સરદાર પટેલ યુનિવર્સિટી

કોમ્પ્યુટર સાયન્સની અભ્યાસ સમિતિની સભા

નો ટિ સ

કોમ્પ્યુટર સાયન્સની અભ્યાસ સમિતિની સભા **તારીખઃ૨૩/૦૯/૨૦૨૦ ના રોજ સવારના ૧૧.૦૦ કલાકે** યુનિવર્સિટી કાર્યાલયના જુના સિન્ડિકેટ ખંડમાં મળશે.

કા ર્ય સૂ ચિ

૧. તારીખઃ ૨૯/૭/૨૦૧૯ના રોજ મળેલ કોમ્પ્યુટર સાયન્સની અભ્યાસ સમિતિની સભાની કાર્યનોંધને બહાલી આપવા બાબત.

(નોંધઃ-તારીખઃ૨૯/૭/૨૦૧૯ના રોજ મળેલ કોમ્પ્યુટર સાયન્સની અભ્યાસ સમિતિની સભાની કાર્યનોંધ સભ્યશ્રીઓને મોકલી આપવામાં આવી.)

૨. કોમ્પ્યુટર સાયન્સની અભ્યાસ સમિતિના કાર્યક્ષેત્રમાં આવતા વિષયો માટે ચોઈસ બેઇઝ્ડ ક્રેડિટ સિસ્ટમ અનુસાર શૈક્ષણિક વર્ષ ૨૦૨૦-૨૧ માં લેવાનારી તમામ અભ્યાસક્રમના તમામ સેમેસ્ટરની યુનિવર્સિટીની પરીક્ષાઓ માટે પરીક્ષકોની યાદી તૈયાર કરવા બાબત.

૩. કા.વડાશ્રી, અનુસ્નાતક કોમ્પ્યુટર સાયન્સ વિભાગે તેઓના તારીખઃ ૧૫/૯/૨૦૨૦ના પત્ર ક્રમાંકઃ જીડીસીએસટી/૪૫ થી **AICTE** ની માર્ગદર્શિકા અનુસાર હવે એમ.સી.એ. નો અભ્યાસક્રમ બે વર્ષનો થયેલ હોઇ, જૂન-૨૦૨૦ થી એમ.સી.એ.ના પ્રથમ થી ચોથા સેમેસ્ટરનું સ્ટ્રક્ચર તેમજ તેનો અભ્યાસક્રમ બિડાણમાં દર્શાવ્યા મુજબ મંજૂર કરવા કરેલ વિનંતી પર વિચારણા કરવા બાબત.

અધ્યક્ષશ્રીની મંજૂરીથી જે કાંઇ રજૂ થાય તે.

નંબરઃ ડી/એ-૩૩/ ૨૭૦૪ કા. નાયબ કુલસચિવ

વલ્લભ વિદ્યાનગર

તારીખ૧૬/૦૯/૨૦૨૦

પ્રતિઃ

કોમ્પ્યુટર સાયન્સની અભ્યાસ સમિતિના સર્વે સભ્યશ્રીઓ તરફ.

પરીક્ષા વિભાગ તરફ જાણ તથા કોમ્પ્યુટર સાયન્સ અભ્યાસ સમિતિના કાર્યક્ષેત્રમાં આવતા તમામ વિષયોની શૈક્ષણિક વર્ષ ૨૦૨૦-૨૧ માં લેવાનારી યુનિવર્સિટીની પરીક્ષાઓ માટે પરીક્ષકોની યાદી સુધારા અર્થે ચેરમેનશ્રીને મોકલી આપવા સા૩.

નિયામકશ્રી, કોમ્પ્યુટર સેન્ટર તરફ યુનિવર્સિટી વેબસાઇટ(નોટિસ અને સરકયુલર)પર મૂકવા સા૩.

SARDAR PATEL UNIVERSITY
Master of Computer Applications (MCA)
Course Structure
(effective from June 2020)

MCA Course Structure for Semester I

SEMESTER-I					
	PAPER CODE & TITLE	CREDITS	EXT.	INT.	TOT.
Core Courses	**PS01CMCA31 :** Python Programming	**4**	**70**	**30**	**100**
	PS01CMCA32 : Computer Networks	**4**	**70**	**30**	**100**
	PS01CMCA33 : Database Management Systems	**4**	**70**	**30**	**100**
	PS01CMCA34 : Operating Systems	**4**	**70**	**30**	**100**
	PS01CMCA35 : Computer Fundamentals	**4**	**70**	**30**	**100**
	PS01CMCA36 : Practicals based on PS01CMCA33 & PS01CMCA34	**3**	**70**	**30**	**100**
	PS01CMCA37 : Practicals based on PS01CMCA31	**2**	**70**	**30**	**100**
	Total Credits	**25**			

MCA Course Structure for Semester II

SEMESTER-II					
	PAPER CODE & TITLE	CREDITS	EXT.	INT.	TOT.
Core Courses	**PS02CMCA31 :** Object Oriented Programming using Java	**4**	**70**	**30**	**100**
	PS02CMCA32 : Software Engineering	**4**	**70**	**30**	**100**
	PS02CMCA33 : Web Technology	**4**	**70**	**30**	**100**
	PS02CMCA34 : .NET Technology	**4**	**70**	**30**	**100**
	PS02CMCA35 : Practicals based on PS02CMCA31& PS02CMCA33	**3**	**70**	**30**	**100**
	PS01CMCA36 : Practicals based on PS02CMCA34	**2**	**70**	**30**	**100**
Elective Course	**Elective-I**	**4**	**70**	**30**	**100**
	Total Credits	**25**			

