

F.Y.B.Sc. Computer Science Syllabus
Credit Based System and Grading System
Academic year 2023-2024
SEMESTER - I

CODE	COURSE TYPE	SUBJECT	SCHEME OF INSTRUCTION		SCHEME OF EXAMINATION				NO. OF CREDITS
			(PERIOD PER WEEK)		(MAX MARKS)				
			TH	LAB	CIA	SEE	Practical	TOTAL	
CS 101	Major	Introduction to Database Management System	3	1	30	45	25	100	4
IT101	Minor	Operating System	3	1	30	45	25	100	4
CS102	General Elective/OE	Computer Hardware and Networking	3	1	30	45	25	100	4
CS103	VSC	Discrete mathematics	2	-	20	30	-	50	2
CS104	SEC	Basic Python Programming-I	-	2	-	-	50	50	2
	AEC	English/Marathi	2	-	20	30	-	50	2
IKS101	IKS	IKS	2	-	20	30	-	50	2
	VEC	SDP	2	-	20	30	-	50	2
	CC		2	-	20	30	-	50	2
TOTAL							600		24

SEMESTER - II

CODE	COURSE TYPE	SUBJECT	SCHEME OF INSTRUCTION		SCHEME OF EXAMINATION				NO. OF CREDITS
			(PERIOD PER WEEK)		(MAX MARKS)				
			TH	LAB	CIA	SEE	Practical	TOTAL	
CS151	Major	Fundamentals of Data Structures	3	1	30	45	25	100	4
IT151	Minor	Object Oriented Programming with C++	3	1	30	45	25	100	4
CS152	General Elective/OE	Digital Marketing Fundamentals	3	1	30	45	25	100	4
CS153	VSC	Descriptive statistics	2	-	20	30	-	50	2
CS154	SEC	Basic Python Programming-II	-	2	-	-	50	50	2
	AEC	English/Marathi	2	-	20	30	-	50	2
	IKS	IKS	2	-	20	30	-	50	2
	VEC	SDP	2	-	20	30	-	50	2
	CC		2	-	20	30	-	50	2
TOTAL							600		24

Course: CSC S101	Introduction to Database Management System (Credits : 3 Lectures/Week: 3)	Lectures
<p>Expected Learning Outcomes:</p> <ol style="list-style-type: none"> 1. Describe the features of database management systems. 2. Differentiate between database systems and file systems. 3. Conceptual modeling tools like ER diagrams and design database schemas based on the conceptual model. 4. Explain Relational data model & Relational Algebra ,functions,join ,subqueries 5. Normalize a given database schema. 6. Designa queries in SQL. 		
Unit I	<p>Introduction: Introduction to database, relational data model, DBMS architecture, data independence and data abstraction, DBA, database users, end users, front end tools</p> <p>Data Modelling: Entity types, entity set, attribute and key, relationships, relation types, ER diagrams, database design using ER diagrams</p>	12 L
Unit II	<p>Relational Data Model: Relational model concepts, relational constraints, primary and foreign key, candidate key, alternate, composite, super-key.</p> <p>Data redundancy, Normalization: 1NF, 2NF, 3NF.</p>	12L
Unit III	<p>Structured Query Language: Introduction to SQL, concepts of Data Definition Language (DDL),constraints and Data Manipulation Language (DML), DDL queries like create a database, drop a database, create table, drop table, alter table, DML queries like inserting data in a table, update in a table, delete data from a table, filter data, views.</p> <p>Structured Query Language (continued.): Create relationships between database tables, auto increment, check, Null values, aggregate functions - min, max, count, average, sum, nested sub-queries, group by, having, exists, case, order by.</p> <p>Join operations - inner, left join, right join, natural join and Cartesian product. Subqueries – subqueries with IN, EXISTS, subqueries restrictions, Nested subqueries, ANY/ALL clause, correlated subqueries</p>	12L
<p>Textbook(s): 1. “Fundamentals of Database System”, ElmasriRamez, NavatheShamkant, Pearson Education, Seventh edition, 2017.</p> <p>2. “Database Management Systems”, Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, 2014 .</p> <p>3.“Murach's MySQL”, Joel Murach, 3rd Edition, 3rd Edition, 2019</p> <p>Additional Reference(s):</p> <ol style="list-style-type: none"> 1. “Database System Concepts”, Abraham Silberschatz, HenryF.Korth, S.Sudarshan, McGraw Hill, 2017 2. 2. “MySQL: The Complete Reference”, VikramVaswani , McGraw Hill, 2017 3. “Learn SQL with MySQL: Retrieve and Manipulate Data Using SQL Commands with Ease”, AshwinPajankar, BPB Publications, 2020. <p>Links:</p> <p>https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/</p> <p>https://www.auhd.site/upfiles/elibrary/Azal2020-01-22-12-28-11-76901.pdf</p>		

