NAAC ACREDITATION: 'A' GRADE

BEST COLLEGE AWARD BY THE UNIVERSITY OF MUMBAI

BACHELOR OF SCIENCE
(B.Sc – Information Technology)

Three Year Integrated Programme-
Six Semesters
Course Structure

(Credit Based Semester and Grading System)

(Year of Implementation:2021-2022)

University of Mumbai
Uttari Bharat Sabha's

Ramanand Arya D.A.V. College
(Autonomous)

Bachelor of Science(Information technology)
(B.Sc. I.T.) Programme
Under Choice Based Credit, Grading and Semester System
Course Structure

FYBSc I.T.

(To be implemented from Academic Year- 2021-2022)

Programme Code : 1S00251			Programme Code : 1S00252		
Course Code	**Semester I**	**Credits**	**Course Code**	**Semester II**	**Credits**
USIT101	Imperative Programming	2	USIT201	Object Oriented Programming	2
USIT102	Digital Electronics	2	USIT202	Microprocessor Architecture	2
USIT103	Operating System	2	USIT203	Web Programming	2
USIT104	Discrete Mathematics	2	USIT204	Numerical & Statistical Method	2
USIT105	Communication Skills	2	USIT205	Green Computing	2
USIT1P1	Imperative Programming-Practical	2	USIT2P1	Object Oriented Programming - Practical	2
USIT1P2	Digital Electronics - Practical	2	USIT2P2	Microprocessor Architecture - practical	2
USIT1P3	Operating System- Practical	2	USIT2P3	Web Programming- Practical	2
USIT1P4	Discrete Mathematics – Practical	2	USIT2P4	Numerical & Statistical Method - Practical	2
USIT1P5	Communication Skills – practical	2	USIT2P5	Green Computing – Practical	2
	Total Credits	**20**		**Total Credits**	**20**

Second Year BSC IT

Programme Code : 1S00253			Programme Code : 1S00254		
Course Code	Semester III	Credits	Course Code	Semester IV	Credits
USIT301	Python Programming	2	USIT401	Core Java	2
USIT302	Data Structures	2	USIT402	Introduction to Embedded System	2
USIT303	Computer Networks	2	USIT403	Computer Oriented Statistical Techniques	2
USIT304	Database Management Systems	2	USIT404	Software Engineering	2
USIT305	Applied Mathematics	2	USIT405	Computer Graphics and Animation	2
USIT3P1	Python Programming- Practical	2	USIT4P1	Core Java- Practical	2
USIT3P2	Data Structures- Practical	2	USIT4P2	Introduction to Embedded System- Practical	2
USIT3P3	Computer Networks- Practical	2	USIT4P3	Computer Oriented Statistical Techniques- practical	2
USIT3P4	Database Management Systems– Practical	2	USIT4P4	Software Engineering – Practical	2
USIT3P5	Mobile Programming – practical	2	USIT4P5	Computer Graphics and Animation - Practical	2
	Total Credits	**20**		**Total Credits**	**20**

Third Year BSC IT

Programme Code : 1S00255			Programme Code : 1S00256		
Course Code	Semester V	Credits	Course Code	Semester VI	Credits
USIT501	Software Project Management	2	USIT601	Software Quality Assurance	2
USIT502	Internet of Things	2	USIT602	Security in Computing	2
USIT503	Advanced Web Programming	2	USIT603	Business Intelligence	2
USIT504	Linux System Administration	2	USIT604	Principles of Geographic Information Systems	2
USIT505	Enterprise Java	2	USIT605	Cyber Laws	2
USIT5P1	Project Dissertation	2	USIT6P1	Project Implementation	2
USIT5P2	Internet of Things- Practical	2	USIT6P2	Security in Computing- Practical	2
USIT5P3	Advanced Web Programming- Practical	2	USIT6P3	Business Intelligence- practical	2
USIT5P4	Linux System Administration – Practical	2	USIT6P4	Principles of Geographic Information Systems- Practical	2
USIT5P5	Enterprise Java – practical	2	USIT6P5	Advanced Mobile – Practical	2
	Total Credits	**20**		**Total Credits**	**20**

✓ **Note:** *Project work is considered as a special course involving application of knowledge in solving/analyzing/exploring a real life situation/ difficult problem. Project work would be of 04 credits. A project work may be undertaken in any area of Elective Courses/ study area selected*

Preamble

The B.Sc. Information Technology programme was started in 2001 with an aim to make the students employable and impart industry oriented training. The main objectives of the course are:

- to think analytically, creatively and critically in developing robust, extensible andhighly maintainable technological solutions to simple and complex problems.
- to apply their knowledge and skills to be employed and excel in IT professional careersand/or to continue their education in IT and/or related post graduate programmes.
- to be capable of managing complex IT projects with consideration of the human,financial and environmental factors.
- to work effectively as a part of a team to achieve a common stated goal.
- to adhere to the highest standards of ethics, including relevant industry andorganizational codes of conduct.
- to communicate effectively with a range of audiences both technical and non-technical.
- to develop an aptitude to engage in continuing professional development.

The new syllabus is aimed to achieve the objectives. The syllabus spanning three years covers the industry relevant courses. The students will be ready for the jobs available in different fieldslike:

- Software Development (Programming)
- Website Development
- Mobile app development
- Embedded Systems Programming
- Embedded Systems Development
- Software Testing
- Networking
- Database Administration
- System Administration
- Cyber Law Consultant
- GIS (Geographic Information Systems)
- IT Service Desk
- Security

And many others

The students will also be trained in communication skills and green computing.

