Prof. Ram Meghe Institute Of Technology And Research Badnera -Amravati

**An Autonomous Institute Affiliated to
Sant Gadge Baba Amravati University,
Amravati, Maharashtra (India)**

PROGRAMME SCHEME & SYLLABI 2023-2024

MASTER IN COMPUTERAPPLICATION

(FIRST YEAR MCA)

Department Vision :

To become a pace-setting Centre of excellence believing in three Universal values namely Synergy, Trust and Passion, with zeal to serve the Nation in the global scenario.

Department Mission:

M1 : To achieve the highest standard in technical education through the state-of-the-art pedagogy and enhanced industry Institute linkages.

M2 : To inculcate the culture of research in core and emerging areas.

M3 : To strive for overall development of students so as to nurture ingenious technocrats as well as responsible citizens.

Program Educational Objectives:

Preparation: To strive for overall personality development of students so as to nurture not only quintessential technocrats but also responsible citizens and to steer the organization towards becoming a pace setting centre of excellence.

Core Competence: To equip the students with the fundamentals of Data Structures, Database management system, Computer Oriented Optimization techniques and Programming methodology. To teach the students about the collection, analysis, organization of data and enhance their ability to convert it into useful information. Also to make the students understand management of information systems along with an understanding of the principles of management and of business systems.

Breadth: To develop the ability in students to analyze data, apply technical concepts and synthesize both for robust software designs.

Professionalism: To inculcate the value systems, leadership and team work, skills, bring holistic development of personality and to promote entrepreneurial thinking among students.

Learning environment: To provide students with encouraging environment that builds rigor and stimulated innovative thinking for a successful professional career.

Program Outcomes:

Management graduate will be able to:

a) An ability to apply knowledge of mathematics, computing and management in the field of computer software.
b) An ability to identify, formulate, design and solve intricate computing problems, as well as to analyze and interpret data.
c) Able to develop algorithms, and implement them in various programming languages.
d) An ability to create and use techniques, expertise and modern computing tools necessary to solve complex computing problems
e) An ability to effectively communicate technical information and complex problems through improved communication and interpersonal skills
f) Graduates will develop an attitude of continuous learning.
g) Graduates will demonstrate knowledge of values and professional ethics in their activities
h) Graduates will develop confidence to face challenges in their career.

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati
(An Autonomous Institute)
Two Year Post Graduate Degree Program in Master in Computer Application
Choice Based Credit System (Semester Pattern)

SEMESTER: I

Sr. No.	Subject Code	Subject	Lecture	Tutorial	P/D	Total Hours/ Week	Credits	Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Max. Marks MSE/ MSIE	Max. Marks TA	Total	Min. Passing Marks in ESE/ ESSE	Overall Min Passing Marks	Int.	Ext.	Total	Min. Passing Marks
			Teaching Scheme					**Examination Scheme**										
			Hours/ Week					**THEORY**							**PRACTICAL**			
									Internal						**Max. Marks**			
Theory																		
01	1SMC01	Computer Organization and Architecture	4			4	4	3	60	30	10	100	24	40				
02	1SMC02	Data Structures using C++	4			4	4	3	60	30	10	100	24	40				
03	1SMC03	Probability and Statistical Methods	4			4	4	3	60	30	10	100	24	40				
04	1SMC04	Computer Networks and Security	4			4	4	3	60	30	10	100	24	40				
Practical																		
05	1SMC05	# Professional Communication				2	1								50		50	25
06	1SMC06TU	Web Designing		1														
07	1SMC06L	Web Designing Lab		1		3	2								25	25	50	25
08	1SMC07TU	Object Oriented Programming(OOP) Using Java		1														
09	1SMC07L	Object Oriented Programming(OOP) Using Java Lab		1		5	3								25	25	50	25
10	1SMC08	Data Structures using C++ Lab				2	1								25	25	50	25
		Total	**4**			**28**	**23**					**400**					**200**	

Note : # - Evaluation will be Based on Continuous Evaluation

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Sr. No.	Subject Code	Subject	Lecture	Tutorial	P/D	Total Hours/ Week	Credits	Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Max. Marks MSE/ MSIE	Max. Marks TA	Total	Min. Passing Marks in ESE/ ESSE	Overall Min Passing Marks	Int.	Ext.	Total	Min. Passing Marks
SEMESTER: II					**Teaching Scheme**				**Examination Scheme**									
Theory																		
01	2SMC01	Operating Systems and Virtualization	4			4	4	3	60	30	10	100	24	40				
02	2SMC02	Database Systems	4			4	4	3	60	30	10	100	24	40				
03	2SMC03	Resource Management Techniques	4			4	4	3	60	30	10	100	24	40				
04	2SMC04	Elective 1	4			4	4	3	60	30	10	100	24	40				
Practical																		
05	2SMC05	Elective 1 Lab			4	4	2								25	25	50	25
06	2SMC06	Operating Systems and Virtualization Lab			4	4	2								25	25	50	25
07	2SMC07	Minor Project based on Database Systems and Web Designing			2	2	1								50	50	100	50
		Total				**26**	**21**					**400**					**200**	

Elective-1	
i)	Python Programming
ii)	System Adinistration and Security
iii)	Client Server Computing
	Minor project - the students need to complete at the end of the semester in order to strengthen the understanding of fundamentals through effective application of the courses learnt.
	Note : # - Evaluation will be Based on Continuous Evaluation

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SEMESTER: III

Sr. No.	Subject Code	Subject	Lecture	Tutorial	P/D	Total Hours/ Week	Credits	Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Max. Marks MSE/ MSIE	Max. Marks TA	Total	Min. Passing Marks in ESE/ ESSE	Overall Min Passing Marks	Int.	Ext.	Total	Min. Passing Marks
Theory																		
01	3SMC01	Cloud computing	4			4	4	3	60	30	10	100	24	40				
02	3SMC02	Artificial Intelligence	4			4	4	3	60	30	10	100	24	40				
03	3SMC03	Cyber Security and Digital Forensics	4			4	4	3	60	30	10	100	24	40				
04	3SMC04	Elective 2	4			4	4	3	60	30	10	100	24	40				
Practical																		
05	3SMC05	Elective 2 lab			2	2	1	3							25	25	50	25
06	3SMC06	Artificial Intelligence lab			2	2	1								25	25	50	25
07	3SMC07	Cloud computing Lab			2	2	1								25	25	50	25
08	3SMC08	Cyber Security and Digital Forensics Lab			2	2	1								25	25	50	25
		Total	**16**		**8**	**24**	**20**					**400**						

Elective-2	
i)	Data Analytics and Machine learning
ii)	Software Architecture and Project Management
iii)	Internet of Things

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			colspan Teaching Scheme					colspan Examination Scheme												