Sr. No.	Problems of CS101 Practical (Credits : 1 Lectures/Week: 2)
1	To execute and verify the Data Definition Language commands
2	To execute and verify the constraints
3	To execute and verify the DML Language commands
4	To execute and verify the TCL Language commands
5	To execute and verify the SQL commands for Views
6	To study and verify the SQL set operator
7	To solve Advanced query on given table
8	To study and verify the GROUP BY operator
9	To study and verify the join operator
10	To solve subquery on given table

Course:CS iIT 101	Operating System (Credits : 3 Lectures/Week: 3)	Lectures
<p>Expected Learning Outcomes:</p> <ol style="list-style-type: none"> 1. Student will able to understanding of operating system, its structures and functioning 2. Students can develop and master understanding of algorithms used by operating systems for various purposes. 3. Students can understand the process, thread and relation between them. 4. Student can able to understand scheduling and solve problem based on it 5. Student can able to understand algorithms based on memory management 6. Student will able to know relation and importance of virtualization and cloud 		
Unit I	<p>Introduction and Operating-Systems Structures: Operating System Structure, Operations and Services; System Calls, Operating-System Design and Implementation; Process Management: Process Scheduling and Operations; Interprocess Communication, Process Synchronization, Critical-Section Problem, Peterson's Solution, Semaphores</p>	12 L
Unit II	<p>CPU Scheduling – Scheduling criteria, Scheduling algorithms,</p>	12L

	Threads - Overview, Multithreading models, Threading issues Deadlock - Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.	
Unit III	Memory Management: Contiguous Memory Allocation, Swapping, Paging, Segmentation, Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files. Storage Management: Mass-Storage Structure, Disk Structure, Scheduling and Management, RAID Structure.	12L

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Modern Operating Systems	Andrew S. Tanenbaum, Herbert Bos	Pearson	,th	2014
2.	Operating Systems – Internals and Design Principles	Willaim Stallings	Pearson	,th	2009
3.	Operating System Concepts	Abraham Silberschatz, Peter B. Galvineg Gagne	Wiley	,th	
4.	Operating Systems	Godbole and Kahate	McGraw Hill	,rd	
5	Operating System	Ashwini Somnathe Abhijit Somnathe	Sheth	^{sth} ₁	

SR NO	Practicals on IT 101
1	Installation of virtual machine software.
2	Installation of Linux operating system (RedHat / Ubuntu) on virtual machine.
3	Customise desktop environment by changing different default options like changing default background, themes, screensavers
4	Screen Resolution: Ascertain the current screen resolution for your desktop
5	Networking: Get the current networking configuration for your desktop. Are you on a wired or a wireless connection? What wireless networks are available, if any?
6	Linux commands: Working with Directories: a. pwd, cd, ls, mkdir, rmdir, b. file, touch, rm, cp. mv, rename, head, tail, cat, tac, more, less, strings, chmod

7	Linux commands: Working with files: 1. Which account are you logged in? How do you find out? Whoami command. 2. Get your current working directory. 3. Man,history,sudo,ps, 4. Identify all operations that require sudo privileges 5. Create a new user and add it to the sudo configuration file. 6. a. Set password for new user. 7. b. Modify the expiration date for new users using password ageing. 8. c. Delete newly added use
8	Windows (DOS) Commands – 1 a. Date, time, prompt, md, cd, rd, path.
9	Windows (DOS) Commands – 2 a.cls,copy,move,rename (ren),del (delete),ipconfig,ping

