in the Real World, Sam Anahory, Dennis Murray, Pearson, 2012.
2. Mastering Data Mining, Michael. I. Berry, Gordon. S. Linoff, Wiley Edition, II edition, 2012.

Course Code	Course Title				Core / Elective		
7PC406ML	STATISTICAL ANALYTICS AND COMPUTING				PC		
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	4	-	-	-	40	60	4

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To understand Statistical parameters for data analytics
2. To use Numpy for organizing and analyzing data
3. To use pandas for summarizing and analysis of data
4. To use of statistical methods for cleaning and preparation of data
5. To performs aggregation of data and understand analysis of time series data

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Understand Statistical parameters for data analytics
2. Develop programs using Numpy for organizing and analyzing data
3. Develop programs using pandas for summarizing and analysis of data
4. Use of statistical methods for cleaning and preparation of data
5. Apply data aggregation and analyze time series data

UNIT I

Python Language Basics, IPython, and Jupyter Notebooks: The Python Interpreter, IPython Basics, Python Language Basics

Built-in Data Structures, Functions, and Files: Data Structures and Sequences, Functions, Files and the Operating System

UNIT II

NumPyBasics: Arrays and Vectorized Computation: The NumPyndarray: A Multidimensional Array Object, Universal Functions, Array-Oriented Programming with Arrays, File Input and Output with Arrays, Linear Algebra, Pseudorandom Number Generation, Example: Random Walks

UNIT III

PANDAS: Introduction to pandas Data Structures, Essential Functionality, Summarizing and Computing Descriptive Statistics, Reading and Writing Data in Text Format, Binary Data Formats, Interacting with Web APIs, Interacting with Databases

UNIT IV

Data Cleaning and Preparation: Handling Missing Data, Data Transformation, String Manipulation

Data Wrangling: Join, Combine, and Reshape: Hierarchical Indexing, Combining and Merging Datasets, Reshaping and Pivoting

UNIT V

Data Aggregation and Group Operations: GroupBy Mechanics, Data Aggregation, Apply: General split-apply-combine, Pivot Tables and Cross-Tabulation

Time Series: Date and Time Data Types and Tools, Time Series Basics, Date Ranges, Frequencies, and Shifting, Periods and Period Arithmetic, Resampling and Frequency Conversion, Moving Window Functions

TEXTBOOKS

1. Python for Data Analysis- DATA WRANGLING WITH PANDAS, NUMPY, AND IPYTHON, Wes McKinney, O-Reilly, 2018
2. Python Data Analytics, Fabio Nelli, Apress, 2015.

REFERENCE BOOKS

1. Data Analysis From Scratch With Python Step By Step Guide, Peters Morgan, AI Sciences
2. Python for Data Analysis: A Step-By-Step Guide to Master the Basics of Data Science and Analysis in Python Using Pandas, Andrew Park, NumpyandIpython

Course Code	Course Title					Core / Elective	
7MC402HS	ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE					MC	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	2	-	-	-	40	60	-

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To reinforce the students understanding with the pan-Indian heritage in terms of culture, traditions and knowledge.
2. To impart understanding of the importance of the roots of the traditional knowledge and types.
3. To impart basic knowledge on the evolution of the multiple languages that highlight India's diversity.
4. To know Indian Languages, Philosophies, Religion, Literature, Fine arts and Technology.
5. To explore the Ancient Science, Scientists, in Medieval and Modern India; the education system.

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Understand the concepts of Indian culture and Traditions and their importance.
2. Distinguish the Indian languages and literature
3. Learn the philosophy of ancient, medieval and modern India.
4. Acquire the information about the fine arts in India
5. Know the contribution of scientists of different eras, interpret the concepts and the importance to protect Intellectual property of the nation.

UNIT- I

Dawn of human civilization and evolution of various cultures, Introduction to Culture: Civilization, Culture and heritage, General characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India

UNIT -II

Indian Languages, Culture and Literature:

Indian Languages and Literature-I:

the evolution and role of Sanskrit, significance of scriptures to current society

Indian philosophies, other Sanskrit literature, literature of south India.

Indian Languages and Literature-II:

Northern Indian languages & literature

UNIT - III

Religion and Philosophy:

Religion and Philosophy in ancient India

Religion and Philosophy in medieval India

Religious reform movements in modern India (selected movements only)

UNIT-IV

Fine Arts in India (Art, Technology & Engineering): -Indian Painting, Indian handicrafts, Music: Divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India: development of science in ancient, medieval and modern India. Their relation in terms of modern scientific perspective, Protection of traditional knowledge, significance, value to economy, role of government in protection of indigenous knowledge and technology, protection of traditional knowledge bill, 2016.