SEMESTER: IV

Sr. No.	Subject Code	Subject	Lecture	Tutorial	P/D	Total Hours/ Week	Credits	Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Max. Marks MSE/ MSIE	Max. Marks TA	Total	Min. Passing Marks in ESE/ ESSE	Overall Min Passing Marks	Int.	Ext.	Total	Min. Passing Marks
colspan **Practical**																		
01		Industry Project and																-
02		Internship/Startup					2		60	30	10	100	24	40		10		
03	4SMC01	A) Stage- I Presentation B) Stage -II Presentation					2		60	30	10	100	24	40		10		
04		C) Final Presentation, Viva Voce					12		60	30	10	100	24	40	150	80	250	125
05	4SMC02	Swayam/NPTEL course on Human Values and ethics /Paper publication in UGC care journals					4	colspan **NPTEL EXAM/PAPER PUBLISHED**							25	25	50	25
colspan **Total**							20										300	

Note: Header has spanning groups — *Hours/ Week* spans Lecture/Tutorial/P/D; *THEORY* spans Duration through Overall Min Passing Marks; *Internal* spans MSE/MSIE and TA; *PRACTICAL* / *Max. Marks* spans Int. and Ext.

Summary of Marks & Credits					
Year	Sem	Sem Marks	Yearly Marks	Sem Credit	Yearly Credit
First Year	I	600	1200	23	44
	II	600		21	
Second Year	III	600	900	20	40
	IV	300		20	
Total		2100		84	

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Course Code	1SMC01
Course Name	**Computer Organization and Architecture**
Credits	**04**
Course Objectives:	1. Students should understand basic organization, design, and programming of a simple digital computer and its basic architectural concepts.
	2. Students should be able to analyze data transfer and instruction execution for various components of a microprocessor and for different microprocessor architectures.
	3. Students should understand the parallel execution of instructions in different architectural types.
Course Outcomes:	On completion of the course, the students will be able to
	1. Understand the basics of computer architecture.
	2. Understand fundamentals of parallel processing and pipeline processing,
	3. Analyze and classify different pipelined processors, with architectural features of advanced processors.
	4. Analyze the memory communication and its use in processor architecture.
	5. Evaluate the types of interconnection between the processors.
	6. Analyze the Multithreaded architecture and data communication between computers.

Units	Contents	Total Hrs
I	Basics of ALP, Amdahl's law, Von Neumann machine architecture, Program development tools, Operating systems. Design of ALU, Bit slice processors. Concept of instruction formats and instruction set, instruction set types, types of operands and operations, Generation of memory addresses and addressing modes, Subroutine nesting using stacks to implement subroutine calls and calling conventions, Processor organizations, Register organization, Stack based organizations, Encoding of machine instructions, General features of RISC and CISC instruction sets, modern processors convergence of RISC with CISC.	8
II	Overview of Parallel Processing and Pipelining Processing, study and comparison of uni-processors and parallel processors. Conventional and EPIC architecture. Overview of Parallel Processing and Pipelining Processing Necessity of high performance, Constraints of conventional architecture, Parallelism in uniprocessor system, Evolution of parallel processors, future trends, Architectural Classification, Applications of parallel processing, Instruction level Parallelism and Thread Level Parallelism, Explicitly Parallel Instruction Computing (EPIC) Architecture. Basic principles of scalable performance: Performance Metrics and	8

	Measures, Speedup Performance Laws.	
III	- Instruction pipeline, instruction pipeline hazards, overcoming hazards using a pipeline with forwarding paths, instruction set design influence on pipelining, example of pipelined CISC processor, example of pipelined RISC processor, VLIW (Very Long Instruction Word) processors, Vector processors, Multithreaded processors, Compilation techniques support to instruction level parallelism, Extracting parallelism.	8
IV	Protection between programs running on the same system, accessing I/O devices, programmed I/O, interrupts, direct memory access DMA, bus arbitration, interface circuits, I/O interfaces, I/O processors, external I/O devices. Multiprocessor Architectures – Objectives, Introduction, Multiprocessor Architectures, Performance Characteristics of Multiprocessors, Multicore Architectures – Single Chip Multiprocessors, Flynn Classification, Interconnection Structures	8
V	Interconnection Networks – Dynamic and Static Multiprocessor System Interconnects, Banyan and Delta Networks (Banyan Multistage Networks), Interprocess Arbitration, Interprocess Communication, Memory Organization in Multiprocessors, Shared-memory Multiprocessor Systems, Synchronization – Memory Organization, Contention and Arbitration, Cache Coherence and Synchronization Mechanisms, Cache Coherence, Message Passing Systems.	8
VI	Study of Architecture of Multithreaded processors, Latency hiding techniques, Principles of multithreading, Issues and solutions. Parallel Programming Techniques: Message passing program development, Synchronous and asynchronous message passing, Message passing parallel programming, Shared Memory Programming, Data Parallel Programming. Implementation issues of a multithreaded program.	8

Textbook :	
	1. Computer Architecture and Organization by Nicholus Carter & Rajkamal, Schaum Series Pub. 2. Kai Hwang, Faye A. Briggs, "Computer Architecture and Parallel Processing" McGraw-Hill International Edition

Reference Books :	
	1. Kai Hwang, "Advanced Computer Architecture", Tata McGraw-Hill 2. V.Rajaraman, L Sivaram Murthy, "Parallel Computers", PHI. 3. William Stallings, "Computer Organization and Architecture, Designing for performance" Prentice Hall, Sixth edition. 4. Kai Hwang, Scalable Parallel Computing. 5. Harrold Stone, High performance computer Architecture. 6. Richard Y. Kain, Advanced Computer Architecture 7. http://www.intel.com/products/processor (for Intel Itanium Processor)

Course Code	1SMC02
Course Name	Data Structures using C++
Credits	4
Course Objectives:	Students should understand linear and non linear data structures and solve various computing problems using c++ through appropriate use of learned data structure.
Prerequisite	➢ Basic knowledge of C++ .
Course Outcomes :	On completion of the course, the students will be able to
	1. Learn array data structure and perform operations on array.
	2. Learn linked list data structure and perform operations on linked list.
	3. Learn stack, queue data structure and perform operations on stack, Queue.
	4. Learn Tree data structure and perform operations on Tree.
	5. Learn Graph data structure and perform operations on Graph.
	6. Apply specific sorting and searching methods depending upon factors like type of data, volume of data and develop Critical Thinking Skills