Course:CS CS102	Computer Hardware and Networking (Credits : 3 Lectures/Week: 3)	Lectures
Expected Learning Outcomes: 1.The student will be able to know the basics of Computer assembling. 2. The Studentswill be able to get the brief knowledge of Computer networking . 3.The student will be able to know the installation of softwares and troubleshooting.		
Unit I	Introduction to Computers – Types of Computers - Micro, Mini, Mainframe and Super Computer, Architecture of a Computer System–Processor (CPU) - Types and their specifications (Intel: Celeron, P4 family, Xeon, dual core, quad core, core 2 duo, i3,i5,i7 and AMD), ALU, Memory - Types, Storage, Semiconductor memories: RAM, ROM, PROM, EMPROM, EEPROM, Static and Dynamic, Cache Memory,Secondary Storage Devices -Types, Capacity, Popular Brands, Standards, Interface, Concept of Tracks, Sector, Cylinder and Cluster.Jumper setting, CMOS setting, Input/Output Devices Serial Port and Parallel Port –Principle of Communication, Types of ConnectingDevices, Interface Standards, Connectors.	12 L
Unit II	Concept of Operating System –Types of Operating Systems, Functions of an Operating System, Need of OS, Batch Processing, Multi-processing, Single user & Multi user OS, Distributed and Time Sharing Operating Systems, Introduction to Unix, Linux, Windows, Windows NT systems.	12L

	<p>Introduction to Computer Networks – Definition, Advantages, Architecture: Peer-to-Peer and Client/Server Network. Network Topologies – Star, Ring, Bus, Tree, Mesh, Hybrid. Types of Network – Local Area Network (LAN), Metropolitan Area Network (MAN), Wide Area Network (WAN), Intranet and Internet. Wi-Fi, Bluetooth.</p> <p>Communication Media & Connectors – Introduction to Data Communication – Analog and Digital Signals. Transmission mode: Simplex, Half-Duplex and Full-Duplex. Unshielded twisted pair (UTP), shielded twisted-pair (STP), Fiber Optics and coaxial cable: RJ-45, RJ-11, BNC. Understanding color codes of CAT5 cable. 568A and 568B convention.</p>	
Unit III	<p>Network Components – Modems, Firewall, Hubs, Bridges, Routers, Gateways, Repeaters, Transceivers, Switches– their functions, advantages and applications. Protocols–OSI, TCP/IP. Simple Mail Transfer Protocol (SMTP), Telnet, File Transfer Protocol (FTP), Hyper Text Transfer Protocol (HTTP). Setting IP Address (IP4/IP6) & Subnet Mask, Classes of IP Addressing. Introduction to Network Security, Concept of Dynamic Host Control Protocol.</p>	12L
<p>Textbook(s): 1. Mastering Pc Hardware And Networking Khanna Book Publishing Company; First Edition (1 January 2014) 2. PC Hardware: The Complete Reference McGraw Hill Education; First Edition (1 July 2017). 3. COMPUTER HARDWARE & NETWORKING (2ND ED.) Computech Publications Limited (Asian Publishers)</p> <p>Additional Reference(s): 1. PC Hardware: The Complete Reference by Craig Zacker and John Rourke 2. PC Hardware: A Beginner's Guide by Ron Gilster 3. Computer Fundamentals - by P.K. Sinha 4. Networking The Complete Reference, Third Edition by Bobbi Sandberg 5. Basics of Computer Networking by Thomas Robertazzi .</p> <p>Links: 1. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBS1104.pdf 2. https://ebooks.jpude.in/computer_application/bca/term_2/DCAP105_WORKSHOP_ON_COMPUTER_HARDWARE_AND_NETWORK.pdf 3. https://samples.jbpub.com/9781449688394/88394_ch03_savage.pdf</p>		

Sr. No.	Problems of CS102 (Credits : 1 Practical /Week: 2)
1	Hardware–Introduction to Computer System. Identify the front and rear panel controls and ports on a PC. Power Supply Connections. Motherboard Connections. Motherboard Components. CPU (Processor), RAM (Memory), Hard Drive Connections, ROM Drives, Video Cards, Sound Cards.