UNIT - V

Education System in India: Education in ancient, medieval and modern India, Aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

TEXTBOOKS

1. Indian Knowledge Systems (2 Vols-Set), Kapil Kapoor and Avadhesh Kumar Singh; ISBN 10: 8124603367 / ISBN 13: 9788124603369, Published by D K Print world, Publication Date: 2007
2. Science in Samskrit, SamskritaBharati, Published by SamskritaBharati, New Delhi, India, 2007; ISBN 10: 8187276339 / ISBN 13: 9788187276333.
3. Traditional Knowledge System and Technology in India, Book by Basanta Kumar Mohanta and Vipin K. Singh, originally published: 2012 Publication Date: 2012; ISBN 10: 8177023101 ISBN 13: 9788177023107.
4. 1.7-Position paper, National Focus Group on Arts, Music, Dance and Theatre NCERT, March 2006, ISBN 81-7450-494-X, NCERT, New Delhi, 2010.
5. Indian Art and Culture, IV Edition, By Nitin Singhania, ISBN: 9354601804 · 9789354601804, © 2022 | Published: December 20, 2021
6. 'Education and Examination Systems in Ancient India, written/authored/edited by S. Narain', published 2017, English-Hardcover, ISBN 9789351282518 publisher: Kalpaz Publications.
7. Satya Prakash, Founders of Sciences in Ancient India, Vijay Kumar Publisher, New Delhi, 1989
M. Hiriyanna, Essentials of Indian Philosophy, MotilalBanarsidass Publishers, New Delhi,

Course Code	Course Title				Core / Elective		
7PC454ML	OPERATING SYSTEMS LAB				PC		
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	-	-	-	2	40	60	1

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To Learn various system calls in Linux
2. To Learn different types of CPU scheduling algorithms.
3. To Demonstrate the usage of semaphores for solving synchronization problem
4. To Understand memory management techniques and different types of fragmentation.
5. To Learn various disk scheduling algorithms

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Use different system calls for writing application programs
2. Evaluate the performance of different types of CPU scheduling algorithms.
3. Implement producer-consumer problem, reader-writers problem, Dining philosopher's problem.
4. Simulate Banker's algorithm for deadlock avoidance.
5. Implement paging replacement and disk scheduling techniques.

List of Programs (preferred programming language is C)

Perform a case study by installing and exploring various types of operating systems on a physical or logical (virtual) machine

1. Write C programs to implement UNIX system calls and file management system calls.
2. Write C programs to demonstrate various process related concepts.
3. Write C programs to demonstrate various thread related concepts.
4. Write C programs to simulate CPU scheduling algorithms: FCFS, SJF, Round Robin
5. Write C programs to simulate Intra & Inter-Process Communication (IPC) techniques: Pipes, Messages Queues, Shared Memory.
6. Write C programs to simulate solutions to Classical Process Synchronization Problems: Dining Philosophers, Producer-Consumer, Readers-Writers
7. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance.
8. Write C programs to simulate Page Replacement Algorithms: FIFO, LRU
9. Write C programs to simulate implementation of Disk Scheduling Algorithms: FCFS, SSTF.
10. Shell programming: creating a script, making a script executable, shell syntax (variables, conditions, control structures, functions, and commands).

Course Code	Course Title					Core / Elective	
7PC455ML	STATISTICAL ANALYTICS AND COMPUTING USING PYTHON LAB					PC	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	-	-	-	2	40	60	1

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. To install Numpy and Pandas
2. To work with 1D and 2D array in Numpy
3. To explore multi-dimensional arrays in Numpy
4. To perform statistical analysis using Numpy
5. To perform statistical analysis using Pandas

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Understand the installation Numpy and Pandas
2. Understand 1D and 2D array in Numpy and process data in arrays
3. Understand multi-dimensional arrays in Numpy and perform conversions
4. Analyze data statistically using Numpy by calculating measures of central tendency, deviation, distances and correlation
5. Analyze data statistically using Pandas.