Units	Contents	Total Hrs
I	**Arrays**: Arrays, Arrays the Abstract Data Type, Array Representation, Multidimensional, Operations on Arrays Traversal ,Searching, Insertion and Deletion, Sorting-Bubble Sort , Vector and Matrix, Multiple List in a Single Array, Application of Arrays-Matrix Multiplication, sparse matrices.	10
II	**Linked lists**: Introduction to Linked List and their representation in memory, traversing a linked list, searching a linked list, Memory allocation & garbage collection. Insertion deletion operations on linked lists. Header linked lists, Two- way linked lists.	10
III	**Stacks** : Introduction to Stacks, Stacks as Abstract Data Type, Representation of Stacks through Arrays **Applications of stacks**: Arithmetic expressions: Polish notation, conversion of Infix to Postfix Expression, Evaluation of Postfix Expression Recursion Implementation of stacks using recursive procedures, Towers of Hanoi . **Queues**: Introduction to Queues, Queues as Abstract Data Type, Representation of Queue through Arrays and Linked list, Circular Queues Deques. Priority queues.	10
IV	**Trees:** Introduction to Binary trees, Types of trees, Representation of Binary trees in memory, Searching a Node, Insertion of a node, Deletion of a node Traversing binary trees. Traversal algorithms using stacks, Header nodes : threads,Heap,Heap Sort	10
V	**Graphs**: Definition, Representation of Graphs through Arrays and Linked list, Graph Traversals, Application of Graph Traversals, Minimum Cost Spanning Trees, Shortest Path Problems, All Pair Shortest Paths.	10

VI	**Sorting**: Insertion Sort, Selection Sort, Quick Sort, Radix Sort and their efficiency, Complexity of algorithms. **Hashing:** Introduction, Hash Function, Collision in hashing, Hashing: Hash Function, Collision Resolution, Rehashing	10

Textbook :
1. Data Structures through C++,ISRD Group,McGraw Hill   2. Seymour Lipschutz: "Data Structures ", Schaum's Outline Series

Reference Books :
1. "Data structure algorithms and Applications in C++" : Sartaj Sahani (Second Edition Universities Press   2. "Data structure" - Tenenbaum 6. "Data structure and algorithm analysis in C++ ": Mark Allan Welss, Addison Wesley

Course Code	1SMC03
Course Name	**Probability and Statistical Techniques**
Credits	**4**
Course Objectives:	1. Perform analysis of sequence, series of real numbers and their convergence, continuity, differentiability of real valued functions and apply statistical & standard distributions
	2. To apply variety of probability and non probability sampling methods for selecting a sample from a population.
Course Outcomes :	On completion of the course, the students will be able to
	1. Understand the foundations of mathematics.
	2. Apply mathematical ideas to model real-world problems.
	3. Analyze data using Statistical Methods
	4. Identify the type of statistical situation and solve statistical Problems
	5. Use discrete and continuous probability distributions, including Requirements, mean and variance, and making decisions.
	6. Identify the characteristics of different discrete and continuous Distributions.

Units	Contents	Total Hrs
I	**Measures of central Tendency:** Arithmetic mean, Weighted mean, Median, Mode, Quartiles, Deciles and Percentiles. Locating median and quartiles through Ogives. Histogram to locate mode and mean. Numerical problems on central tendency **Measures ofDispersion**: Range, Quartile deviation, Mean deviation from mean, Standard deviation and their coefficients. Numerical problems on Range, quartile deviation, mean deviation.	10

II	**Skewness, Correlation & Regression**:- Karl Pearson's coefficient of Skewness, Bowley's coefficient of Skewness, Scatter Diagram, Karl Pearson's coefficient of correlation, Spearman's rank correlation coefficient , Linear Regression and Estimation, Coefficients of regression	10
III	**Introduction to Probability**:-Random experiment, Sample space, Events, Axiomatic Probability, Algebra of events **Elementary ProbabilityTheory:** Concept of random experiment/trial and possible outcomes; Sample Space and Discrete Sample Space; Events their types, Algebra of Events, Mutually Exclusive and Exhaustive Events, Complimentary events.Classical definition of Probability, Addition theorem (without proof), conditional probability. Simple examples	10
IV	**Conditional Probability**:- Conditional Probability, Multiplication theorem of Probability, Independent events, Baye's Theorem **Random variables**:- Discrete random variable, Continuous random variable, Two-dimensional random variable, Joint probability distribution, Stochastic independence	10
V	**Bivariate Linear Regression:** Finding Regression lines by method of least squares. Properties of Regression Coefficients- i) r = √byxbxyii) ($\overline{x}$, $\overline{y}$) is the point of intersection of two regression lines. Numerical problems on BivariateLinear Regression. **Time series :**Definition of Time series & uses of time series. Components of Time series, Additive & multiplicative models. Methods of estimating trend by moving average method graphical method, semi-average method & by least square methods. Numerical problems on Time Series	10
VI	**Testing of Hypothesis**:-Hypothesis, Type I and Type II errors. Tests of significance – Student's t-test:Single Mean, Difference of means, paired t-test, Chi-Square test:Test of Goodness of Fit, Independence Test	10

Textbook:	
	1. Linear Algebra and its Applications by David C Lay, Pearson 2. Business Mathematics by KashyapTrivedi, ChiragTrivedi, Pearson

Reference Books:	
	1. Fundamentals of Mathematical Statistics – 1st Edition S.C.Gupta, V.K.Kapoor , S Chand 2. Introduction to Probability & Statistics – 4th Edition J.Susan Milton, Jesse C. Arnold Tata McGraw Hill 3. Fundamentals of Statistics : 7th edition S C Gupta, Himalaya Publishing house 4. Probability and Statistics with Reliability, Queuing, And Computer Science Applications (English) 1st Edition: KishoreTrivedi, PHI 5. Schaum's Outlines Probability, Random Variables & Random Process 3rd Edition Tata McGraw Hill 6. Probability & Statistics for Engineers: Dr J Ravichandran, Wiley 7. Statistics for Business and Economics: Dr Seema Sharma, Wiley 8. 1Applied Business Statistics 7th Edition Ken Black, Wiley

Course Code	1SMC04
Course Name	**Computer Networks and Security**
Credits	**4**
Course Objectives :	1. Understand fundamentals of networking concepts with the help of layered architecture which includes OSI and TCP/IP model
	2. Know the principles of congestion control and trade-offs in fairness and efficiency, network security, network management, sensor networks etc
Course Outcomes :	On completion of the course, the students will
	1. To familiarize the student with the basic taxonomy and terminology of computer networks
	2. Learn sockets programming and how to implement client/server programs.
	3. Know the concepts of reliable data transfer and how TCP implements these concepts
	4. Understand the basics of error detection including parity, checksums, and CRC
	5. To prepare the student for advanced courses in computer networking.
	6. Familiarize the student with current topics such as security, network management, sensor networks, and/or other topics.