2	Installation of a PC–Removing and Installing - Power Supply, the Processor, the Motherboard, RAM, ROM, Hard Drive, Fans, Video Card, Expansion Cards, a CPU Cooler, CMOS Battery. Troubleshooting, About SMPS and its cable, Connector and Servicing Procedure.
3	Windows Installation–Windows - Concept of GUI, Desktop, Icons - My Computer, Network Neighborhood, Network Places, Recycle bin, Briefcase. Display, Drag and Drop, Task Bar, Start Menu, Tool Bar, and Menus. Windows Explorer. Properties of files and folders. Executing application programs. Properties of connected devices. Applications under windows accessories. Windows Help, Search feature, Control panel, Installation of devices. A walkthrough of installing Windows XP, Windows 7 / 8, Imaging: create a Windows system image. How to Backup/Restore your Windows partition with the bootable image disk, Setting a multiboot system, the Windows bootmanager vs. an alternative bootmanager, Setting up a dualboot system, Dual Boot Linux and Windows. Windows XP registry tweaks.
4	Components of Computer Network –Layout of Network, Familiarization with various Network devices, Connectors and Cables.
5	Crimping & Punching –Crimping practice with straight and cross CAT 5 cables. Punching practice in IO Box and patch panel. Crimping and making cables.
6	Cabling –Create cabling in a lab with HUB/Switch and IO Boxes and patch panel. Fitting of Switch Rack.
7	Install & configure a Network – Installing & Configuring a Peer-to-Peer Network using Windows Software.
8	Configuration of Data Communication Equipment –Connecting computers with Network with Drop cable and using Wi Fi configuration. Basic Programmable switch Configuration, IP Routing Process, Verifying Configuration.
9	IP Addressing & TCP/IP – IP Addressing Technique(IP4/IP6) and Subnetting and Supernetting the network. Installation and Configuration of TCP/IP Protocol. Practice TCP/IP Utilities: PING, IPCONFIG, HOSTNAME, ROUTE.
10	Other Network Protocols: Working with SMTP, TELNET, FTP, HTTP, Configuring DHCP

Course:CS CS103	Discrete mathematics (Credits : 2 Lectures/Week: 2)	Lectures

Expected Learning Outcomes:

After successful completion of this course, students would be able to:

1. Understand the basic concepts and principles of descriptive statistics.
2. Collect, organize, and summarize data using appropriate graphical and numerical methods.
3. Compute and interpret measures of central tendency and dispersion.
4. Identify and interpret different types of graphical representations.
5. Apply descriptive statistics techniques to real-world data sets.
6. Communicate statistical findings effectively through written and oral presentations.

Unit I	<p>Data Presentation Data types : attribute, variable, discrete and continuous variable, Univariate and Bivariate distribution. Types of Characteristics, Different types of scales: nominal, ordinal, interval and ratio. Data presentation : frequency distribution, histogram ogive, curves, stem and leaf display. Measures of Central tendency: Mean, Median, mode for raw data, discrete, grouped frequency distribution. Measures dispersion: Variance, standard deviation, coefficient of variation for raw data, quartiles, quantiles Real life examples.</p>	12 L
Unit II	<p>Regression: Concept of dependent (response) and independent (predictor) variables, concept of regression, Types and prediction, difference between correlation and regression, Relation between correlation and regression. Linear Regression - Definition, examples using least square method and regression coefficient, coefficient of determination, properties. Concept of Multiple regression and Logistic regression.</p>	12L

Text Book:

- 1) Trivedi, K.S.(2001) : Probability, Statistics, Design of Experiments and Queuing Semester End Examination, with applications of Computer Science, Prentice Hall of India, New Delhi

Additional References:

- 1) Ross, S.M. (2006): A First course in probability. 6th Edⁿ Pearson
- 2) Kulkarni, M.B., Ghatpande, S.B. and Gore, S.D. (1999): common statistical tests. Satyajeet Prakashan, Pune
- 3) Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi
- 4) Gupta, S.C. and Kapoor, V.K. (1999): Applied Statistics, S. Chand and Son's, New Delhi
- 5) Montgomery, D.C. (2001): Planning and Analysis of Experiments, wiley.