List of Programs

1. Installing Numpy
2. Working with arrays
 - a. Create a 1D array
 - b. Create a boolean array
 - c. Extract items that satisfy a given condition from 1D array
 - d. Replace items that satisfy a condition with another value in numpy array
 - e. Replace items that satisfy a condition without affecting the original array
 - f. Reshape an array
 - g. Extract all numbers between a given range from a numpy array
3. Multiple arrays
 - a. Stack two arrays vertically
 - b. Stack two arrays horizontally
 - c. Get the common items between two python numpy arrays
 - d. Remove from one array those items that exist in another
 - e. Get the positions where elements of two arrays match
4. Multi-dimensional arrays
 - a. Convert an array of arrays into a flat 1d array
 - b. Swap two columns in a 2d numpy array
5. Statistical analysis

- a. Compute the mean, median, standard deviation of a numpy array
 - b. Find the percentile scores of a numpy array
 - c. compute the euclidean distance between two arrays
 - d. Find the correlation between two columns of a numpy array
 - e. Probabilistic sampling in numpy
 - f. compute the moving average of a numpy array
6. Data Cleaning
 - a. Find the position of missing values in numpy array
 - b. Drop rows that contain a missing value from a numpy array
 - c. Replace all missing values with 0 in a numpy array
 - d. Drop all missing values from a numpy array
7. Data Transformation
 - a. Normalize an array so the values range exactly between 0 and 1
 - b. Compute the min-by-max for each row for a numpy array 2d
8. Pandas Basics
 - a. Installing Pandas
 - b. Import pandas and check the version
 - c. Create a series from a list, numpy array and dict
 - d. Convert the index of a series into a column of a dataframe
 - e. Combine many series to form a dataframe
9. Statistical analysis in pandas
 - a. Get the minimum, 25th percentile, median, 75th, and max of a numeric series
 - b. Get frequency counts of unique items of a series
 - c. Bin a numeric series to 10 groups of equal size
 - d. Compute the euclidean distance between two series
10. Data Preparation in pandas
 - a. Normalize all columns in a dataframe
 - b. Compute the correlation of each row with the succeeding row
 - c. Compute the autocorrelations of a numeric series

Course Code	Course Title					Core / Elective	
7PC456ML	DATA WAREHOUSING AND DATA MINING LAB					PC	
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
Python Programming	-	-	-	2	40	60	1

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. Load datasets and identify dependent and independent variables using Python libraries.
2. Handle missing data and categorical data, and scale features using Python libraries.
3. Split datasets into training and testing sets for model building and evaluation.
4. Build a linear regression model on a dataset and interpret the results.
5. Implement the Apriori algorithm to generate frequent itemsets and association rules

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Demonstrate proficiency in data preprocessing tasks using Python libraries, including handling missing and categorical data, feature scaling, and dataset splitting.
2. Apply various similarity and dissimilarity measures in Python
3. Utilize the Apriori algorithm to generate frequent itemsets and association rules for market basket data.
4. Develop decision tree classification models with Python.
5. Implement and interpret clustering algorithms on different datasets.

Usepythonlibraryscikit-learnwherevernecessary

1. Demonstrate the following data preprocessing tasks using python libraries.
 - a) Loading the dataset
 - b) Identifying the dependent and independent variables.
 - c) Dealing with missing data
2. Demonstrate the following data preprocessing tasks using python libraries.
 - a) Dealing with categorical data.
 - b) Scaling the features.
 - c) Splitting dataset into Training and Testing Sets
3. Demonstrate the following Similarity and Dissimilarity Measures using python
 - a) Pearson's Correlation
 - b) Cosine Similarity
 - c) Jaccard Similarity
 - d) Euclidean Distance
 - e) Manhattan Distance
4. Build a model using linear regression algorithm on any dataset.
5. Build a classification model using Decision Tree algorithm on iris dataset
6. Apply Naïve Bayes Classification algorithm on any dataset

7. Generate frequent item sets using Apriori Algorithm in python and also generate association rules for any market basket data.
8. Apply K-Means clustering algorithm on any dataset.
9. Apply Hierarchical Clustering algorithm on any dataset.
10. Apply DBSCAN clustering algorithm on any dataset.

Course Code	Course Title				Core / Elective		
7PW457ML	SKILL DEVELOPMENT COURSE II				PW		
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
	-	-	-	2	40	60	1

COURSE OBJECTIVES:

The objective of this course is to make the student to

1. Able to identify the basic components of an Android app, such as activities, layouts, and views.
2. Be able to use layouts to arrange your user interface elements in a logical and efficient way.
3. Be able to store data in the app's internal storage, or in a cloud-based storage service.
4. Able to add that feature to an existing Android app.
5. Able to deploy that app to the Google Play Store.