Units	Contents	Total Hrs
I	Introduction: Brief history of computer networks & Internet, Basic Model of Communication System; *Data Transmission*: Modes: Simplex, Half Duplex, Full Duplex; Methods*/Types*: Parallel, Serial: Asynchronous, Synchronous, Isochronous; *Transmission Media:* Guided and unguided; *switching***:** Circuit, Message, and Packet, Layered architecture, Internet protocol stack,. Delays in Packet Switched Network. *Models***:** ISO-OSI model.	10
II	*Application layer*: Principles of protocols, *Processes***:** Client-Server Mode Socket Interface; Services required by Application Layer; *HTTP*: Introduction, RTT, HTTP Handshake, types of HTTP Connections Authentication and Cookies; *FTP***:** Service Model. Electronic Mail; SMTP, HTTP, FTP, SMTP and DNS protocols. Network topologies, Types of Networks: LAN, MAN, WAN.	10
III	Transport Layer: Services; Multiplexing and Demultiplexing Applications; Connectionless Transport – UDP; Principles of Reliable of Data Transfer (RDT); Connection-Oriented Transport: TCP; Flow Control; Principles of Congestion Control; Approaches towards Congestion Control; TCP Congestion Control	10
IV	**Network Layer:** Services; Network Service Model: Datagram, Virtual Circuit; Routing Principles; Routing Algorithms: Classifications; Hierarchical Routing; Internet Protocol: IP and ICMP; Routing in the Internet: RIP, OSPF, BGP; Router.	8
V	Data Link Layer: Introduction, Services; Error Detection and Correction Multiple Access Protocols: ALOHA, CSMA/CD; LAN Addresses and Address Resolution Protocol ARP; Carrier Sense Multiple Access / CD Ethernet; Hubs, Bridges and Switches; Point-to-Point Protocol.	8

VI	Network security issues, Network security components, principles of cryptography, authentication & authentication protocol, integrity, digital signatures, key distribution & certification, Network Management: principles, infrastructure for network management, The Internet Network – management framework.	8

Textbook :	
	Data Communication and Networking – Behrouz A. Forouzan (McGrawHill), . James F. Kurose & K W Ross: Computer Networking, Pearson Education (LPE) REFERENCES: . Douglas E. Comer: Computer Network & Internet, Addison Wesley. . Andrew S. Tanenbaum : Computer Networks, PHI (5E) . Leon Garcia & Widjaja: Communication Networks, TMH . William Stallings: Data & Computer Communication, Pearson Education.

Reference Books :	
	1. Computer Networking –James F. Kurose and Keith W. Ross(Pearson) 2. Data Communication and Networking – Behrouz A. Forouzan (McGrawHill) 3. Computer Network & Internet - Douglas E.Comer(Pearson) 4. Data and Computer Communication – WilliamStallings(Pearson) 5. Computer Networks - Andrew S.Tanenbaum(PHI) 6. Mobile Communications - JochenSchiller(Addison-Wesley)

Course Code	1SMC05
Course Name	Professional Communication
Credits	1
Course Objectives:	1. Understand the various techniques of professional communication and apply them.
Course Category	Humanities and Social Science Core
Course Outcomes :	On completion of the course, the students will be able to
	1. Understand the types of professional communication and correspondence
	2. Comprehend the processes like receiving, filing and replying
	3.Implementation of effective techniques in presentation and social network.

Activity	Contents	Total Hrs
I	**Before Speak! Think or Write** Introduction and Importance of communication in mode of speaking, writing, speaking.	8
II	**Make a group, Always in a group** Group activity like – group discussion brainstorming the topic -– questioning and clarifying – GD strategies, Debate, Problem solving techniques using positive communication	10

III	**Express your skill** Need of presentation, making PowerPoint presentation, Paper Presentation, Report writing, Interview etiquette (dress code – body language – attending job interviews).	12
IV	**Time and Network** Managing time-managing stress- networking professionally- respecting social protocols-understanding career management	10

Reference Materials:	
1.	Effective Communication - Introduction to Communication Skills - Communication Skills - https://www.youtube.com/watch?v=W-4IcNJIyM8&list=PLvbKJaHKFw3ZYTp2Fc9cj2LwZtIbOd5ux
2.	How to improve Communication Skills? By Sandeep Maheshwari I Hindi - https://www.youtube.com/watch?v=hE6I9apUvrk
3.	Public Speaking Skills	Boost your Confidence	Ankur Warikoo
4.	https://www.youtube.com/watch?v=savwVzZh5go

Course Code	1SMC06
Course Name	**Web Designing lab**
Credits	**2**
Course Objectives:	After completion of this course the students will be able to develop dynamic web pages using HTML ,Cascading Style Sheets and Javascript .
Course Outcomes :	1. Learn and use mark-up language HTML and Scripting language CSS. 2. Work with JavaScript and develop UI/UX design. 3. Develop skills of basic web development and design professional web pages.

Sr. No.	Contents
	Write programs based on **HTML** Lists ,Tables ,Images ,Forms, Buttons, Audio ,Video, DatePicker **Cascading Style Sheet:** -Font Properties , Background properties , Border properties ,text properties ,margin properties, padding properties ,table properties, positioning properties , line/marker properties. **JAVASCRIPT :** control structures, predefined keywords - arrays ,predefined functions , user defined functions – arrays and functions – mathematical functions , string functions ,objects ,expressions ,pattern matching using RegEXp ,String Class ,Exception Handling ,Built–in objects , Bgcolor/ Fgcolor, Date Object, Events and Event Handling ,Validations , Window Confirmation, alert messages, lambda expression

Contents	Total hours
The sample list of programs given below. This list can be used as guideline for problem statements. Aim of the list is to inform about minimum expected outcomes. 1) Cerate a web page using text formatting tags like<H><p><hr>
<font><b>,<i> etc 2) Create a webpage which displays the use of table 3) Create a webpage which displays the use of ordered and unordered list 4) Create a employee registration webpage using html form objects. 5) Create WebPages for online shopping site and use inline, internal andexternal css. 6) Write a Javascript program that uses different control structure. 7) Write a Javascript program that performs validations on html form fields. 8) Write a Javascript program to demonstrate the use of functions. 9) Write a Javascript program to demonstrate the use of lambda expression 10) Write a JavaScript code to study the String object and various methods 11) Implement few programs using tools like DreamViewer, Bootstrap	**2** **4**

Apart from the Format shown above for Course Lab, special instructions may be added like Text or Reference books or List of Practical's to be covered beyond syllabus etc

TEXT BOOK:	
	1. HTML 5 Black Book, Covers CSS3, JavaScript, XML, XHTML,AJAX, PHP andjQuery, 2nd Edition 2016 2. Javascript A Beginners Guide, 3rd Edition – John Pollock - Tata McGraw-HillEdition 3. Raj Kamal, Internet and Web Technologies, Tata McGraw Hill

Useful Links :	
	1. https://developer.mozilla.org/en-US/docs/Learn/HTML 2. https://developer.mozilla.org/en-US/docs/Web/CSS/Tutorials 3. www.tutorialspoint.com 4. www.javatpoint.com