Elective-I (Any One)	**PS02EMCA37 :** Cyber Security
	PS02EMCA38 : Data Mining and Data Warehousing
	PS02EMCA39 : Software Testing
	PS02EMCA40 : Embedded Systems & IoT

SARDAR PATEL UNIVERSITY
Master of Computer Applications (MCA)
Course Structure
(effective from June 2020)

MCA Course Structure for Semester III

SEMESTER-III					
	PAPER CODE & TITLE	**CREDITS**	**EXT.**	**INT.**	**TOT.**
Core Courses	**PS03CMCA31 :** Web Application Framework	**4**	**70**	**30**	**100**
	PS03CMCA32 : Mobile Application Development	**4**	**70**	**30**	**100**
	PS03CMCA33 : Artificial Intelligence	**4**	**70**	**30**	**100**
	PS03CMCA34 : Computer Graphics	**4**	**70**	**30**	**100**
	PS03CMCA35 : Practicals based on PS03CMCA31 & PS03CMCA32	**3**	**70**	**30**	**100**
	PS03CMCA36 : Project Work (In-house)	**2**	**70**	**30**	**100**
Elective Course	**Elective-II**	**4**	**70**	**30**	**100**
	Total Credits	**25**			

Elective-II (Any One)	**PS03EMCA37 :** Cloud Computing and Distributed Systems
	PS03EMCA38 : Machine Learning
	PS03EMCA39 : Data Science & Big Data Analytics
	PS03EMCA40 : Advanced Java

MCA Course Structure for Semester IV

SEMESTER-IV					
	PAPER CODE & TITLE	**CREDITS**	**EXT.**	**INT.**	**TOT.**
Core Course	**PS04CMCA31 :** Project Work	**25**	**280**	**120**	**400**
	Total Credits	**25**			

SARDAR PATEL UNIVERSITY
MASTERS OF COMPUTER APPLICATION
(Semester – I) (W.E.F. June, 2020)

COURSE NO: PS01CMCA31 ***w.e.f. June 2020***

PYTHON PROGRAMMING

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To learn the fundamentals of the Python programming language
- Learning to develop procedural as well as object-oriented Python programs
- To learn GUI program development using Python
- Learning how to access files and databases from Python

PREREQUISITES:

- Knowledge of computer fundamentals and basics of logic development

OUTCOMES OF THE COURSE:

- Ability to develop computer programs using the Python programming language
- Knowledge of manipulating different Python data types
- Ability to develop object-oriented programs using Python
- Familiarity with Python package system
- Basic knowledge of GUI programming, file handling and database access in Python

COURSE CONTENT

Unit No.	Course Content
1	**Introduction to Python** – Brief history, key characteristics, – Advantages & Python Application Areas – Syntax overview, comments, naming conventions – Primitive data types, data type constructors – Operators – Console input and output – Control structures
2	**Aggregate Data Types** – Sequence types: lists, tuple, range – Common operations on sequences – Operations on lists

- Using tuples and ranges
- Text sequence type: str
- Operations on strings

3 Composite Data Types, Functions and Exception Handling

- Mapping type : dict
- Set type: set
- Functions
- Exception handling

4 Additional Features of Python

- Object-oriented programming in Python
- File handling in Python
- Modules and packages
- Introduction to GUI applications and database connectivity

MAIN REFERENCE BOOKS:

1. Rao, R. Nageswara : Core Python Programming, 2nd Edition, Dreamtech Press, 2018.
2. Lutz, Mark : Learning Python, 5th Edition, O'Reilly, 2013.
3. Summerfield, Mark : Programming in Python 3: A Complete Introduction to the Python Language, 2nd Edition, Pearson Education, 2018.
4. Guttag, John V. : Introduction to Computation and Programming Using Python, 2nd Edition, The MIT Press, 2016.

ADDITIONAL REFERENCES:

1. Sneeringer, Luke : Professional Python, Wiley, 2015.
2. Sedgewick, Robert, Wayne, Kevin, Dondero, Robert : Introduction to Programming in Python, Addison-Wesley Professional, 2015.

WEB REFERENCES:

1. Python documentation.

COURSE NO: PS01CMCA32 ***w.e.f. June 2020***

COMPUTER NETWORKS

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To understand the basic concepts of computer networks and data communication
- To provide understanding of network protocols and standards

PREREQUISITES:

- Basic knowledge of computer systems

OUTCOMES OF THE COURSE:

- Ability to describe the significance and functioning of computer networks
- Understanding of fundamental concepts related to data communication
- Knowledge on various network protocols and standards

COURSE CONTENT

Unit No.	Course Content
1	**Introduction and Data Communication Fundamentals** – Introduction to computer networks – Classification of computer networks – Transmission media : guided and unguided media. – Functions of network connecting devices: Amplifier, Repeater, Bridge, Hub, Switch, Router, Gateway, Modems – Data transmission concepts : transmission modes, multiplexing, switching technologies, asynchronous and synchronous transmission – Introduction to Local Area Networks (LANs), LAN topologies, – Gigabit Ethernet
2	**Layered Protocols** – Protocols, Protocol hierarchies – Design issues for the layers – The OSI reference model and the TCP/IP reference model – The Internet Protocol (IP), IP addresses, Subnets, – Introduction to Transmission Control Protocol (TCP), The TCP segment header – Introduction to User Datagram Protocol (UDP)
3	**Routing, Congestion Control and Internetworking** – Virtual Circuits and Datagrams – Routing Techniques – Congestion Control