COURSE OUTCOMES:

After the completion of course the students will be able to:

1. Understand the basics of Android development, including the Android Studio IDE, the Android SDK, and the AndroidManifest.xml file.
2. Create an app with multiple activities that can communicate with each other using intents.
3. Create a variety of user interface elements, such as buttons, text fields, and checkboxes.
4. Use layouts to arrange their user interface elements in a logical and efficient way.
5. Understand how to store data in Android apps, using both local and remote storage options.

List of Programs:

1. **Portable Devices Overview**
 - 1.1. Introduction to SW development for portable devices
 - 1.2. Overview of Portable Devices
 - 1.3. HW & SW for Portable Devices
 - 1.4. Applications of Portable Devices
 - 1.5. Portable devices - Understanding HW platforms
 - 1.5.1. HW Platforms (Processors, Peripheral devices, Sensors etc)
 - 1.5.2. HW Platforms – Mobile Phones + Wireless
 - 1.5.3. HW Platforms – Internet of things (IoT) + Wireless
 - 1.5.4. Example - Rasberry Pi
 - 1.5.5. Sensors in Portable devices

1.5.6. Generic HW platforms

2. Overview of SW Platforms & Development

2.1. Mobile OS

2.1.1. Architecture and Framework of different mobile platforms

2.1.2. Development platforms and development tools

2.1.3. Programming languages

2.1.4. Simulator and emulator

2.1.5. SDK and Development Environments

2.1.6. Development Life Cycle of Application

2.2. CREATING APPLICATIONS AND ACTIVITIES

2.2.1. Introducing the Application Manifest File

2.2.2. Creating Applications and Activities

2.2.3. Architecture Patterns (MVC)

2.2.4. Review of other Architecture and Design patterns

2.2.5. The Android Application Lifecycle

3. User Interface Design; Intents and Broadcasts

3.1. Fundamental Android UI Design

3.2. Introducing Layouts

3.3. Introducing Fragments

3.4. Introducing Intents

3.5. Creating Intent Filters and Broadcast Receivers

4. Background Services and Using Internet Resources

4.1. Introducing Services

4.2. Using Background Threads

4.3. Parsing Internet Resources

4.4. Using the Download Manager

4.5. Using Internet Services

4.6. Connecting to Google App Engine

4.7. Best Practices for Downloading Data Without Draining the Battery

5. Files, Saving States and Preferences

5.1. Shared Preferences

5.2. Introducing the Preference Framework and the Preference Activity

5.3. Static Files as Resources

5.4. Working with the File System

6. Database and Content Providers

6.1. Introducing Android Databases

- 6.2. Introducing SQLite
- 6.3. Content Values and Cursors
- 6.4. Working with SQLite Databases
- 6.5. Creating Content Providers
- 6.6. Using Content Providers
- 6.7. Case Study: Native Android Content Providers

7. Location Based Services, Telephony and SMS

- 7.1. Using Location-Based Services
- 7.2. Using the Emulator with Location-Based Services
- 7.3. Selecting a Location Provider
- 7.4. Using Proximity Alerts
- 7.5. Using the Geocoder
- 7.6. Example: Map-based activity
- 7.7. Hardware Support for Telephony
- 7.8. Using Telephony
- 7.9. Introducing SMS and MMS

8. Hardware Support and Devices (AUDIO, VIDEO, AND USING THE CAMERA)

- 8.1. Using Sensors and the Sensor Manager
- 8.2. Monitoring a Device's Movement and Orientation
- 8.3. Introducing the Environmental Sensors
- 8.4. Playing Audio and Video
- 8.5. Using Audio Effects
- 8.6. Using the Camera
- 8.7. Recording Video
- 8.8. Adding Media to the Media Store

TEXTBOOKS

1. Professional Android 4 Application Development, by Reto Meier, WROX Press, Wiley Publishing

REFERENCE BOOKS

1. Android Application Development, Programming with the Google SDK, by, Rick Rogers, John Lombardo, ZigurdMednieks, Blake Meike, SPD, Oreilly, ISBN10: 81-8404-733-9, ISBN13:978-81-8404-733-2
2. Hello Android, Introducing Google's Mobile Development Platform, 3rd Edition, by Ed Burnette, Pragmatic Programmers, LLC. ISBN-10: 1-934356-56-5, ISBN-13: 978-1-934356-56-2