University of Mumbai
Uttari Bharat Sabha's
Ramanand Arya D.A.V. College
(Autonomous)

BACHELOR OF SCIENCE
(B. Sc I.T.)
(First Year: Semester I and II)

REVISED SYLLABUS
AND
QUESTIONPAPERPATTERN

(Credit Based Semester and Grading System)

(Year of Implementation:2021-2022)

University of Mumbai

Uttari Bharat Sabha's

Ramanand Arya D.A.V. College
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Bachelor of Science(Information Techonoly)
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(To be implemented from Academic Year- 2021-2022)

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USIT1P4	Discrete Mathematics – Practical	2	USIT2P4	Numerical & Statistical Method - Practical	2
USIT1P5	Communication Skills – practical	2	USIT2P5	Green Computing – Practical	2
	Total Credits	**20**		**Total Credits**	**20**

Note :
First year Syllabus has been Revised in the Academic year 2021-2022 however second and third year syllabus will be revised in 2022-2023 and 2023-2024 respectively .
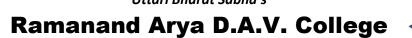
Core Course
Imperative Programming

Sr.No.	Modules/Units	No. of Lectures
1	Introduction to Computer Language.	12 Lectures
	Introduction: Types of Programming languages, History, features and application. Simple program logic, program development cycle, pseudo code statements and flowchart symbols, sentinel value to end a program, programming and user environments, evolution of programming models., desirable program characteristics. **Fundamentals:** Structure of a program. Compilation and Execution of a Program, CharacterSet,identifiersandkeywords,datatypes,constants,variables and arrays, declarations, expressions, statements, Variable definition, symbolic constants.	
2	Operators and Expressions and Data Input and output	12 Lectures
	Operators and Expressions: Arithmetic operators, unary operators, relational and logical operators, assignment operators, assignment operators, the conditional operator, library functions. **Data Input and output:** Single character input and output, entering input data, scanf function, printf function, gets and puts functions, interactive programming.	
3	Conditional Statements and Loops and Functions	12 Lectures
	Conditional Statements and Loops: Decision Making Within A Program, Conditions, Relational Operators, Logical Connectives, If Statement, If-Else Statement, Loops: While Loop, Do While, For Loop. Nested Loops, Infinite Loops, Switch Statement **Functions:** Overview, defining a function, accessing a function, passing arguments to a function, specifying argument data types, function prototypes, recursion, modular programming and functions, standard library of c functions, prototype of a function: foo1lal parameter list, return type, function call, block structure, passing arguments to a function: call by reference, call by value.	
4	Program structure, Preprocessor and Arrays	12 Lectures
	Program structure: Storageclasses,automaticvariables,externalvariables,staticvariables, multi file programs, more library functions, **Preprocessor:** Features, #define and #include, Directives and Macros **Arrays:** Definition, processing, passing arrays to functions, multidimensional arrays, arrays and strings.	
5	Pointers and Structures and Unions	12 Lectures
	Pointers: Fundamentals, declarations, Pointers Address Operators, Pointer Type Declaration, PointerAssignment, PointerInitialization, Pointer Arithmetic, Functions and Pointers, Arrays and Pointers, Pointer Arrays, passing functions to other functions	

Structures and Unions: Structure Variables, Initialization, Structure Assignment, Nested Structure, Structures and Functions, Structures and Arrays: Arrays of Structures, Structures Containing Arrays, Unions, Structures and pointers.

List of Practical

Practical no.	Title	No of lectures
1	**Basic Programs:** a) Write a program to display the message HELLO WORLD. b) Write a program to declare some variables of type int, float and double. Assign some values to these variables and display these values. c) Write a program to find the addition, subtraction, multiplication and division of two numbers.	3
2	**Programs on variables:** a) Write a program to swap two numbers without using third variable. b) Write a program to find the area of rectangle, square and circle. c) Write a program to find the volume of a cube, sphere, and cylinder.	3
3	**Conditional statements and loops(basic)** a) Write a program to enter a number from the user and display the month name. If b) number >13 then display invalid input using switch case. c) Write a program to check whether the number is even or odd. d) Write a program to check whether the number is positive, negative or zero. e) Write a program to find the factorial of a number. f) Write a program to find the largest of three numbers	3

4	**Conditional statements and loops(advanced)** a) Write a program to find the sum of squares of digits of a number. b) Write a program to reverse the digits of an integer. c) Write a program to find the sum of numbers from 1 to 100. d) Write a program to print the Fibonacci series. e) Write a program to find the reverse of a number. f) Write a program to find whether a given number is palindrome or not. g) Write a program to count the digit in a number	3
5	**Programs on pattern using different loops** a). Write a program in C to print following pattern * * * * * * * * * * b). Write a program in C to print following pattern 1 1 2 1 2 3 1 2 3 4 1 2 3 4 5 c). Write a program in C to print following pattern a b c d e a b c d a b c a b a	3
6	**Functions:** a) Write a program in C to find the square of any number using the function. b) Write a program in C to swap two numbers using function c) Write a program in C to check a given number is even or odd using the function.	3
7	**Recursive functions** a) Write a program to find the factorial of a number using recursive function. b) Write a program to find the sum of natural number using recursive function.	3

8	**Arrays** a) Write a program to find the largest value that is stored in the array. b) Write a program using pointers to compute the sum of all elements stored in an c) array. d) Write a program to arrange the 'n' numbers stored in the array in ascending and e) descending order. f) Write a program that performs addition and subtraction of matrices. g) Write a program that performs multiplication of matrices.	3
9	**Pointers** a) Write a program to demonstrate the use of pointers. b) Write a program to perform addition and subtraction of two pointer variables.	3
10	**Structures and Unions** a) Write a program to read and print an employee's detail using structure. b) Write a program to declare, initialize an union, example of union.	3
	Total	**30**

Reference Books:

Books and References:					
Sr. No.	Title	Author/s Publisher	Publisher	Edition	Year
1	Programming with C	Byron Gottfried	Tata McGraw-Hill	2nd	1996
2	"C" Programming"	Brian W. Kernighan and Denis M. Ritchie	PHI	2nd	
3	Let us C	Yashwant P. Kanetkar	BPB publication		
4	C for beginners	Madhusudan Mothe	X-Team Series	1st	2008

Core Course
Digital Electronics

Sr.No.	Modules/Units	No. of Lectures
1	Number Systems and Binary Arithmetic	12 Lectures
	Number System: Analog System, digital system, numbering system, binary number system, octal number system, hexadecimal number system, conversion from one number system to another, floating point numbers, weighted codes binary coded decimal, non-weighted codes Excess – 3 code, Gray code, Alphanumeric codes – ASCII Code, EBCDIC, Error detection and correction, Code conversion. **Binary Arithmetic**: Binary addition, Binary subtraction, Negative number representation, Subtraction using 1's complement and 2's complement, Binary multiplication and division, Arithmetic in octal number system, Arithmetic in hexadecimal number system, BCD and Excess – 3 arithmetic	
2	**Boolean Algebra and Logic Gates, Minterm, Maxterm and Karnaugh** Maps	12 Lectures
	Boolean Algebra and Logic Gates: Introduction, Logic (AND OR NOT), Boolean theorems, Boolean Laws, De Morgan's Theorem, Perfect Induction, Reduction of Logic expression using Boolean Algebra, Deriving Boolean expression from given circuit, exclusive OR and Exclusive NOR gates, Universal Logic gates, Implementation of other gates using universal gates, Input bubbled logic, Assertion level. **Minterm, Maxterm and Karnaugh** Maps: Introduction, minterms and sum of minterm form, maxterm and Product of maxterm form, Reduction technique using Karnaugh maps – 2/3/4/5 variable K-maps, grouping of variables in K-maps, K-maps for product of sum form, minimize Boolean expression using K-map and obtain K-map from Boolean expression	
3	**Combinational Logic Circuits and Arithmetic Circuits**	12 Lectures
	Combinational Logic Circuits: Introduction, Multi-input, multi-output Combinational circuits, Code converters design and implementations **Arithmetic Circuits**: Introduction, Adder, BCD Adder, Excess – 3 Adder, Binary Subtractors, BCD Subtractor, Multiplier, Comparator	

4	**Sequential Circuits**	12 Lectures
	Multiplexer, Demultiplexer, ALU, Encoder and Decoder: Introduction, Multiplexer, Demultiplexer, Decoder, ALU, Encoders. **Sequential Circuits: Flip-Flop:** Introduction, Terminologies used, S-R flip-flop, D flip-fop, JK flipflop, Race-around condition, Master – slave JK flip-flop, T flip-flop, Application of flipflops	
5	**Counters and Shift Register**s	12 Lectures
	Introduction, Asynchronous counter, Terms related to counters, IC 7493 (4-bit binary counter), Synchronous counter, Bushing, Type T Design, Type JK Design, Pre settable counter, IC 7490, IC 7492, Synchronous counter ICs, Analysis of counter circuits. **Shift Register**: Introduction, parallel and shift registers, serial shifting, serial–in serial– out, serial–in parallel–out, parallel–in parallel–out, Ring counter, Johnson counter, Applications of shift registers, IC7495, Seven Segment displays, analysis of shift counters . Types of memory: Types of RAM,ROM, Magnetic memory, content addressable memory, optical memory flash memory	

List of Practicals

Practical no.	Title	No of lectures
1	**Study of Logic gates and their ICs and universal gates**: a. Study of AND, OR, NOT, XOR, XNOR, NAND and NOR gates b. IC 7400, 7402, 7404, 7408, 7432, 7486, 74266 c. Implement AND, OR, NOT, XOR, XNOR using NAND gates. d. Implement AND, OR, NOT, XOR, XNOR using NOR gates	3
2	**Implement the given Boolean expressions using minimum number of gates.** a. Verifying De Morgan's laws. b. Implement other given expressions using minimum number of gates. c. Implement other given expressions using minimum number of ICs.	3
3	**Implement combinational circuits** a. Design and implement combinational circuit based on the problem given and minimizing using K-maps	3
4	**Implement code converters**. a. Design and implement Binary – to – Gray code converter. b. Design and implement Gray – to – Binary code converter. c. Design and implement Binary – to – BCD code converter d. Design and implement Binary – to – XS-3 code converter	3

5	**Implement Adder and Subtractor Arithmetic circuits.** a. Design and implement Half adder and Full adder. b. Design and implement BCD adder. c. Design and implement XS – 3 adder. d. Design and implement binary subtractor	3
6	**Implement Arithmetic circuits.** a. Design and implement a 2-bit by 2-bit multiplier. b. Design and implement a 2-bit comparator	3
7	**Implement Encode and Decoder and Multiplexer and Demultiplexers.** a. Design and implement 8:3 encoder. b. Design and implement 3:8 decoder c. Design and implement 4:1 multiplexer. Study of IC 74153, 74157 d. Design and implement 1:4 demultiplexer. Study of IC 74139 e. Implement the given expression using IC 74151 8:1 multiplexer. f. Implement the given expression using IC 74138 3:8 decoder.	3

8	**Study of flip-flops and counters**
	   a. Study of IC 7473.
	   b. Study of IC 7474.
	   c. Study of IC 7476.
	   d. Conversion of Flip-flops.
	   e. Design of 3-bit synchronous counter using 7473 and required gates
	 Design of 3-bit ripple counter using IC 7473
		3