- Introduction and Issues that arise in Internetworking
- Fragmentation
- Tunneling
- Virtual Private Networks

4 Wireless Communication and Network Security

- Introduction to Wireless Networks
- Satellite Communication (LEO, MEO, GEO)
- Wireless LAN protocols
- Introduction to Mobile Telephone Systems, Cell Fundamentals
- Traditional Cryptography, Substitution Cipher vs Transposition Cipher, Fundamental Cryptographic Principles
- Secret-Key Algorithms vs Public-Key Algorithms
- Firewalls

MAIN REFERENCE BOOKS:

1. Tanenbaum A. S.: Computer Networks, Prentice-Hall of India Pvt. Ltd., New Delhi, 2002.(5th Edition 2019).
2. Forouzan B. A.: Data Communications and Networking, 5th Edition, Tata McGraw-Hill, 2013.

ADDITIONAL REFERENCES:

1. Stallings W.: Data and Computer Communications, 10th Edition, Macmillan Pub. Company, New York, 2014.

COURSE NO: PS01CMCA33 *w.e.f. June 2020*

DATABASE MANAGEMENT SYSTEM

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To understand the basic concepts of Database and its components
- To learn data types &usage of database functions
- To understand the concept of Normalization and De-Normalization
- To learn Database programming concepts

PREREQUISITES:

- Knowledge of record keeping concepts
- Basic knowledge of computer systems
- Basic concepts of mathematics

OUTCOMES OF THE COURSE:

- Ability to understand concepts of Database and gain the knowledge of the Database normalization
- Knowledge of database operations
- Professional Expertise in SQL & PL/SQL Programming

COURSE CONTENT

Unit No.	Course Content
1	**Introduction** – Database Management System (DBMS) Concepts – Relational Database Model – Codd rules – The Entity-Relationship (ER) Model – Concepts of Data Independence, Data Sharing, Data Integrity, – Data Protection, System Catalog – Users associated with database systems and their roles – Normalization and De-Normalization
2	**Structured Query Language (SQL)** – Introduction to SQL – SQL sublanguages – DDL, DML, DCL – Basic data types – SQL statements: Create, Select, Insert, Delete, Update etc. – Database constraints – Built-in functions

3 SQL and PL/SQL

- Sub queries
- Joins and its types
- Set operations
- Database objects: View, Index, Sequence, Synonym etc.
- PL/SQL – introduction and its features
- PL/SQL block structure
- Control structures

4 Advanced PL/SQL

- Exception handling
- Cursors
- Stored procedures and stored functions
- Database triggers
- Packages

MAIN REFERENCE BOOKS:

1. Ivan Bayross, SQL, PL/SQL The Programming Language of Oracle, BPB Publications.
2. Oracle Press, Oracle 9i: A Beginner's Guide, TMH – Edition.
3. Elmasri & Navathe: Fundamentals of Database Systems, 7th Edition, Pearson Education, 2016.
4. Desai, Bipin C. : An Introduction to Database Systems, Galgotia Publication Pvt. Ltd., 2005.
5. Groff and Weinberg : The complete reference SQL, 3rd Edition, Tata McGraw Hill, 2010

ADDITIONAL REFERENCES:

1. Feuerstein and Pribyl. : Oracle PL/SQL Programming, 5th Edition, O'Reilly, 2009.
2. Date C. J. :An Introduction to Database Systems, 8th Edition, Pearson Education, 2004.
3. Silberschatz, Korth, Sudarshan : Database System Concepts, 6th Edition, McGraw Hill International, 2010.
4. Dillon, Beck and Kyte : Beginning Oracle Programming, Apress, 2004.

COURSE NO: PS01CMCA34 *w.e.f. June 2020*

OPERATING SYSTEMS

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To provide basic understanding of the role and functioning of an operating system
- To introduce Linux shell environment and programming

PREREQUISITES:

- Basic knowledge of computer systems

OUTCOMES OF THE COURSE:

- Ability to describe the role and functioning of an operating system
- Understanding of fundamental concepts related to operating systems
- Knowledge of process, memory and file system management
- Familiarity with Linux command line environment
- Knowledge of basic Linux commands
- Ability to develop Linux shell scripts

COURSE CONTENT

Unit No.	Course Content
1	**Introduction to Operating Systems** – Understanding the role of operating systems – Operating system services – Operating system structure – The concepts of interrupt handling, system call, shell, operating system interface – Virtual machines – Linux Bash shell programming fundamentals – Command-line processing – Bash shell variables, control structures – input, output, integer arithmetic, string operations
2	**Process Management** – The concept of a process – Scheduling of processes – Interprocess communication – Multithreading: concepts, advantages, models – Schedulers: long term, middle term, short term – CPU scheduling: criteria and algorithms – Multiprocessor scheduling

- Introduction to process synchronization
- The critical section problem and Peterson's solution
- The concepts of semaphores and monitors
- Introduction to deadlocks

3 Memory Management and File Systems

- Basic concepts of memory management
- Paging
- Segmentation
- Virtual memory, demand paging
- Page replacement
- Introduction to file system management and directory structure
- File system mounting
- Disk scheduling

4 Linux Shell Programming

- The vim editor
- File system manipulation commands
- I/O redirection
- Regular expressions
- Basic filters
- The sed and awk commands

MAIN REFERENCE BOOKS:

1. Silbetschatz, Galvin, Gagne: Operating System Concepts, 8th edition, John Wiley and Sons, Inc., 2008
2. Kochan S. G., Wood, P. : Unix Shell Programming, 4th edition, Addison Wesley, 2016
3. Das S. : UNIX and Shell Programming, Tata McGraw-Hill Education, 2008