Links:

1. https://www.tutorialspoint.com/statistics/hypothesis_testing.htm
2. <https://2012books.lardbucket.org/pdfs/beginning-statistics.pdf>
3. <http://www.math.louisville.edu/~pksaho01/teaching/Math662TB-09S.pdf>
4. <https://pakistandasti.files.wordpress.com/2013/11/introduction-to-computer-theory-by-cohen-co-py.pdf>

Course:CS CS104	Basic Python Programming-I (Credits : 2 practical/Week: 4)	Lectures
<p>Expected Learning Outcomes: After successful completion of this course, students would be able to: 1)Examine Python syntax and semantics and be fluent in the use of various Operators of Python. 2) Develop Python programs with conditionals and loops. 3)Create, run and manipulate Python Programs using core data structures like Lists and Tuples. 4) Demonstrate the use of functions, modules</p>		
<p>Unit I</p>	<p>Introduction to Python : Python Introduction, History of Python, Introduction to Python Interpreter and program execution, Python Installation Process in Windows and Linux, Python IDE, Introduction to anaconda, features of python, python variable declaration,Comments, Keywords, Indents in Python, Python input/output operations Introduction Data, Expressions, Statements : Data types: Int, float, Boolean, string, and list; variables, expressions. Operators:Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Ternary Operator, Operator precedence. Input and Output statements: input() function, reading multiple values from the keyboard in a single line, print() function, ‘sep’ and ‘end’ attributes, Printing formatted string, replacement operator ({}). Illustrative examples on all the above topics. Control flow statements: Conditional statements – if, if-else and if-elif-else statements. Iterative statements – for, while. Transfer statements – break, continue and pass. Illustrative examples on all the above topics.</p>	<p>8 L</p>
<p>Unit II</p>	<p>Strings: Introduction to strings, Defining and Accessing strings, Operations on string - String slicing, Mathematical Operators for String, Membership operators on string, Removing spaces from the string, Finding Substrings, Counting substring in the given String, Replacing a string with another string, Splitting of Strings, Joining of Strings, Changing case of a String, Checking starting and ending part of the string, checking type of characters present in a string. Illustrative examples on all the above topics. Lists: Creation of list objects, Accessing and traversing the elements of list. Important functions of list – len(), count(), index(), append(), insert(), extend(), remove(), pop(), reverse() and sort(). Basic Operations on list: Aliasing and Cloning of List objects, Mathematical Operators for list objects,</p>	<p>8 L</p>

	<p>Comparing list objects, Membership operators on list, Nested Lists, List Comprehensions. Illustrative examples on all the above topics. Tuples: Creation of Tuple objects, Accessing elements of tuple, Mathematical operators for tuple, Important functions of Tuple – len(),count(),index(), sorted(), min(), max(), cmp().Tuple Packing and Unpacking. Illustrative examples on all the above topics</p> <p>Dictionaries: Creation of Dictionary objects, Accessing elements of dictionary, Basic operations on Dictionary - Updating the Dictionary, Deleting the elements from Dictionary. Important functions of Dictionary – dict(), len(), clear(), get(), pop(), popitem(), keys(), values(), items(), copy(), setdefault().</p> <p>Illustrative examples on all the above topics.</p>	
Unit III	<p>Functions - Defining Functions, Calling Functions, Types of Arguments - Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Recursive functions, Illustrative examples on all the above topics.</p> <p>Modules: Creating modules, import statement, from Import statement.</p>	8 L

Text Book:

- 1) Charles Dierbach, Introduction to Computer Science using Python, Wiley, 2013
- 2) James Payne , Beginning Python: Using Python 2.6 and Python 3, Wiley India, 2010

Additional References:

- 1) Paul Gries , Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 2/E 2014
- 2) Adesh Pandey, Programming Languages – Principles and Paradigms, Narosa, 2008

Links:

- 1) <https://anh.cs.luc.edu/331/notes/PythonBasics.pdf>
- 2) https://www.scipy-lectures.org/intro/language/python_language.html
- 3) <https://www.programiz.com/python-programmin>

Sr. No.	Problems of CS104 Practical (Credits : 2 Lectures/Week: 2)
BASIC:	
1	Python program to do arithmetical operations

2	Python program to find the area of a triangle
3	Python program to solve quadratic equation
4	Python program to swap two variables
5	Python program to generate a random number
6	Python program to convert kilometers to miles
7	Python program to convert Celsius to Fahrenheit
8	Python program to display calendar
Conditional and Loop	
	Python Program to Check if a Number is Positive, Negative or Zero
	Python Program to Check if a Number is Odd or Even
	Python Program to Check Leap Year
	Python Program to Find the Factorial of a Number
	Python Program to Display the multiplication Table
	Python Program to Print the Fibonacci sequence
	Python Program to Find the Sum of Natural Numbers
Python String Programs	
	Python Program to Sort numbers in Alphabetic Order
	Python Program to reverse a string
	Python Program to convert list to string
	Python Program to convert int to string
	Python Program to concatenate two strings
	Python Program to generate a Random String
Python List Programs	