9	**Study of counter ICs and designing Mod-N counters.** a. Study of IC 7490, 7492, 7493 and designing mod-n counters using these. b. Designing mod-n counters using IC 7473 and 7400 (NAND gates)	3
10	**Design of shift registers and shift register counters.** a. Design serial – in serial – out, serial – in parallel – out, parallel – in serial – out, parallel – in parallel – out and bidirectional shift registers using IC 7474. b. Study of ID 7495. c. Implementation of digits using seven segment displays	3
	Total	30

Reference Books:

Books and References:					
Sr. No.	Title	Author/s Publisher	Publisher	Edition	Year
1	Digital Electronics and Logic Design	N. G. Palan	Technova		
2	Make Electronics	Charles Platt	O'Reilly	1 st	2010
3	Modern Digital Electronics	R. P. Jain	Tata McGraw Hill	3rd	
4	Digital Principles and Applications	Malvino and Leach	Tata McGraw Hill		
	Digital Electronics: Principles, Devices and Applications,	Anil K. Maini	Wiley		2007

Core Course
Operating Systems

Sr.No.	Modules/Units	No. of Lectures
1	**Introduction to Operating Systems**	12 Lectures
	Introduction What is an Operating System? History of operating system, computer hardware, different operating systems, operating system concepts, system calls, operating system structure. **Processes and Threads:** Processes, threads, interprocess communication, scheduling.	
2	**Memory Management, File Systems**	12 Lectures
	Memory Management: No memory abstraction, memory abstraction: address spaces, virtual memory, page replacement algorithms, design issues for paging systems, implementation issues, segmentation. **File Systems:** Files, directories, file system implementation, file-system management and optimization, MS-DOS file system, UNIX V7 file system.	
3	**Input-Output, Deadlocks**	12 Lectures
	Input-Output: Principles of I/O hardware, Principles of I/O software, I/O software layers, disks, clocks, user interfaces: keyboard, mouse, monitor, thin clients, power management, **Deadlocks:** Resources, introduction to deadlocks, the ostrich algorithm, deadlock detection and recovery, deadlock avoidance, deadlock prevention, issues.	
4	**Virtualization and Cloud, Multiple Processor Systems**	12 Lectures
	Virtualization and Cloud: History, requirements for virtualization, type 1 and 2 hypervisors, techniques for efficient virtualization, hypervisor microkernels, memory virtualization, I/O virtualization, virtual appliances, virtual machines on multicore CPUs, Clouds. **Multiple Processor Systems** Multiprocessors, multicomputers, distributed systems.	

5	Case Studies	12 Lectures
	Case Study on ANDROID: History of Android versions, features of each version. Architecture, Security. Advantages, Disadvantages over traditional operating systems. **Case Study on Windows:** History of windows through Windows 10, programming windows, system structure, processes and threads in windows, memory management, caching in windows, I/O in windows, Windows NT file system, Windows power management, Security in windows.	

List of Practicals

Practical No	Practical Topic	Module Wise Pedagogy Used	No. of Lectures
1	**Installation of virtual machine software**	Desktop used for practical	**3**
2	**Installation of Linux Operating System (RedHat/Ubuntu) on virtual machine**	Desktop used for practical	**3**
3	**Installation of Windows Operating System on Virtual Machine**	Desktop used for practical	**3**
4	**Linux Commands : Working with Directories** 4.1 pwd, cd, absolute and relative paths, ls, mkdir, rmdir 4.2 file, touch, rm, cp, mv, rename, head, tail, cat, more, less, strings, chmod	Linux OS loaded machines used for demonstrating the commands	**3**
5	**Linux Commands : Working with Files** 5.1 ps, top, kill, pkill, bg,fg 5.2 grep, locate, find 5.3 date, cal, whoami, finger, uname, man, df, du, free, whereis, which 5.4 compression: tar, gzip	Linux OS loaded machines used for demonstrating the commands	**3**
6	**Windows DOS Commands-I** 6.1 Date, time, prompt, md, cd, rd, path 6.2 Chkdsk, copy, xcopy, format, fdisk, cls, defrag, del, move	Windows OS loaded machines used for demonstrating the commands	**3**
7	**Windows DOS Commands-II** 7.1 Diskcomp, diskcopy, diskpart, doskey, echo 7.2 Edit, fc, find, rename, set, type, ver	Windows OS loaded machines used for demonstrating the commands	**3**
8	**Working with Windows Desktop Utilities** 8.1 Adjusting Display Resolution 8.2 Configuring simple networking 8.3 Creating users and shares	Windows OS loaded machines used for demonstrating the given	**3**

		functions	
9	**Working with Linux Desktop Utilities** 9.1 Adjusting Display Resolution 9.2 Configuring simple networking 9.3 Creating users and shares	Linux OS loaded machines used for demonstrating the commands	3
10	**Installing utility software on Linux and Windows**	Desktop with relevant software	3
	Total		30

Reference Books:

Sr. No.	Title	Author/s Publisher	Publisher	Edition	Year
1.	Modern Operating Systems by Andrew S. Tanenbaum, Herbert Bos Pearson 4th Edition	Andrew S. Tanenbaum, Herbert Bos	Pearson	4th	2014
2.	Operating Systems – Internals and Design Principles by William Stallings Pearson 8th Edition	William Stallings	Pearson	8th	2009
3.	Operating System Concepts by Abraham Silberschatz, Peter B. Galvine Gagne Wiley 8th Edition	Abraham Silberschatz, Peter B. Galvine Gagne	Wiley	8th	
4.	Operating Systems by Godbole and Kahate McGraw Hill 3rd Edition	Godbole and Kahate	McGraw Hill	3rd	