Course Code	1SMC07
Course Name	**Object Oriented Programming(OOP) Using Java Lab(0-0-4)**
Credits	3
Course Objectives:	1. Students should be able to implement and appreciate the paradigms of object oriented programming using Java
	2. Students should understand concepts of multithreading and exception handling and be able to write simple programs based on them
	3. Students should understand the Collection framework and know the difference between different data structures in collection framework

Course Outcomes :	On completion of the course, the students will
	1. Write OOP using java 2. Write programs for file handling 3. Write programs using appropriate collection frameworks

	Contents	Total Hrs
	Write test and debug programs based on: Java loops, conditionals, classes, inheritance, abstract classes, interfaces, packages, access control in packages, exception handling, multithreading, file handling, lambda expressions, and diligently use various data structures from the collection framework. List of Practical's: 1 WAP in java to Print Given Output A . 10101 B. 1 0101 232 101 34543 01 4567654 1 567898765 2 Write a Program that accepts integer input and covert the given integer number to Binary or Hexadecimal. 3 WAP in java which read the string from command line argument and check the string for vowels and prints the string without the vowels. 4 WAP that has a class with overloaded member function (add) . One add takes double arguments and the other takes int arguments. The add member function should display all the arguments it takes and also display their sum Run the program by providing different number of arguments(NOTE: use VarArgs). Run the program atleast 10 times with different number of arguments and take 10 outputs. 5 Create an abstract class Fig3d with a data member dim1 and an abstract function vol(). Create 2 classes sphere and cylinder and that inherit Fig3d. These classes should implement the vol() function. Add this program to a package. 6 WAP in java that Creates an Interface figure2d with member function area(). Write two classes named "rectangle" and "triangle" that implements the above interface and display the area of the figure. 7 Write a Program in java that Generates two set of 10 random numbers and divides a number from one set with one from the another set. Anticipate the kind of exception that will be generated and catch it. 8 WAP in java that takes your birth date as input from the command line. Check if the date is valid. If yes, check if it is less than today's date. If not generate an exception created by you, with a proper message that birthdates should be less than today's date. If proper date is entered display the age 9 WAP in java that Creates Two Threads, set there Priorities (High to Low) and Shows the number of CPU Cycles allotted to each thread. Make a use of join() Method. 10 WAP in java to Display the Use of Synchronized Method Synchronized Block 11 WAP in java to Copy the Content of one file to the other file without using any looping statements. Read the Name of the file from the command line 12 WAP in Java that reads and displays its own contents. 13 Write an application program in Java using Switch statements to print A-Z,a-	30

z,0-9by inputting ASCII value of first character.

14 Write an application in Java which creates an AddressBook class which manages collection of person object and allows programmer to add, delete search a Person object in the Address Book using Collection Framework.

Course Code	1SMC08
Course Name	Data Structures using C++ Lab
Credits	1
Course Outcome	On completion of the course, the students will be able to get
	1.Develop program for implementing different data structure such as array, linked list ,stack, queue, tree and graph for operations such as searching , Inserting, deleting, Sorting.
	2. Identify and use various data structures for solving problem.
	3. Perform Analysis of algorithms.

Sr. No.	Contents	Total Hrs
	The sample list of programs given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes. 1. Write a program to implement Searching Algorithm i) Linear Search ii) BinarySearch 2. Write a program to implement Sorting Algorithm i) Bubble Sort ii) Selection Sort iii) InsertionSort 3. Write a program to perform i) Addition of Matrix ii) Multiplication of Matrix 4. Write a program to implement Array (Insertion, Deletion & Searching operation) 5. Write a program to implement Linear Linked List (Insertion ,Deletion & Searching operation) 6. Write a program to implement Stack (PUSH, POP, DISPLAY Operations) 7. Write a program for towers of Hanoi using Recusion. 8. Write a program to implement Queue (Insertion, Deletion) 9. Write a program to implement Tree Traversal Algorithm (Inorder, Preorder, Postorder) 10. Write a program to implement Graph using Adjacency Matrix.	30

SYLLABUS OF MASTER IN COMPUTER APPLICATION 1st Year SEMESTER II [Two Years]	
Course Code	**2SMC01**
Course Name	**Operating Systems and Virtualization**
Credits	**4**
Course Objectives:	1. Understand the mechanisms of the Operating Systems like Process Management, Process Synchronization storage Structures used in OS and apply the mechanism to resolve deadlocks.
	2. Implement memory management ,disk and process scheduling techniques
	3. To Understand the most common hardware features that support virtualization and explain how they are used by operating system modules.
Course Outcomes:	On completion of this course, student will be able to:
	1. Understand the concept of programs & processes along with the need of scheduling in operating systems
	2. Recognize different states of process and schedulers to apply scheduling algorithms to meet the scheduling objectives and acquire the knowledge of dealing with deadlocks.
	3. Apply memory management techniques & virtual memory concepts to avoid page faults and computing page replacement strategies
	4. Analyze and apply various virtualization techniques in OS security
	5. Compare different operating system and Guest system.
	6. Apply hypervisor techniques to build virtual environment for network system.

Units	Contents	Total Hrs
I	Introduction: Operating System (OS) definition, OS Evolution, OS Components and Services. Process Concept, Process Scheduling, Operations on Processes, Cooperating Processes, Interprocess Communication, Threads Overview, Multi-threading Models, Threading Issues.	10
II	CPU Scheduling Concepts, Scheduling Criteria and Algorithms. Process Synchronization: The Critical-Section Problem, Synchronization Hardware, Semaphores, Monitors. Deadlocks: Definition & Characterization, Deadlocks Prevention, Avoidance, Detection and Recovery from Deadlock.	8
III	Memory Management Background, Swapping, Contiguous Memory Allocation Schemes, Paging, Segmentation. Virtual Memory Management: Background, Demand Paging scheme, Process Creation, Page Replacement Policies, Allocation of Frames, Thrashing.	9
IV	File-System Interface; Directory structure, File-System Mounting, File Sharing & Protection. File-System Structure, File-System Implementation. Directory Implementation, Allocation Methods, Free-Space Management. File Recovery	8

	I/O Systems: Overview, I/O Hardware, Application I/O Interface, and Kernel I/O Subsystem. Transforming I/O to Hardware Operations. Disk Scheduling, Disk Management, Swap – Space Management, RAID Structure.	
V	I/O Systems: Overview, I/O Hardware, Application I/O Interface, and Kernel I/O Subsystem. Transforming I/O to Hardware Operations. Disk Scheduling, Disk Management, Swap – Space Management, RAID Structure.	8
VI	Virtualization: Introduction, Types of virtualizations, Linux KVM, VM Manager, Kimchi Project, SDN, Performance tuning in KVM, Implementing Type II hypervisor (Virtual Box), Installation of Guest OS and firewall configuration.	10
Text Book	Avi Silberschatz , P.B.Galvin, G. Gagne : "Operating System Concepts"	

Reference Books :	
	1. Avi Silberschatz , P.B.Galvin, G. Gagne : "Operating System Concepts" 2. D M Dhamdhere "Operating Systems" Tata McGraw-Hill. 3. Humble chirammal - Mastering KVM virtualization – Packt Publication

Course Code	**2SMC02**
Course Name	**Database Systems**
Credits	**04**
Course Objectives:	1. Design relational data models .
	2. Use SQL, and other database supporting software for designing and querying databases.
	3. Implement security and integrity policies related to databases.
Course Outcomes:	On completion of the course, the students will be able to
	1. Comprehend the fundamental elements of relational database management systems
	2. Query the databases using SQL and write stored procedure and functions.
	3. Design database using the E-R Model
	4. Understand basic database storage structures and access techniques
	5. Implement accuracy and integrity using transaction properties.
	6. Apply the concepts of database for data analytics,, parallel and distributed databases.