ADDITIONAL REFERENCES:

1. Nutt G. : "Operating Systems" : 3rd Edition, Pearson Education, 2004
2. Tanenbaum A. S., Woodhull A.S. : "Operating Systems Design and Implementation", 3rd edition, Prentice Hall, 2006
3. Shotts W. : "The Linux Command Line: A Complete Introduction Illustrated Edition", 2nd Edition, No Starch Press, 2019

COURSE NO: PS01CMCA35 *w.e.f. June 2020*

COMPUTER FUNDAMENTALS

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To provide basic understanding of logical organization and architecture of a computer
- To introduce fundamental concepts related to gates and logic circuits used in a digital computer
- To impart fundamental knowledge on various data structures

PREREQUISITES:

- Basic familiarity with computer systems

OUTCOMES OF THE COURSE:

- Understanding of fundamental concepts related to organization of a computer system
- Understanding of the fundamental concepts related to gates and logic circuits used in a digital computer
- Fundamental knowledge on different data structures

COURSE CONTENT

Unit No.	Course Content
1	**Introduction and Processor Organization** – Block diagram of a simple computer and its different functional units – Representation of information: integer & floating-point number representation, character codes – Error detection and correction codes – CPU organization – Instruction execution – Instruction-level parallelism: pipelining, superscalar architectures – Processor-level parallelism: array processors, multiprocessors, multicomputers – Microprocessor chips, Architecture of a typical microprocessor – RISC Vs. CISC
2	**Memory, Input/Output, Instruction Formats and Flow of Control** – Memory: main memory, secondary memory, types & organization – Input/Output: common types of I/O devices, Controllers – Design criteria for instruction formats – Addressing techniques, Instruction types – Traps & Interrupts

3 Gates and Basic Logic Circuits

- Gates, Boolean algebra, Truth tables
- Circuit equivalence, De Morgan's theorems
- Combinational circuits
- Arithmetic circuits
- Latches, Flip flops
- Introduction to Registers and Counters

4 Introduction to Data Structures

- Primitive and composite data types
- Arrays, stacks, queues, linked lists
- Binary trees, B-trees
- Hashing techniques
- Linear Search, Binary Search
- Bubble Sort

MAIN REFERENCE BOOKS:

1. Tanenbaum A. S. : Structured Computer Organization, 3rd Edition, Prentice-Hall of India Pvt. Ltd., 1993. (Tanenbaum A. S and T Austin, Structured Computer Organization, Pearson, 6th Edition, 2016).
2. Malvino A. P.: Digital Computer Electronics, 2nd Edition, 3rd Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 2017.
3. Tremblay J. & Sorenson P. G. : An Introduction to Data Structures with Applications, 2nd Edition, McGraw-Hill International Edition, 2017.

ADDITIONAL REFERENCES:

1. Hall Douglas V. : Microprocessors and Interfacing - Programming and Hardware., McGraw Hill Book Company, 3rd Edition, 2017.
2. Gothmann, William H. : Digital Electronics - An Introduction to Theory and Practice, 2nd Edition,PHI,1982.
3. Singh Bhagat & Naps Thomas : Introduction to Data Structures, Tata McGraw-Hill Publishing Co. Ltd.,1985.
4. M.M. Mano : Computer System Architecture, 3rd Edition, Pearson Education, 2000.

COURSE NO: PS01CMCA36 *w.e.f. June 2020*

PRACTICALS BASED ON PS01CMCA33 & PS01CMCA34

COURSE NO: PS01CMCA37 *w.e.f. June 2020*

PRACTICALS BASED ON PS01CMCA31

SARDAR PATEL UNIVERSITY
MASTERS OF COMPUTER APPLICATION
(Semester – II) (W.E.F. June, 2020)

COURSE NO: PS02CMCA31 ***w.e.f. June 2020***

OBJECT ORIENTED PROGRAMMING USING JAVA

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To learn computer programming using the Java programming language and the Java Platform, Standard Edition (Java SE)
- To learn the fundamentals of object-oriented programming
- Learning to write object-oriented programs in Java
- Knowledge of important features of the Java SE platform
- Learning to develop graphical and database programs using Java

PREREQUISITES:

- Knowledge of computer fundamentals and basics of computer programming

OUTCOMES OF THE COURSE:

- Ability to develop computer programs using the Java programming language and the Java SE platform
- An understanding of fundamental object-oriented programming concepts
- Ability to develop object-oriented software in Java
- Knowledge of multithreading, file handling and network programming in Java
- Ability to develop GUI programs in Java
- Knowledge of database access in Java using JDBC

COURSE CONTENT

Unit No.	Course Content
1	**Introduction to Java** – The Java programming language: history, evolution, features – Introduction to the Java programming environment, JDK, JRE – Introduction to the IDE – Data types and wrapper classes, operators – Control structures – String handling – Basic Input-output

2 Introduction to Object-oriented Programming

- Basic concepts of object-oriented programming
- Classes, instances, methods
- Static and non-static members
- Packages
- Inheritance and polymorphism, method overriding
- Final and abstract classes, abstract methods
- Interfaces
- Generics, enumeration
- Inner classes and anonymous classes
- Class loaders, class path

3 More Features of the Java Platform

- Exception handling
- Input-output and file handling
- The collections framework and handling classes in it
- Introduction to the java.util package
- Multithreading
- Introduction to network programming
- Introduction to lambda expressions and serialization

4 Developing Graphical Programs and Database Access

- An introduction to graphics in Java
- Brief introduction to AWT
- The Swing library
- Writing graphical programs using Swing
- Using various Swing components
- Managing layout using Swing
- Event handling using Swing
- Introduction to JDBC
- Different types of JDBC drivers
- Programming database applications using JDBC

MAIN REFERENCE BOOKS:

1. Schildt H. : Java: The Complete Reference, 9th Edition, McGraw-Hill Education, 2017.
2. Deitel P., Deitel, H. : Java: How to Program: Early Objects, 11th Edition, Pearson Education, 2018.
3. Rao, R. N.: Core Java: An Integrated Approach, New Edition, Dreamtech Press, 2008.