Core Course
Discrete Mathematics

Sr.No.	Modules/Units	No. of Lectures
1	**Introduction, Set Theory, The Logic of Compound Statements**	12 Lectures
	Introduction: Variables, The Language of Sets, The Language of Relations and Function. **Set Theory:** Definitions and the Element Method of Proof, Properties of Sets, Disproof's, Algebraic Proofs, Boolean Algebras. **The Logic of Compound Statements :** Logical Form and Logical Equivalence Conditional Statements, Valid and Invalid Arguments	
2	**Quantified Statements**	12 Lectures
	Quantified Statements: Predicates and Quantified Statements, Statements with Multiple Quantifiers, Arguments with Quantified Statements **Elementary Number Theory and Methods of Proof:** Introduction to Direct Proofs, Rational Numbers, Divisibility, Division into Case and the **Quotient-Remainder Theorem, Floor and Ceiling, Indirect Argument:** Contradiction and Contraposition, Two Classical Theorems, Applications in algorithms.	
3	**Sequences, Mathematical Induction, and Recursion**	12 Lectures
	Sequences, Mathematical Induction, and Recursion: Sequences, Mathematical Induction, Strong Mathematical Induction and the Well- Ordering Principle for the Integers, Correctness of algorithms, defining sequences recursively, solving recurrence relations by iteration, Second order linear homogenous recurrence relations with constant coefficients. General recursive definitions and structural induction. **Functions:** Functions Defined on General Sets, One-to-One and On to, Inverse Functions, Composition of Functions, Cardinality with Applications to Computability	

4	Relation, Graphs and Trees	12 Lectures
	Relations: Relations on Sets, Reflexivity, Symmetry, and Transitivity, Equivalence Relations, Partial Order Relations. **Graphs and Trees:** Definitions and Basic Properties, Trails, Paths, and Circuits ,Matrix Representations of Graphs, Isomorphism's of Graphs, Trees, Rooted Trees, Isomorphism's of Graphs, Spanning trees and shortest paths.	
5	Counting elements to dis-joint sets , **Algebraic Structure**	12 Lectures
	Counting elements to dis-joint sets; The addition rule. The Pigeonhole Principle, Counting Subsets of a Set: Combinations, r-Combinations with Repetition Allowed, Probability Axioms and Expected Value. **Some Algebraic Structure:** Introduction, Binary Operation, Properties of Binary Operation, Semi group, Mono id, Group, Properties of Group.	

List of Practicals

List of Practical: Write the programs for the following using SCILAB	
1.	**Set Theory**
a.	Inclusion Exclusion principle.
b.	Power Sets
c.	Mathematical Induction
2.	**Functions and Algorithms**
a.	Recursively defined functions
b.	Cardinality
c.	Polynomial evaluation
d.	Greatest Common Divisor
3.	**Counting**
a.	Sum rule principle
b.	Product rule principle
c.	Factorial
d.	Binomial coefficients
e.	Permutations
f.	Permutations with repetitions
g.	Combinations
h.	Combinations with repetitions
i.	Ordered partitions
j.	Un ordered partitions
4.	**Probability Theory**
a.	Samples pace and events
b.	Finite probability spaces
c.	Equi probable spaces
d.	Addition Principle

5.	**Graph Theory**	
a.	Paths and connectivity	
b.	Minimum spanning tree	
c.	Isomorphism	
6.	**Directed Graphs**	
a.	Adjacency matrix	
b.	Path matrix	
7.	**Properties of integers**	
a.	Division algorithm	
b.	Primes	
c.	Euclidean algorithm	
d.	Fundamental theorem of arithmetic	
e.	Congruence relation	
f	Linear congruence equation	
8.	**Algebraic Systems**	
a.	Properties of operations	
b.	Roots of polynomials	
9.	**Boolean Algebra**	
a.	Basic definitions in Boolean Algebra	
b.	Boolean algebras lattices	
10.	**Recurrence relations**	
a.	Linear homogeneous recurrence relations with constant coefficients	
b.	Solving linear homogeneous recurrence relations with constant coefficients	
c.	Solving general homogeneous linear Recurrence relations	

Reference Books:

Books and References:

Title	Author/s	Publisher	Edition	Year
Discrete Mathematics with Applications	Sussana S. Epp	Cengage Learning	4th	2010
Discrete Mathematics, Schaum's Outlines Series	Seymour Lipschutz, Marc Lipson	Tata MCGraw Hill		2007
Discrete Mathematics andits Applications	Kenneth H. Rosen	Tata MCGraw Hill		
Discrete mathematical structures	B Kolman RC Busby, S Ross	PHI		
Discrete structures	Liu	Tata MCGraw Hill		

Uttari Bharat Sabha's

Ramanand Arya D.A.V. College

(Autonomous)

Core Courses (CC)

Communication Skills

Sr.No.	Modules/Units	No. of Lectures
1	The Seven Cs of Effective Communication, Understanding Business Communication	12 Lectures
	● Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness. ● Nature and Scope of Communication, Non-verbal Communication, Cross-cultural communication, Technology-enabled Business Communication.	
2	Writing Business Messages and Documents	12 Lectures
	● Letter Writing, Email Writing, (as per IT environment) Presentation Basic, Presentation (use of templates, graphics) Process: Planning the presentations, executing the presentations, Impressing the audience by performing, Planning stage, Advance presentation skills using tools. ● Business Reports and Proposals, Career building and Resume writing.	
3	Developing Oral Communication Skills for Business	12 Lectures
	● Meetings and Conferences, Group Discussions and Team Briefing, Effective Listening, Public Speaking, Conversations, Interviews, Article Writing: Understanding and working on Article writing, Mechanism to develop Article writing.	
4	Understanding Specific Communication Needs	12 Lectures
	● Corporate Communication, Persuasive Strategies in Business Communication, Ethics in Business Communication, Business Communication Aids, Marketing communication.	
5	Group creativity techniques, Working on Google Docs Editor, Content writing	12 Lectures

	Brainstorming, mind maps / concept maps, executing stage: chunking theory, creating outlines, Creating and working on Google forms, docs, sheets. Content writing: What is content writing, Basics of content writing, Mechanism to develop content writing skills.	