Units	Contents	Total Hrs
I	Database System Applications, Purpose of Database System, View of Data, Database Languages, Database Design, Database Engine, Database and Application Architecture, Database Users and Administrators, Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, The Relational Algebra.	8
II	Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database, Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Index Definition in SQL, Authorization, Accessing SQL from a Programming Language, Functions and Procedures, Triggers.	8
III	Database Design Using the E-R Model: Overview of the Design Process, The Entity-Relationship Model, Complex Attributes, Mapping Cardinalities, Primary Key Removing Redundant Attributes in Entity Sets, Reducing E-R Diagrams to Relational Schemas, Extended E-R Features, Entity-Relationship Design Issues Relational Database Design: Features of Good Relational Designs, Decomposition Using Functional Dependencies, Normal Forms, 1NF, 2NF, 3NF, Boyce-Codd Normal Form, 4NF, Functional- Dependency Theory, Algorithms for Decomposition Using Functional Dependencies,	8
IV	Physical Storage Systems: Overview of Physical Storage Media, Storage Interfaces, Magnetic Disks, Flash Memory, RAID, Disk-Block Access. Data Storage Structures: Database Storage Architecture, File Organization Organization of Records in Files, Data-Dictionary Storage, Database Buffer Column-Oriented Storage, Storage Organization in Main-Memory Databases.	8
V	Indexing: Basic Concepts of Indexing, Ordered Indices, B+-Tree Index Files Creation of Indices. Transactions: Transaction Concept, Simple Transaction Model, ACID properties Storage Structure, Transaction Atomicity and Durability, Transaction Isolation Serializability, Transaction Isolation and Atomicity.	8
VI	Concurrency Control: Basic concept of concurrency control, introduction of Protocols. Database-System Architectures: Overview of Centralized Database Systems, Server System Architectures, Parallel Systems, Distributed Systems Transaction Processing in Parallel and Distributed Systems, Cloud-Based Services Introduction to BigData.	8

Textbook :
Silberschatz, Korth, Sudarshan : Database System Concepts , McGraw Hill, 7th Edition

Reference Books :
1. Raghu Ramkrishnan :Database System (TMH) 2. C.J.Date : Database System, 7th ed,.(Pearson Education) 3. Connolly & Begg, : Database System, Low Price Ed. (Pearson Education) 4. Navathe & Elmarsi , Fundamentals of Database Systems. 4/e (Pearson Education).

Course Code	2SMC03
Course Name	**Resource Management Techniques**
Credits	**4**
Course Objectives:	1. Students should acquire a systematic understanding of resource management techniques and apply them for optimization of resources in real life problems.
	2. The students should be able to make decision using systematic process and techniques
Course Outcomes :	On completion of the course, the students will be able to
	1. Use transportation problem solving techniques to optimize transportation problem.
	2. Apply job scheduling techniques for effective production management and allocation of resources.
	3. Apply decision making techniques to help individual, poor or strong financial firms.
	4. Apply network scheduling techniques to improve the production management.
	5. Solve dynamic programming problem and calculate replacement age of equipment that deteriorate with time.
	6. Simulate real life situation into a mathematical model using LPP.

Units	Contents	Total Hrs
I	**Transportation Problem:** Introduction to transportation problem mathematical model, types of transportation problem, Optimization techniques for transportation problem, methods to find basic solution, Northwest Corner cell Method (NWCM), Least Cost cell Method (LCM), Vogel Approximation Method (VAM). Optimizing the basic feasible solution using U-V method.	10
II	**Sequencing Problem:** N Jobs and Two machine sequencing Problems, N job and three machine sequencing problem. **Assignment Problem:** Introduction, zero-one programming model for Assignment problems, type of assignment problems.	10
III	**Decision Theory:** Introduction to decision theory, minimax, minimin maximin and maximax decision procedure, Bayes decision procedure. Regret function versus loss function. **Game Theory:** minimax, maximin, pure strategies, mixed strategies & expected payoff, solution of $2 \times n$ games, $m \times 2$ games. Brawn's Algorithm	10
IV	**Network Analysis:** Critical Path Method (CPM), Critical Path, Time estimates as EST, EFT, LST and LFT and Floats. Project Evaluation and Review Technique (PERT) Network, ET, TE, TL, SE,critical path, probability of completing events on schedule.	10
V	**Dynamic programming problems:** Introduction, Terminology, Bellmans Principle of Optimality, Applications of dynamic programming-shortest path problem, Investment problem. **Equipment replacement problems**: Introduction , Types of Failure Replacement of items that deteriorate with time	10
VI	**Linear Programming Problems:** Introduction, concept of linear programming model, Formulation of Linear Programming Problem Graphical Method, Simplex Method, Big M Method, Two phase Method.	10

Textbook :	
	1. J.K. Sharma " Operation Research" (2/e)Macmillan. 2. R.Panneerselvam "Operation Research"PHI. 3. Operations Research, KantiSwarup, Gupta. P. K. & Man Mohan, S. Chand & Sons.

Reference Books :	
	1. Tata Hamdy, " Operations Research- An Introduction" (5/e), PHI. 2. Taha H. A. "Operation Research"Macmillan.