ADDITIONAL REFERENCES:

1. Horstmann C. : Core Java Volume I – Fundamentals, 11th Edition, Prentice Hall, 2018.
2. Horstmann C. : Core Java, Volume II – Advanced Features, 11th Edition, Prentice Hall, 2018.

WEB REFERENCES:

1. Java SE API Documentation.
2. The Java™ Tutorials.

COURSE NO: PS02CMCA32 ***w.e.f. June 2020***

SOFTWARE ENGINEERING

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To learn development of feasible and reliable software products for solving real life problems
- To learn process understanding and flow of process
- To acquire skills and knowledge for upgrading analytic, communication and technical skills
- To learn the methodology required for software development
- To learn the process of improving the quality of software work products

PREREQUISITES:

- Knowledge of process understanding, communication and problem solving concepts

OUTCOMES OF THE COURSE:

- An ability to apply engineering design to produce economical software solutions that satisfy needs of end users
- An ability to communicate effectively with stakeholders of software development
- An ability to develop and conduct appropriate experimentation, analyze and interpret data

COURSE CONTENT

Unit No.	Course Content
1	**Introduction** – Software – meaning and applications – Software Engineering – meaning, goal, challenges and approach – Software Process – Software Development Process Models – waterfall, prototyping, iterative, time boxing and spiral – Introduction to Agile Computing – Agile Software Development Approaches (Scrum, eXtreme – Programming, Feature Driven Development, Dynamic Driven Development) – Collaborative User Story Creation, Retrospectives, Continuous Integration, Release and Iteration Planning
2	**Software Requirement Analysis and Project Management** – Software Development Life Cycle (SDLC) – Software Requirements Specification (SRS) – Need, Process, Problem Analysis, Requirement Specifications, structure and components, Functional Specifications using Use Cases

- Software Project Management : Project Planning, various issues addressed in Project Planning, Effort Estimation
- Work Breakdown Structure (WBS)

3 Software Design

- Design – meaning, types
- Design approaches - function-oriented design (introduction), object-oriented design
- Design Concepts for Object-oriented design - information hiding, functional independence, refinement, refactoring and design classes
- Object Modeling using UML – Overview, Diagrams – class, sequence, collaboration, use-case, activity, state chart

4 Coding and Testing

- Coding – meaning, process, programming standards and guidelines, refactoring, verification, metrics
- Testing – meaning, importance and process
- Testing fundamentals – error, fault, bug, failure, test oracles, test cases and test criteria
- Introduction to Black-box (functional) testing and White-box (structural) testing
- Comparison of Black-box and White-box testing
- Alpha testing and Beta testing

MAIN REFERENCE BOOKS:

1. Jalote Pankaj : Pankaj Jalote's Software Engineering: A Precise Approach, Wiley India Pvt. Ltd. Reprint 2012.
2. Roger S. Pressman : Software Engineering, A Practice Approach, 6th Edition, Mc-Graw Hill International Edition, Fifth Reprint 2012.
3. Rajib Mall : Fundamentals of Software Engineering, 2nd Edition, Prentice-Hall of India, 2006.
4. "Head First Agile", Andrew Stellman & Jennifer Greene, O'Reilly Media Inc., 2017.

ADDITIONAL REFERENCES:

1. Ian Sommerville : Software Engineering, 9th edition, Pearson Education, 2011.
2. Waman S Jawadekar, Software Engineering Principles and Practice, 2nd Reprint,Tata McGraw Hill, 2008.

COURSE NO: PS02CMCA33 *w.e.f. June 2020*

WEB TECHNOLOGY

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To learn the fundamentals of how the World Wide Web works
- To learn the basic protocols and standards of the World Wide Web
- To learn design and development of websites and web-based applications using HTML5, CSS3 and JavaScript
- To learn to develop dynamic database-driven websites using PHP

PREREQUISITES:

- Fundamental knowledge of computer networks
- Knowledge of computer programming

OUTCOMES OF THE COURSE:

- Knowledge of the fundamentals of how the World Wide Web works
- Knowledge of the basic protocols and standards of the World Wide Web
- Ability to design and develop web pages using HTML5 and CSS3
- Knowledge of JavaScript and client-side web development
- Ability to create HTML forms
- Knowledge of PHP
- Ability to carry out server-side web development using PHP
- Ability to create dynamic website utilizing data from a database
- Knowledge of state management and implementation of basic security in a website or web application

COURSE CONTENT

Unit No.	Course Content
1	**Client-side Web Technologies - I** – Introduction to HTTP and HTML5 – URL format – HTML5 document structure – Headers, body, declarations – Elements, element ID, name, attributes, events – HTML5 media – Forms – HTTP Verbs – Introduction to the DOM – Introduction to CSS3