	Python Program to append element in the list
	Python Program to compare two lists
	Python Program to convert list to dictionary
	Python Program to remove an element from a list
	Python Program to add two lists
	Python Program to convert List to Set
	Python Program to convert list to string
Python Dictionary Programs	
	Python Program to convert list to dictionary
	Python Program to sort a dictionary
	Python Program to Merge two Dictionaries
Python Matrix Programs	
	Python Program to Add Two Matrices
	Python Program to Transpose a Matrix
Python Function Programs	
	Python Program to Make a Simple Calculator
	Python Program to Display Calendar
	Python Program to Display Fibonacci Sequence Using Recursion
	Python Program to Find Factorial of Number Using Recursion
Python modules Programs	
	Math Operations Module: Create a file named math_operations.py:
	Module - random
	Working with Dates and Times:

Random Number Generation:

SEM II

Course: CS151	Fundamental of Data Structure (Credits : 3 Lectures/Week: 3)	Lectures
Expected Learning Outcome		
<ol style="list-style-type: none"> 1. Recognize Data structures, its types and significance in computing. 2. Develop searching and sorting techniques 3. Examine the difference between stack and queue 4. Illustrate concepts of develop applications using data structure and Evaluate postfix and prefix expressions. 		
Unit I	Abstract Data Types: Introduction, The Date Abstract Data Type, Bags, Iterators. Application Arrays: Array Structure, Python List, Two Dimensional Arrays, Matrix Abstract Data Type, Application Sets and Maps: Sets-Set ADT, Selecting Data Structure, List based Implementation, Multi-Dimensional Arrays-Multi-Array ADT, Application. Algorithm Analysis: Complexity Analysis-Big-O Notation,	15l
Unit II	Searching and Sorting: Searching-Linear Search, Binary Search, Sorting-Bubble, Selection and Insertion Sort, Working with Sorted Lists-Maintaining Sorted List, Linked Structures: Introduction, Singly Linked List-Traversing, Searching, Prepending and Removing Nodes, Doubly Linked Lists-Organization and Operation, Circular Linked List-Organization and Operation,	15l
Unit III	Stacks: Stack ADT, Implementing Stacks-Using Python List, Using Linked List, Evaluating Postfix Expressions Queues: Queue ADT, Implementing Queue-Using Python List, Circular Queue. Priority Queues- Priority Queue ADT, Bounded and unbounded Priority Queues Recursion: Recursive Functions, Properties of Recursion, Its working, Recursive Applications Hash Table: Introduction, Hashing-Linear Probing, Clustering, Rehashing, Separate Chaining, Hash Functions	15l
	TextBook: <ol style="list-style-type: none"> 1) Data Structure and algorithm Using Python, Rance D. Necaie, 2016 Wiley India Edition 2) Data Structure and Algorithm in Python, Michael T. Goodrich, Robertom Tamassia, M. H. Goldwasser, 2016 Wiley India Edition 	

	<p>References:</p> <ol style="list-style-type: none"> 1) Data Structure and Algorithmic Thinking with Python-Narasimha Karumanchi, 2015, Careermonk Publications 2) Fundamentals of Python: Data Structures, Kenneth Lambert, Delmar Cengage Learning <p>Links:</p> <p>https://lecturenotes.in/subject/81/data-structure-using-c-ds http://www.cs.yale.edu/homes/aspnes/classes/223/notes.pdf https://www.smartzworld.com/notes/data-structures-pdf-notes-ds/ https://www.geeksforgeeks.org/data-structures/</p>	
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Sr.No	Practicals of CS151 (Credits : 1 Practical /Week: 2)
1	Implement Linear Search to find an item in a list.
2	Implement binary search to find an item in an ordered list
3	Implement Sorting Algorithms <ol style="list-style-type: none"> a. Bubble sort b. Insertion sort c. Selection Sort
4	Implement use of Sets and various operations on Sets.
5	Implement working of Stacks. (pop method to take the last item added off the stack and a push method to add an item to the stack)
6	Implement the following <ol style="list-style-type: none"> a. A queue as a list which you add and delete items from. b. A circular queue. (The beginning items of the queue can be reused).
7	Implement Linked list and demonstrate the functionality to add and delete items in the linked list.
8	Recursive implementation of <ol style="list-style-type: none"> a. Factorial b. Fibonacci c. Tower of Hanoi