Course Code	Elective 1 2SMC04-i
Course Name	**i) Introduction to Python Programming (4-0-0)**
Credits	**4**
Course Objectives:	1. Students should understand Python programming constructs and be able to write simple python programs using them.
	2.Students should understand various data structures and numpy and pandas packages of Python and be able to use them for a given problem statement

Course Outcomes:	On completion of the course, the students will
	1. Use basic functionalities of Python
	2. Know and apply various data structures of Python
	3. Understand exception handling, decorators, Generators
	4. Use multithreading and multiprocessing
	5. Use numpy functions and methods on given data
	6. Use pandas functions and methods on given data

Units	Contents	Total Hrs
I	Why Python? Install Python on Windows, various IDEs used for Python Programming. Numbers, Strings, Lists, variables, if statement for loops, functions, lambda functions Programming problems on all topics	8
II	Data Structures: Sets, Dictionaries, Tuples, List Comprehensions, Modules: Installing modules, creating modules, using modules, working with JSON, Reading Reading/Writing Files, Understanding ___main___	8
III	Exception handling, Classes and objects, Inheritance, Multiple Inheritance Iterators, Generators, Decorators, command line arguments	8
IV	Introduction to Multithreading, Multiprocessing, Sharing data between processes, Multiprocessing lock, Multiprocessing pool	8
V	Numpy: Introduction, Creating arrays: single to multi dimensional, attributes of Numpy Array:ndim, shape, size, dtype, itemsize, Numpy functions: zeroes, ones, empty, zeros_like, ones, ones_like, empty,set_printoptions. arrange, reshape, BasicArrayOperations:min, max, cumsum, sqrt, exp, add, Statistical order functions, averages , variance, covariance, correlation, Nan equivalent functions Indexing, slicing and iterating arrays, changing the shape, stacking, splitting of arrays, Random Generators and seeds, Basic Random functions, Probably distributions in Numpy, Reading data from csv,excel,text files	8
VI	Pandas: Introduction to Pandas, datastructures in pandas:Series,DataFrame reading excel,csv,tsv,table data into a data frame, reading data from a data frame back into a table,reading data from a DataFrame, Deleting external data selecting rows and columns from DataFrame, Creating new columns from existing, rename row/column names, Summary statistics: mean, median aggregating statistics by category: groupby, value_counts, count, loc, iloc reshape table layout: sort_values, long to wide format(pivot) and viceversa(melt),Concatenating and merging objects, Handling Time Series Data, textual Data	8

TextBooks :	
	3. Martin C. Brown- Python: The Complete Reference-Fourth Edition-Mc-Graw Hill-2018

Reference Books :

	1. John V. Guttag, Introduction to Computation and Programming Using Python with Application to Computational Modelling and Understanding Data- Third Edition- MIT press- 2021. 2. Paul J. Deitel- Harvey Deitel- Python for Programmers- First Edition- Pearson-2020.

Course Code	**Elective 1 2SMC04-ii)**
Course Name	**ii) System Administration and Security (4-0-0)**
Credits	**4**
Course Objectives:	1. Students should understand principles, and practices and goals of system administration and the major approaches to computer management in the network environment.
	2. Students should be able to implement Network OS administration techniques and management techniques to provide security.
Course Outcomes :	On completion of the course, the students will be able to
	1. Integrate a biblical world view within information technology, also Describe threats to information security
	2. Examine the primary components of administrative domains. Identify methods, tools and techniques for combating these threats
	3. Identify types of attacks and problems that occur when systems are not properly protected
	4. Analyze applications to solve organizational needs. also Explain integral parts of overall good information security practices
	5.Identify and discuss issues related to access control
	6. Identify security issues related to personnel decisions, and qualifications of security personnel

Units	Contents	Total Hrs
I	Introduction to network security, Introduction to System Administration, Definition and role of system administration, Key responsibilities and skills of system administrators, Overview of different operating systems and their administration tools, Network Fundamentals, Introduction to computer networks and network topologies, Network services and protocols, Network device management (routers, switches, firewalls)..	10
II	Computer security concepts, OSI Security architecture, Security attacks, Passive and active attacks, Understanding threats: Internal Threats, External Threats, Security Attacks, authentication, integrity, access control, A model for network security, Standards, Cryptography: Symmetric Encryption Principles: Cryptography; Cryptanalysis; Feistel Cipher Structure.	10

III	Symmetric Block Encryption Algorithms: Data Encryption Standard; Triple DES; Advanced Encryption Standard, standardization process, Key distribution, public key cryptography principles, digital signature, and internet standards, Symmetric key distribution using symmetric encryption Network security applications: Kerberos, Key Distribution Using Asymmetric Encryption, X.509 certificate	8
IV	Transport-level security, Web security considerations, secure socket layer and transport layer security, HTTPS, System Security: Intruder, Intruder Behavior Patterns, and Intrusion Techniques, Intrusion Detection, Password Management, Password Protection, password selection strategies, Password Complexity, Types of Password Attacks, IP Security: Overview, Web Security.	8
V	Malicious software, Types of Malicious Software, Introduction to Viruses, Stages of Viruses Life, and Working of Viruses, Indications of Viruses attack, Types of Viruses, viruses and related threats: Nature of viruses, Viruses Classification, Computer Worms, Dos attack, and various antivirus approaches, Virus detection methods, Virus and worms countermeasures, Firewall, Need for firewall.	8
VI	Network Management Security: Basic concepts of SNMP, Ethical Hacking, Types of Hackers, Skills required for an Ethical Hacker, Types of Attacks, Social Engineering, Behaviors Vulnerable to attacks, Why is Social Engineering Effective, Warning Signs of an Attacks, Denial of Service Attack, Symptoms of DoS attack, Botnets, Introduction to Cyber Crime Investigation, Cyber Law & IT Act.	8

Textbook :

	Network Security Essentials - William Stallings (Pearson Edu. Asia)

Reference Books :

	1 Security for Telecommunication and Network management by Moshe Rozenbit (PHI) 2. Internet Security Protocols - Protecting IP Traffic, by Uyless Black (Pearson Edu. Asia)

Course Code	ELECTIVE 1 2SMC04-iii
Course Name	iii)Client Server Computing iii(4-0-0)
Credits	4
Course Objectives:	Provide a sound foundation to the students on the concepts and practices used in Client Server Computing using java as the language, so that the students are able to put into use the advanced features of Java language to build and compile robust enterprise grade applications using advanced concepts like Servlets , JSP, Beans, JDBC, Hibernate and Spring
Course Outcomes:	On completion of the course, the students will
	1. Write JDBC Code to access and manipulate database data
	2. Write servlets, JDBC servlets and understand and use techniques of session handling
	3. Write JSP and also use JSTL

	4. Use Javascript for client side validations.
	5. Use hibernate and appreciate it as compared to JDBC.
	6. Use MVC with spring and implement the server side programs in MVC framework **Pre-requisite of course: Knowledge of Core Java**