List of practicals

Sr. No	List of Practical Questions:	Practical Duration
1	Communication Origami, Guessing Game, Guessing the emotion	3
2	Body Language, Follow All Instructions, Effective Feedback Skills	3
3	The Name Game, Square Talk (Effective Communication), Room 101 (Influential and persuasive skills)	3
4	Back to Back Communication, Paper Shapes (Importance of two-way communication), Memory Test (Presentation Skills)	3
5	Exercises on Communication Principles	3
6	Exercises on communication icebreakers	3
7	Communication exercises	3
	For the following practical's, Microsoft Office, Open Office, Libre Office or any other software suite can be used	3
8	Use of word processing tools for communication, Google forms	3
9	Use of spreadsheet tools for communication	3
10	Use of presentation tools for communication	3
	Total	**30**

Reference Books:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1	Business Communication	Edited by Meenakshi Raman and Prakash Singh	Oxford University Press	Second	
2	Professional Communication	ArunaKoneru	Tata McGraw Hill		
3	Strategies for improving your business	Prof. M. S. Rao	Shroff communication publishers and distributors		2016
4	Business Communication	Dr. Rishipal and Dr. Jyoti Sheoran	SPD		2014
5	Graphics for Learning: Proven Guidelines for Planning, Designing, and Evaluating Visuals in Training Materials	Ruth C. Clark, Chopeta Lyons	Pfeiffer, Wiley		2011
6	Basic Business Communication: Skills for Empowering the Internet Generation	Lesikar Raymond V and Marie E. Flatley	Tata McGraw Hill	10th	2005
7	Nonverbal Communication: Notes on the Visual Perception of Human Relations	Ruesh, Jurgen and Weldon Kees	University of California Press		1966
8	Business Communication Today	Bovee, Courtland L.; Thill, John V.	Pearson Education Ltd.		2015
9	Communication Skills	Dr. Nageshwar Rao Dr. Rajendra P. Das	Himalaya Publishing House		
10	The only Content Writing Handbook 2021	Kounal Gupta			2021
11	The complete guide to article	Navved Saleh	Writer's Digest Books		2014

Board of Studies in Information Technology, R.A.D.A.V. College, Bhandup (e)

SEMESTER – II

Core Courses (CC)

Object Oriented Programming

Sr.No.	Modules/Units	No. of Lectures
1	**Object Oriented Methodology, Principles of OOPS**	12 Lectures
	Objects Oriented Methodology: Introduction, Advantages and Disadvantages of Procedure Oriented Languages, what is Object Oriented? What is Object Oriented Development? Object Oriented Themes, Benefits and Application of OOPS. **Variable Names and Keywords,** **Conditional Statements:** if, if-else, nested if –else **Looping:** for, while, nested loops **Principles of OOPS:** OOPS Paradigm, Basic Concepts of OOPS: Objects, Classes, Data Abstraction and Data Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing	
2	**Classes and Objects, Constructors and Destructors**	12 Lectures
	Classes and Objects: Simple classes (Class specification, class members accessing), Defining member functions, passing object as an argument, Returning object from functions, friend classes, Pointer to object, Array of pointer to object. **Constructors and Destructors:** Introduction, Default Constructor, Parameterized Constructor and examples, Destructors	
3	**Program development using Inheritance,** **Exception Handling**	12 Lectures
	Program development using Inheritance: Introduction, understanding inheritance, Advantages provided by inheritance, choosing the access specifier, Derived class declaration, derived class constructors, class hierarchies, multiple inheritance, multilevel inheritance, containership, hybrid inheritance. **Exception Handling:** Introduction, Exception Handling Mechanism, Concept of throw & catch with example	

4	**Polymorphism, Virtual Functions**	12 Lectures
	Polymorphism: Concept of function overloading, overloaded operators, overloading unary and binary operators, overloading comparison operator, overloading arithmetic assignment operator, Data Conversion between objects and basic types, **Virtual Functions:** Introduction and need, Pure Virtual Functions, Static Functions, this Pointer, abstract classes, virtual destructors.	
5	**Templates, Working with Files**	12 Lectures
	Templates: Introduction, Function Template and examples, Class Template and examples. **Working with Files:** Introduction, File Operations, Various File Modes, File Pointer and their Manipulation	

Sr. No	List of Practical Questions:	No. of Lectures
1	**Classesand methods** a. Designanemployeeclassforreadinganddisplayingtheemployeeinformation,the getInfo() and displayInfo() methods will be used repectively. Where getInfo() willbe privatemethod b.DesigntheclassstudentcontaininggetData()anddisplayData()astwoofitsmethodswhichwillbeu sedforreadinganddisplayingthestudentinformation respectively.WheregetData() willbeprivatemethod. c. Design the class Demowhich will contain thefollowingmethods:readNo(),factorial() for calculating the factorial of a number, reverseNo() will reverse thegivennumber,isPalindrome()willcheckthegivennumberispalindrome,isArmstrong() which will calculate the given number is armStrong or not.WherereadNo()willbeprivatemethod. d. Writeaprogramto demonstratefunctiondefinitionoutsideclassand accessing classmembersinfunctiondefinition.	3
2	**Usingfriendfunctions.** a. Writeafriendfunctionforaddingthetwocomplexnumbers,usingasingleclass b. Writeafriend functionforaddingthetwodifferentdistancesanddisplayitssum,usingtwoclasses. c. Writeafriend functionforaddingthetwomatrixfromtwodifferentclassesand displayitssum.	3
3	**Constructors and method overloading.** a.Design a class Complex for adding the two complex numbers and also show the use of constructor. b. Design a class Geometry containing the methods area() and volume() and also overload the area() function . c. Design a class StaticDemo to show the implementation of static variable and static function.	3