- CSS3 Syntax
- Different properties, values and units
- Specifying colors

2 Client-side Web Technologies - II

- CSS3 selectors, classes
- CSS3 precedence rules
- Introduction to media query
- Introduction to JavaScript
- JavaScript syntax
- Variables: declaration, data type
- Strings, numbers, arrays
- Operators
- Functions
- Variable scope
- Event handling
- Client-side form validation
- DOM access and manipulation from JavaScript
- Built-in objects

3 Server-side Web Development Using PHP – I

- Introduction to server-side scripting
- Introduction to PHP
- Data types, variables, constants, operators
- Flow Control and looping
- Strings, arrays, functions
- Regular expressions, server-side input validation
- Superglobals
- Headers
- Handling file uploads
- Maintaining state: sessions, cookies, query parameters, hidden fields
- File handling

4 Server Side Web Development Using PHP – II

- Introduction to MySQL
- Database Connectivity in PHP
- Exception handling
- Security - authentication and authorization
- Handling special characters in input
- SQL injection attacks and prevention
- Introduction to object-oriented programming with PHP

MAIN REFERENCE BOOKS:

1. John Dean, "Web Programming with HTML5, CSS, and JavaScript", Publisher(s): Jones & Bartlett Learning, 2018, ISBN: 9781284091809.
2. Robin Nixon, Learning PHP, MySQL, JavaScript, CSS & HTML5, O'Reilly, 2014.
3. Time Converse and Joyce Park with Clark Morgan, PHP5 and MySQL Bible – Wiley Publishing Inc., First Edition, 2004, ISBN 81-265-0521-4.
4. Steve Suehring Tim Converse Joyce Park: PHP6 and MySQL Bible - Wiley Publication, 2009.

ADDITIONAL REFERENCES:

1. Elizabeth Naramore, Beginning PHP5, Apache, MYSQL web Development, Wiley Publishing Inc.
2. Danny Goodman, Machael Morrison , "JavaScript Bible", 3rd edition.

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1. HTML documentation.
2. CSS documentation.
3. JavaScript documentation.
4. PHP documentation.

COURSE NO: PS02CMCA34 *w.e.f. June 2020*

THE .NET TECHNOLOGY

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To learn .NET Environment and its technologies
- To learn development skill in Window-based Programming and Web-based programming
- To learn C#.NET and ASP.NET
- To learn OOPs concept using C#.NET
- To learn database programming and report generation

PREREQUISITES:

- Knowledge of Programming

OUTCOMES OF THE COURSE:

- An ability to understand and use .NET Framework
- An ability to use IDE
- An ability to develop various kinds of Window-based applications and web-based applications
- An ability to use ADO.NET and Reporting facility

COURSE CONTENT

Unit No.	Course Content
1	**The .NET Technology** – Introduction to .NET Framework – Architecture of .NET framework – BCL (Base Class Library), CLR (Common Language Runtime), etc. – .NET Languages – introduction, Types of applications supported by .NET Technology – Managed code, compilation to intermediate language, Just-In-Time compilation, garbage collection, assemblies and the GAC
2	**Language basics** – C#.NET – Introduction and features – General structure of C#.NET program – C#.NET – basic data types, variables, constants, type conversion - boxing and unboxing – C#.NET – statements (conditional and looping) – Console Applications, Windows Applications - Windows Forms and Life Cycle – User interface controls - Basic Controls, Dialog controls, Menu control

3 ASP.NET - I

- Introduction to ASP.NET
- ASP.NET Web Application Project – introduction, creation
- ASP.NET Web form - introduction, creating web forms
- ASP.NET Page – layout, lifecycle
- ASP.NET Controls - adding server controls to a Web Form, adding event procedures to Web Server Controls, Implementing code-behind pages
- Master Pages, themes and skins

4 ASP.NET - II

- Accessing Data with ADO.NET
- Validating user input – validation controls, page validation
- Site Navigation, Personalization
- State Management
- Reporting
- Web Services – overview, creation and calling
- Packaging and Deploying ASP.NET Applications

MAIN REFERENCE BOOKS:

1. Andrew Troelsen, Philip Japikse, : C# 6.0 and the .NET 4.6 Framework, Apress, 2017.
2. Black Book: .NET 4.5 Programming (6-in-1) covers .NET 4.5 Framework, Visual Studio 2012, C# 2012, ASP.NET 4.5, VB 2012, and F# 3.0, Dreamtech Press, 2013.
3. Bill Evjen, Scott Hanselman, Devin Rader: Professional ASP.NET 4.5, Wiley India Pvt. Ltd., 2010.
4. Matthew MacDonald: Beginning ASP.NET 4.5 in C#, Apress, 2013.

ADDITIONAL REFERENCES:

1. Joseph Albabari, Ben Albabari: C# 4.0 in a Nutshell, O'Reilly.
2. Documentation of relevant software packages.
3. G. Andrew Duthie, "ASP.NET programming with Microsoft Visual C#.NET Step by Step", version 2003, Prentice-Hall of India.