Units	Contents	Total Hrs
I	**Java Database Connectivity:** JDBC Concepts, JDBC API, Driver Manager, Connection,Statement,PreparedStatement, CallableStatementand ResultSet classeswith relevant methods, Types of ResultSets.Handling queries, inserts, deletes and updates to database.Displaying the query results. Stored Procedures.	8
II	**Servlets in Java:** Servlet structure & lifecycle. Servlet A P I basics, various classes & interfaces. Servlet requirements, writing. Running of Servlets, Concepts ofCookies, Servlets & cookies. Session managementwith ServletAPI. Server side includes and request forwarding.Servlet chaining. Jdbc Servlets.	8
III	**Introduction to JSP:** Simple JSP concepts, Environment set up for JSP, Life cycle of a JSP, Elements involved with development of JSP: Scripting Elements,Directives, Implicit Objects. Java beans: Concept of Beans, Properties, Bean instances & serialization, Bean Scopes, Writing Beans, Deploying a bean, JDBC bean. Jsp Actions, Using a bean in a JSP. Java StandardTagLibrary(JSTL/AdvancedJSP):Typesoftags,coreandSQLtags in detail.	8
IV	**Introduction to Javascript:** What is Javascript?, Values, Types and Operators Expressions and statements, control flow statements, Functions, Arrow Functions, HTTP and Forms, Event handling, data Structures, objects, Regular Expressions	8
V	**Introduction to Hibernate:** Why Hibernate?, Architecture of Hibernate, Hibernate Query language,Hibernate O/R Mapping,Setting up the Development Environment ,Creating Database TableWriting-> Hibernate Configuration File, JavaBean, and Hibernate Mapping File, Developing Controller Component,Developing view Component	8
VI	**Introduction to Spring**: Spring MVC essentials. Architecture & workflow features, Maven repository ,Dependency Injection (IoC), Spring Beans & Bean factory. Spring controller & annotations AOP (Aspect oriented programming) . Spring boot,Auto configuration & Maven dependency management. Spring initializer, Actuators, Spring data JPA, application.properties(hibernate),Spring REST. GET & POST services,Introduction to Microservices and serverless computing.	8

Textbook :
Java Server Programming Java EE 7 (J2EE 1.7) Black Book(2014) KogentLearning SolutionsInc.
Core Servlets and Java Server Pages: Core Technologies by Marty Hall and Larry Brown Java 2 Platform Enterprise Edition series, PrenticeHall

Reference Books :
Suggested Resources: 1) 1 Java EE cookbook, Elder Moraes,Packt Publishing Limited (9 April 2018) **Reference URLs**: www.docs.oracle.com www.tutorialspoint.com www.javatpoint.com ***Suggested Resource for unit VI: https://spring.io/guides***

Course Code	2SMC05-i
Course Name	**Elective 1 Lab-I: Python Programming Lab (0-0-4)**
Credits	**2**
Course Outcomes:	On completion of the course, the students will
	1 Learn to write, test, and debug simple Python programs, Loops and Conditionals, Use OOP concepts in Python programs
	2. Read and write data from/to files in Python. String Operations, Basic Data structures
	3. Understand and Use the Numpy and Pandas packages. **Write test and debug minimum 10 programs based on: All topics learnt in course MCA23204**

Course Code	2SMC05-ii
Course Name	**Elective 1 Lab-II: System Administration and Security_Lab (0-0-4)**
Credits	**2**
Course Outcomes:	On completion of the course, the students will
	1 Comprehend and apply authentication, email security, web security services and mechanisms
	2. Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to various attacks.
	3. Identify and know security risks, concepts, Ethics in Network Security. Identify and classify various Attacks and explain the same. Discuss the effectiveness of passwords in access control.

	Contents

	Topics covered in LAB Hours:-
	
	 1. About Linux OS.
	 2. Introduction to Linux Shell (BASH)
	 3. Linux Network configuration & setup using network tools.
	 4. System administrator & User management.
	 5. Maintaining linux file system.
	 6. File and service sharing (SAMBA & NFS)
	 7. Configure client side DNS.
	 8. Perform security administration tasks
	    a)Network Trouble shooting
	    b) Firewall setup
	    c) GRUB & BIOS Setup
	 9. Securing data with encryption.
	 10. Linux Server Configuration.

Course Code	2SMC05-iii
Course Name	**Elective 1 Lab- III -: Client Server Computing(0-0-4)**
Credits	2
Course Outcomes :	On completion of the course, the students will be able to

	1. Design and Develop Desktop application using JDBC 2. Design and Develop applications by Integrating any of Servlets, JSPs, JDBC and JavaScript 3. Design and Develop applications by integrating Spring, hibernate by analyzing requirements and evaluating existing system.

	Contents

	The sample list of programs is given below. This list can be used as a guideline but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.
	
	Write program TO:
	1. Create a database, table/tables, in the database using JDBC
	2. Insert, Update, delete records from database table based on conditions
	3. Display the records in database table based on conditions
	4. Write servlet programs to manipulate table data
	5. Write a servlet program in Java that calls a stored procedure.
	6. Write a small application that performs state management using Cookies,
	7. Write a small application that performs state management using Http Session
	8. Create a registration form with validations using javas cript
	9. Write a java script program to validate Roman numerals, mobile number, email
	10. Write programs that manipulate database tables using JSP,JSTL
	11. Rewrite few of the above JDBC based programs using hibernate
	12. Create a small application using Spring and hibernate
	    ☐ What is VI editor
	    ☐ Create BIO data in VI
	    ☐ Steps to save file on system

Course Code	2SMC06
Course Name	**Operating Systems and Virtualization Lab**
Credits	1

Course Outcomes:	1. To implement shell programming and process scheduling.
	2. Implementation of virtualization techniques and hypervisor Configuration.
	3. Implement file management and user configuration on network system.

Sample list for practical completion is as follows –

1.	Case Study on – Ubuntu Operating system Case study must include following : OS (Debian) ☐ Origin of Ubuntu – up to current version ☐ Version details of Ubuntu OS ☐ Tools used in Ubuntu OS (GIMP, Libre etc) ☐ What is GCC ? ☐ What is shell programming ? ☐ State and explain different types of Shell. ? ☐ What is Terminal ? how to use command on Terminal
2.	Write a shell script program of basic shell or using select case statement.

3.	Create a text file using vi editor, use insert / command / execute mode
	              – version
	   Explain Modes of VI

4	Write Shell script program to check whether given file is a directory or not.
5	Write a shell script to display details of running process and threads in system Use select case – A. Enter p for process details B. Enter t for threads details
6.	Write a Shell script to find the number of words character, words and lines in a file.
7.	Write a shell script program to display list of users currently logged in.
8.	Write a program for Round robin algorithm.
9.	Write a program for FCFS scheduling algorithm.
10.	Install a Type II hypervisor and share virtual file instance between host and guest OS.

Course Code	2SMC07
Course Name	**Minor Project based on Database Systems and Web Designing**
Credits	2
Course Objectives:	1. To make the students to set the industrial exposure.
	2. To implement the knowledge of database systems & web designing and apply innovative and creative ideas for solving real world problems in order to get industry like exposure.
Course Outcomes:	On completion of the course, the students will be able to
	1. Apply the basic concepts of Database Systems and design a data model.
	2. Create web pages using web designing tools.
	3. Develop an application using a commercial relational database system (Oracle, MySQL) using SQL, stored procedure, function and web designing tools.

	1. Develop a small project using HTML, CSS, Python/Java, MySQL