Course: CS152	Digital Marketing Fundamentals (Credits : 3 Lectures/Week: 3)	Lectures
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Expected Learning Outcome

1. Understand the core concepts of E-Commerce.
2. Understand the various online payment techniques
3. Understand the core concepts of digital marketing and the role of digital marketing in business.
4. Apply digital marketing strategies to increase sales and growth of business
5. Apply digital marketing through different channels and platforms
6. Understand the significance of Web Analytics and Google Analytics and apply the same

Unit I	<p>Introduction to E-Commerce and E- Business: Definition and competing in the digital economy, Impact of E-Commerce on Business Models, Factors Driving e-commerce and e-Business Models, Economics and social impact of e-Business, opportunities and Challenges, e-Commerce vs m- Commerce, Different e-Commerce Models (B2B, B2C, C2B, C2C, B2E), eCommerce Applications: e-Trading, e-Learning, e-Shopping, Virtual Reality & Consumer Experience, Legal and Ethical issues in e-Commerce.</p> <p>Overview of Electronic Payment systems: Types of Electronic payment schemes (Credit cards, Debit cards, Smartcards, Internet banking), Echecks, E-Cash Concepts and applications of EDI and Limitation</p> <p>Introduction & origin of Digital Marketing: Traditional v/s Digital Marketing. Digital Marketing Strategy, The P-O-E-M Framework, Segmenting & Customizing Messages, The Digital landscape, Digital Advertising Market in India. Skills required in Digital Marketing. Digital Marketing Plan.</p>	151
Unit II	<p>Social Media Marketing: Meaning, Purpose, types of social media websites, Social Media Engagement, Target audience, Facebook Marketing: Business through Facebook Marketing, Creating Advertising Campaigns, Adverts, Facebook Marketing Tools, LinkedIn Marketing: Importance of LinkedIn Marketing, Framing LinkedIn Strategy, Lead Generation through LinkedIn, Content Strategy, Analytics and Targeting, Twitter Marketing: Framing content strategy, Twitter Advertising Campaigns, YouTube Marketing: Video optimization, Promoting on YouTube, Monetization, YouTube Analytics</p> <p>Email Marketing: Types of Emails, Mailing List, Email Marketing tools, Email Deliverability & Email Marketing automation</p> <p>Mobile Marketing: Introduction, Mobile Usage, Mobile Advertising, Mobile Marketing Types, Mobile Marketing Features, Mobile Campaign Development, Mobile Advertising Analytics</p> <p>Content Marketing: Introduction, Content marketing statistics, Types of Content, Types of Blog posts, Content Creation, Content optimization, Content Management & Distribution, Content Marketing Strategy, Content creation tools and apps, Challenges of Content Marketing.</p>	151

Unit III	<p>Search Engine Optimization: Meaning, Common SEO techniques, Understanding Search Engines, basics of Keyword search, Google rankings, Link Building, Steps to optimize website, On-page and off-page optimization</p> <p>Search Engine Marketing: Introduction to SEM, Introduction to Ad Words - Google Ad Words, Ad Words fundamentals, Ad Placement, Ad Ranks, Creating Ad Campaigns, Campaign Report Generation, Display marketing, Buying Models: Cost per Click (CPC), Cost per Milli (CPM), Cost per Lead (CPL), Cost per Acquisition (CPA).</p> <p>Web Analytics: Purpose, History, Goals & objectives, Web Analytic tools & Methods. Web Analytics Mistakes and Pitfalls.</p> <p>Google Analytics: Basics of Google Analytics, Installing Google Analytics in website, Parameters of Google Analytics, Reporting and Analysis</p>	151
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Textbooks: .