4	**Operator Overloading** a.Overload the operator unary(-) for demonstrating operator overloading. b. Overload the operator + for adding the timings of two clocks, And also pass objects as an argument. c. Overload the + for concatenating the two strings. For e.g "Py" + "thon" = Python	3
5	**Inheritance** a.Design a class for single level inheritance using public and private type derivation. b. Design a class for multiple inheritance. c. Implement the hierarchical inheritance.	3
6	**Virtual functions and abstract classes** a. Implement the concept of method overriding. b. Show the use of virtual function c. Show the implementation of abstract class.	3
7	**String handling** a. String operations for string length , string concatenation b. String operations for string reverse, string comparison, c. Console formatting functions.	3
8	**Exception handling** a. Show the implementation of exception handling b. Show the implementation for exception handling for strings c. Show the implementation of exception handling for using the pointers.	3
9	**File handling** a. Design a class FileDemo open a file in read mode and display the total number of words and lines in the file. b. Design a class to handle multiple files and file operations c. Design a editor for appending and editing the files	3
10	**Templates** a. Show the implementation for the following b. Show the implementation of template class library for swap function. c. Design the template class library for sorting ascending to descending and viceversa	3
	Total	30

Reference Books:

Books and References:					
Sr. No.	Title	Author/s Publisher	Publisher	Edition	Year
1	Object Oriented Analysis and Design	Timothy Budd	TMH	3 rd	2012
2	Mastering C++	K R Venugopal, Rajkumar Buyya, T Ravishankar	Tata McGraw Hill	2 nd Edition	2011
3	C++ for beginners	B. M. Hirwani	SPD		2013
4	Effective Modern C++	Scott Meyers	SPD		
5	Object Oriented Programming with C++	E. Balagurusamy	Tata McGraw Hill	4 th	
6	Learning Python	Mark Lutz	O' Reilly	5 th	2013
7	Mastering Object Oriented Python	Steven F. Lott	Pact Publishing		2014

Core Course

Microprocessor Architecture

Sr.No.	Modules/Units	No. of Lectures
1	Microprocessor, microcomputers, and Assembly Language Microprocessor Architecture and Microcomputer System 8085 Microprocessor Architecture and Memory Interface	12 Lectures
	Microprocessor, microcomputers, and Assembly Language: Microprocessor, Microprocessor Instruction Set and Computer Languages, From Large Computers to Single-Chip Microcontrollers, Applications. **Microprocessor Architecture and Microcomputer System:** Microprocessor Architecture and its operation's, Memory, I/O Devices, Microcomputer System, Logic Devices and Interfacing, Microprocessor-Based System Application. **8085 Microprocessor Architecture and Memory Interface**: Introduction, 8085 Microprocessor unit, 8085-Based Microcomputer, Memory Interfacing, Interfacing the 8155 Memory Segment, Illustrative Example: Designing Memory for the MCTS Project, Testing and Troubleshooting Memory Interfacing Circuit, 8085-Based Single-Board microcomputer	
2	Interfacing of I/O Devices Introduction to 8085 Assembly Language Programming: Introduction to 8085 Instructions	12 Lectures
	Basic Interfacing concepts, Interfacing Output Displays, Interfacing Input Devices, Memory Mapped I/O, Testing and Troubleshooting I/O Interfacing Circuits. **Introduction to 8085 Assembly Language Programming**: The 8085 Programming Model, Instruction Classification, Instruction, Data and Storage, writing assembling and Execution of a simple program, Overview of 8085 Instruction Set, Writing and Assembling Program. **Introduction to 8085 Instructions:** Data Transfer Operations, Arithmetic Operations, Logic Operation, Branch Operation, Writing Assembly Languages Programs, Debugging a Program	
3	Programming Techniques with Additional Instructions: Counters and Time Delays Stacks and Sub-Routines	12 Lectures
	Programming Techniques with Additional Instructions: Programming Techniques: Looping, Counting and Indexing, Additional Data Transfer and 16-Bit Arithmetic Instructions, Arithmetic Instruction Related to Memory, Logic Operations: Rotate, Logics Operations: Compare, Dynamic Debugging. **Counters and Time Delays**: Counters and Time Delays, Illustrative Program: Hexadecimal Counter, Illustrative Program: zero-to-nine (Modulo Ten) Counter, Generating Pulse Waveforms, Debugging Counter and Time-Delay Programs. **Stacks and Sub-Routines:** Stack, Subroutine, Restart, Conditional Call, Return Instructions, Advanced Subroutine concept	

4	The 8085 Interrupt Introduction to 16 bit microprocessor	12 Lectures
	Interrupts: The 8085 Interrupt, 8085 Vectored Interrupts, Restart as S/W Instructions, Additional I/O Concepts and processes Introduction to 16-bit microprocessor Architecture, Internal block diagram, Execution unit, Bus interface unit, addressing modes, programming concept assembly process, assembler in x86, classification of 8086 instruction set, pin config, mn/mx mode	
5	The Pentium and Pentium Pro microprocessors Core 2 and later Microprocessors SUN SPARC Microprocessor	12 Lectures
	The Pentium and Pentium Pro microprocessors: Introduction, Special Pentium registers, Memory management, Pentium instructions, Pentium Pro microprocessor, Special Pentium Pro features. **Core 2 and later Microprocessors:** Introduction, Pentium II software changes, Pentium IV and Core 2, i3, i5 and i7. **SUN SPARC Microprocessor:** Architecture, Register file, data types and instruction format	

