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.

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.

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.

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

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