1. “E-Commerce Strategy, Technologies and Applications”, Whitley, David, Tata McGraw Hill, 2017
2. Digital Marketing, Seema Gupta, McGraw Hill Education, 2nd Edition

Additional References:

1. E-Commerce by S. Pankaj, A.P.H. Publication, New Delhi
2. Fundamentals of Digital Marketing, Punit Singh Bhatia, Pearson, 2nd Edition
3. “Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation”, Damian Ryan, Calvin Jone. Kogan Page, 4th Edition

Sr.No	Practicals of CS152 (Credits : 1 Practical /Week: 2)
1	Digital Marketing Implementation in Business Scenario
2	Create the Digital Marketing Webpage
3	Conducting the Search Engine Optimization and Search Engine Marketing
4	Using Google Analytics to analyze website performance
5	Creating Promotional banner through Canva
6	Facebook Promotion using banners
7	Creating YouTube Channel for Marketing
8	Twitter Marketing

9	Instagram Marketing
10	Email Marketing
Additional 11	Digital Marketing Final Analysis and Report

Course: CS154	Basic Python Programming-II (Credits : 2)	Lectures
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Sr.No	Practicals of CS152 (Credits : 2 Practical /Week: 4)
1	Write a Python program to read an entire text file.
2	Write a Python program to append text to a file and display the text.
3	Write a Python program to read last n lines of a file.
4	Design a class that store the information of student and display the same
5	Implement the concept of inheritance using python
6	<p>Create a class called Numbers, which has a single class attribute called MULTIPLIER, and a constructor which takes the parameters x and y (these should all be numbers).</p> <p>i. Write a method called add which returns the sum of the attributes x and y.</p> <p>ii. Write a class method called multiply, which takes a single number parameter a and returns the product of a and MULTIPLIER.</p> <p>iii. Write a static method called subtract, which takes two number parameters, b and c, and returns b - c.</p> <p>iv. Write a method called value which returns a tuple containing the values of x and y. Make this method into a property, and write a setter and a deleter for manipulating the values of x and y.</p>
7	Try to configure the widget with various options like: bg="red", family="times", size=18
8	Try to change the widget type and configuration options to experiment with other widget types like Message, Button, Entry, Checkbutton, Radiobutton, Scale etc.

9	Design a simple database application that stores the records and retrieve the same.
10	Design a database application to search the specified record from the database.
Additional 11	Design a database application to that allows the user to add, delete and modify the records.

Course:	Descriptive Statistics - I (Credits : 2 Lectures/Week: 2)	Lectures
Expected Learning Outcome		
<ol style="list-style-type: none"> 1. Identify the descriptive statistical concepts & present it graphically. 2. Analyze the data and its properties by use of central tendency and variability. 3. Analyze the relationship between two quantitative variables using Correlation and Regression 		
Unit I	<p>Data Presentation Data types : attribute, variable, discrete and continuous variable, Univariate and Bivariate distribution. Types of Characteristics, Different types of scales: nominal, ordinal, interval and ratio. Data presentation : frequency distribution, histogram ogive, curves, stem and leaf display. Measures of Central tendency: Mean, Median, mode for raw data, discrete, grouped frequency distribution, quartiles.. Measures dispersion: Variance, standard deviation, coefficient of variation for raw data, quartiles.</p>	151
Unit II	<p>Correlation: Concept of correlation, Types and interpretation, Measure of Correlation: Scatter diagram and interpretation; Karl Pearson's coefficient of correlation (r): Definition, examples for ungrouped and grouped data, effect of shift of origin and change of scale, properties; Spearman's rank correlation coefficient: Definition, examples. Regression: Concept of dependent (response) and independent (predictor) variables, concept of regression, Types and prediction, difference between correlation and regression, Relation between correlation and regression. Linear Regression - Definition, examples using least square method and regression coefficient, coefficient of determination, properties.</p>	151
<p>Text Book:</p> <ol style="list-style-type: none"> 1) Trivedi, K.S.(2001) : Probability, Statistics, Design of Experiments and Queuing Semester End Examination, with applications of Computer Science, Prentice Hall of India, New Delhi <p>Additional References:</p> <ol style="list-style-type: none"> 1) Ross, S.M. (2006): A First course in probability. 6th Edⁿ Pearson 		

- 2) Kulkarni, M.B., Ghatpande, S.B. and Gore, S.D. (1999): common statistical tests. Satyajeet Prakashan, Pune
- 3) Gupta, S.C. and Kapoor, V.K. (1987): Fundamentals of Mathematical Statistics, S. Chand and Sons, New Delhi
- 4) Gupta, S.C. and Kapoor, V.K. (1999): Applied Statistics, S. Chand and Son's, New Delhi
- 5) Montgomery, D.C. (2001): Planning and Analysis of Experiments, wiley.