COURSE NO: PS02CMCA35 *w.e.f. June 2020*

PRACTICALS BASED ON PS02CMCA31 & PS02CMCA33

COURSE NO: PS02CMCA36 *w.e.f. June 2020*

PRACTICALS BASED ON PS02CMCA34

COURSE NO: PS02EMCA37 ***w.e.f. June 2020***

CYBER SECURITY

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- Understanding of the concepts of Cyber crimes, cyber security
- Learning how to avoid becoming victims of cyber crimes
- Preparing for a platform to the students who wish to seek career or research in cyber security
- Acquiring knowledge of security risk related to data and information
- Understanding of the tools and methods to protect systems from cyber attacks

PREREQUISITE:

- Basic knowledge of computer networking

OUTCOMES OF THE COURSE:

- Ability to understand cyber security concepts
- Knowledge of latest security issues and solutions
- Expertise in cyber security

COURSE CONTENT

Unit No.	Course Content
1	**Introduction to Cybercrime** – Cybercrime : Definition And Origins Of The World – Cybercrime And Information Security – Who Are Cybercriminals? – Classifications Of Cybercrimes – Cybercrime: The Legal Perspectives – Cybercrimes: An Indian Perspectives – Cybercrime And The Indian ITA-2000 – Cyber Offenses: How Criminals Plan The Attacks – Social Engineering – Cyberstalking – Botnets
2	**Tools and Methods Used in Cybercrime** – Password Cracking – Key Loggers And Spywares – Virus And Worms – Trojan Horses And Backdoors

- DoS And DDoS Attacks
- SQL Injection
- Buffer Overflow
- Phishing
- Identity Theft
- Networking Commands

3 Cryptography

- Security Services: Confidentiality, Authentication, Integrity,
- Non-repudiation, Access Control, Availability
- Symmetric Key Algorithms (DES & AES)
- Asymmetric Key Algorithms (RSA)
- Digital Signature & Message Digest
- Digital Certificate

4 Computer Forensics & Forensics of Hand-Held Devices

- The Need For Computer Forensics
- Digital Forensics Life Cycle
- Forensics And Social Networking Sites: The Security/Privacy
- Threats
- Technical Challenges In Computer Forensics
- Hand-Held Devices And Digital Forensics
- Forensic Tools

MAIN REFERENCE BOOKS:

1. Nina Godbole, SunitBelpure, "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley, 1st Edition, 2011.
2. Andrew S Tanenbaum, David. J. Wetherall, "Computer Networks", Pearson Education, 5th Edition, 2011.

ADDITIONAL REFERENCES:

1. Bruce Schneier Applied Cryptography: Protocols, Algorithms, and Source Code in C, 20th Anniversary Edition, John Wiley & Sons, 2015.
2. Behrouz A. Forouzan, "Cryptography and Network Security", TMH, 2nd Edition, 2007.
3. WilliamStallings,Network Security Essentials Applications and Standards,Pearson, 5th Edition, 2014.
4. Charles P. Pfleeger; Shari LawrencePfleeger, Security in Computing, Prentice Hall,, Fifth Edition, 2015.
5. Mike Shema, Anti-Hacker Tool Kit (Indian Edition), Mc Graw Hill, 2014.

COURSE NO: PS02EMCA38 ***w.e.f. June 2020***

DATA MINING AND DATA WAREHOUSING

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To understand the need of Data Warehouses, and the difference between usage of operational and historical data stores
- To be able to differentiate between query tools & Data Mining tools
- To understand the architecture of a Data Warehouse and the need for preprocessing

PREREQUISITES:

- Knowledge of Database Management Systems

OUTCOMES OF THE COURSE:

- Ability to create a Starflake schema for a given Data Warehousing requirements
- Ability to apply pre-processing on existing operational & historical data for creation of Data warehouse
- Ability to perform data mining

COURSE CONTENT

Unit No. **Course Content**

1 Data Warehousing and Data Mining - Introduction

- Data warehouse introduction
- Characteristics of data warehouse
- Data warehouse delivery method
- Data mining introduction
- Introduction and comparison of OLTP and OLAP
- Three Data Warehouse Models:
  - Enterprise Warehouse
  - Data Mart
  - Virtual Warehouse

2 Data Warehouse Architecture

- System Process - Process flow within an data warehouse
  - Extract and Load Process
  - Clean and Transform data
  - Backup and Archive Process
  - Query Management Process
- Process Architecture

- Load and Warehouse Manager
- Query Manager
- Detailed and Summary Information
- Metadata

3 Database Design – Logical

- Database Schema – Starflake
- Partitioning strategy
- Aggregations
- Data Marting technique
- Metadata
- System and Data Warehouse Process Manager

4 Data mining rules

- Basics of Data Mining
- Operating Data Warehouse
- Data mining Vs Query tools
- Data Learning
- Benefits of data mining
- Basics of Supervised & Unsupervised Learning
- Difference between Classification & Prediction
- Introduction to Association Rule Mining
- Apriori Algorithm
- Examples of Enterprise Data Mining Applications

MAIN REFERENCE BOOKS:

1. S. Anahory & D. Murray: Data Warehousing in the real world – Addison Wesley, 2002.
2. R. Kinball: Data Warehouse Toolkit – John Wiley & Sons, 3rd edition.
3. R. Kinball, L.Reeves : The Data Warehouse Lifecycle Toolkit – John Wiley & Sons.
4. Pieter Adriaans, Dolf Zantinge, "Data Mining", Addison Wesley, 1996.

ADDITIONAL REFERENCE:

1. G.K. Gupta , " Introduction to Data Mining with Case Studies", PHI, 3rd edition.
2. Paulraj Ponniah, "Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals", Wiley-India.
3. A B M Shawkat Ali, Saleh A. Wasimi, " Data Mining : Methods and Techniques", Cengage Learning.
4. Daniel T. Larose, "Data Mining Methods & Models", Wiley-India.

COURSE NO: PS02EMCA39 ***w.e.f. June 2020***

SOFTWARE TESTING

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To understand software testing process
- To perform testing activities using modern software tools
- To prepare test plans and schedules for testing software projects
- To understand the criteria for test case design
- To understand structural and functional testing and its types
- To understand the testing complexity

PREREQUISITES:

- Knowledge of computer software and its development process

OUTCOMES OF THE COURSE:

- An ability to perform effective software testing
- An ability to design effective test cases
- An ability to perform test management
- An ability to perform structural and functional testing
- An ability to reduce testing time and testing complexity

COURSE CONTENT

Unit No.	Course Content
1	**Basics of Software Testing** – Introduction and need of testing – Basic concepts in testing – Levels of testing – Testing process – Software Testing Life Cycle Model
2	**Functional Testing and Structural Testing** – Introduction – Functional (Black Box) testing : Meaning, Techniques - Boundary Value Analysis, Equivalence Class Partitioning, Decision Table Based Testing, Cause-Effect Graphing – Structural (White Box) testing : Meaning, Techniques - Control Flow Testing, Data Flow Testing, Slice Based Testing, Mutation Testing – Black-box Testing Vs. White-box Testing

3 Test Cases

- Test cases – meaning, typical test case parameters, examples
- Test case selection criteria
- Test case design techniques, Test suite
- Generating test cases
- Automated test data generation

4 Testing Tools

- Introduction to testing tools, examples of popular testing tools
- Advantages and disadvantages of using testing tools
- Types of testing tools
- Open source software testing tools

MAIN REFERENCE BOOKS:

1. Software Testing - A Craftsman's Approach Paul C. Jorgensen, Third Edition Auerbach Publications, 2013.
2. Software Testing YOGESH SINGH Cambridge University Press, First Paper Edition 2012.

ADDITIONAL REFERENCES:

1. Software Quality and Testing By S. A. Kelkar, Prentice Hall of India, 2012.
2. Software Testing : Principles, Techniques and Tools, M G LIMAYE Tata McGraw-Hill Education Pvt. Ltd., 2011.

COURSE NO: PS02EMCA40 *w.e.f. June 2020*

EMBEDDED SYSTEMS AND IoT

(3 Lectures & 1 Seminar/Tutorial per Week Total Marks: 100)

LEARNING OBJECTIVES:

- To learn the fundamentals of embedded systems
- To understand the concepts, techniques, characteristics and applications of Internet of Things
- To gain an understanding of developing small/medium sized IoT projects using AVR, Arduino and other components
- To gain an understanding of developing IoT projects using the Raspberry Pi

PREREQUISITES:

- Knowledge of computer programming
- Knowledge of the Python programming language

OUTCOMES OF THE COURSE:

- Understanding of the fundamentals of embedded systems
- Knowledge of the definition, characteristics and applications of Internet of Things
- Familiarity with the hardware elements of IoT and the communication protocols commonly used with IoT
- Understanding of working with sensors, actuators and other devices
- Appreciation of security and privacy issues with IoT
- Basic knowledge of developing AVR/Arduino based IoT projects
- Basic knowledge of developing Raspberry Pi based IoT projects

COURSE CONTENT

Unit No.	Course Content
1	**Introduction to Embedded Systems** – An introduction to embedded systems – Types and applications of embedded systems – The embedded system constraints: processing constraints, memory constraints, input/output constraints, response time constraints, predictability/reliability constraints – Processing units: microprocessors, microcontrollers, SoCs, ASICs, DSPs, FPGAs, etc. – Unique characteristics of embedded systems programming

2 Introduction to Internet of Things

- Definition and characteristics of Internet of Things (IoT)
- Applications of IoT in various domains
- Hardware elements of IoT and their characteristics
- Communication protocols commonly used with IoT
- Sensors, actuators and other devices employed in IoT
- Security and privacy concerns in IoT

3 Development of Small/Medium Sized IoT Projects

- Introduction to AVR microcontollers
- Introduction to the Arduino
- Interfacing with the Arduino
- Arduino shields
- Arduino programming and the Arduino IDE
- Wireless control and communications with the Arduino

4 Development of IoT projects using the Raspberry Pi

- Introduction to the Raspberry Pi
- Installing operating system and software on the Raspberry Pi
- Interfacing with the Raspberry Pi
- Raspberry Pi hats
- Developing projects using the Raspberry Pi

MAIN REFERENCE BOOKS:

1. Prasad, K. V. K. K.: Embedded / Real-Time Systems – Concepts, Design & Programming Black Book, New Edition, Dreamtech Press, 2009.
2. Bahga, A., Madisetti, V.: Internet of Things – A Hands-on Approach, Universities Press, 2014.
3. Hoile C., et al.: Make – Raspberry Pi and AVR Projects, MakerMedia, 2014.
4. Margolis, M.: Arduino Cookbook, O'Reilly, 2nd Edition, 2011.
5. Halfacree, G.: The Official Raspberry Pi Beginner's Guide, Raspberry Pi Press, 2018.

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1. Hughes, J. M.: Arduino – A Technical reference, O'Reilly (SPD), 2017.
2. Monk, S.: Raspberry Pi Cookbook, O'Reilly (SPD), 2014.
3. Richardson, M., Wallace, S.: Make – Getting Started with Raspberry Pi, 2nd Edition, MakerMedia, 2015.

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1. Embedded Systems, Wikibook, https://en.wikibooks.org/wiki/Embedded_Systems .
2. The Official Raspberry Pi Beginner's Guide (online), https://www.raspberrypi.org/magpi-issues/Beginners_Guide_v1.pdf .
3. The Official Raspberry Pi Projects Book (online), https://www.raspberrypi.org/magpi-issues/Projects_Book_v1.pdf .