List of Practicals

Practical no.	Title	No of Lectures
1	Perform the following Operations related to memory locations. a. Store the data byte 32H into memory location 4000H. b. Exchange the contents of memory locations 2000H and 4000H	3
2	**Simple assembly language programs**. a. Subtract the contents of memory location 4001H from the memory location 2000H and place the result in memory location 4002H. b. Subtract two 8-bit numbers c. Add the 16-bit number in memory locations 4000H and 4001H to the 16-bit number in memory locations 4002H and 4003H. The most significant eight bits of the two numbers to be added are in memory locations 4001H and 4003H. Store the result in memory locations 4004H and 4005H with the most significant byte in memory location 4005H. d. Add the contents of memory locations 40001H and 4001H and place the result in the memory locations 4002Hand 4003H. e. Subtract the 16-bit number in memory locations 4002H and 4003H from the 16-bit number in memory locations 4000H and 4001H. The most significant eight bits of the two numbers are in memory locations 4001H and 4003H. Store the result in memory locations 4004H and 4005H with the most significant byte in memory location 4005H. f. Find the l's complement of the number stored at memory location 4400H and store the complemented number at memory location 4300H.	3

	g. Find the 2's complement of the number stored at memory location 4200H and store the complemented number at memory location 4300H.	
3	**Packing and unpacking operations.** a. Pack the two unpacked BCD numbers stored in memory locations 4200H and 4201H and store result in memory location 4300H. Assume the least significant digit is stored at 4200H. b. Two-digit BCD number is stored in memory location 4200H. Unpack the BCD number and store the two digits in memory locations 4300H and 4301H such that memory location 4300H will have lower BCD digit	**3**
4	**Register Operations.** a. Write a program to shift an eight-bit data four bits right. Assume that data is in register C. b. Program to shift a 16-bit data 1 bit left. Assume data is in the HL register pair c. Write a set of instructions to alter the contents of flag register in 8085. d. Write a program to count number of l's in the contents of D register and store the count in the B register	**3**
5	**Multiple memory locations.** a. Calculate the sum of series of numbers. The length of the series is in memory location 4200H and the series begins from memory location 4201H. a. Consider the sum to be 8-bit number. So, ignore carries. Store the sum at memory location 4300H. b. Consider the sum to be 16-bit number. Store the sum at memory locations 4300H and 4301H b. Multiply two 8-bit numbers stored in memory locations 2200H and 2201H by repetitive addition and store the result in memory locations 2300H and 2301H. c. Divide 16-bit number stored in memory locations 2200H and 2201H by the 8-bit number stored at memory location 2202H. Store the quotient in memory locations 2300H and 2301H and remainder in memory locations 2302H and 2303H. d. Find the number of negative elements (most significant bit 1) in a block of data. The length of the block is in memory location 2200H and the block itself begins in memory location 2201H. Store the number of negative elements in memory location 2300H e. Find the largest number in a block of data. The length of the block is in memory location 2200H and the block itself starts from memory location 2201H. Store the maximum number in memory location 2300H. Assume that the numbers in the block are all 8-bit unsigned binary numbers	**3**
6	**Calculations with respect to memory locations.** a. Write a program to sort given 10 numbers from memory location 2200H in the ascending order. b. Calculate the sum of series of even numbers from the list of numbers. The length of the list is in memory location 2200H and the series itself begins from memory location 2201H. Assume the sum to be 8-bit number so you can ignore carries and store the sum at memory location 2Sample problem: c. Calculate the sum of series of odd numbers from the list of numbers. The length of the list is in memory location 2200H and the series itself begins	**3**

	from memory location 2201H. Assume the sum to be 16-bit. Store the sum at memory locations 2300H and 2301H. d. Find the square of the given numbers from memory location 6100H and store the result from memory location 7000H e. Search the given byte in the list of 50 numbers stored in the consecutive memory locations and store the address of memory location in the memory locations 2200H and 2201H. Assume byte is in the C register and starting address of the list is 2000H. If byte is not found store 00 at 2200H and 2201H f. Two decimal numbers six digits each, are stored in BCD package form. Each number occupies a sequence of byte in the memory. The starting address of first number is 6000H Write an assembly language program that adds these two numbers and stores the sum in the same format starting from memory location 6200H g. Add 2 arrays having ten 8-bit numbers each and generate a third array of result. It is necessary to add the first element of array 1 with the first element of array-2 and so on. The starting addresses of array l, array2 and array3 are 2200H, 2300H and 2400H, respectively	
7	**Assembly programs on memory locations.** a. Write an assembly language program to separate even numbers from the given list of 50 numbers and store them in another list starting from 2300H. Assume starting address of 50 number list is 2200H b. Write assembly language program with proper comments for the following: A block of data consisting of 256 bytes is stored in memory starting at 3000H. This block is to be shifted (relocated) in memory from 3050H onwards. Do not shift the block or part of the block anywhere else in the memory. c. Add even parity to a string of 7-bit ASCII characters. The length of the string is in memory location 2040H and the string itself begins in memory location 2041H. Place even parity in the most significant bit of each character. d. A list of 50 numbers is stored in memory, starting at 6000H. Find number of negative, zero and positive numbers from this list and store these results in memory locations 7000H, 7001H, and 7002H respectively e. Write an assembly language program to generate Fibonacci number. f. Program to calculate the factorial of a number between 0 to 8.	3
8	**String operations in assembly programs.** a. Write an 8085-assembly language program to insert a string of four characters from the tenth location in the given array of 50 characters b. Write an 8085-assembly language program to delete a string of 4 characters from the tenth location in the given array of 50 characters. c. Multiply the 8-bit unsigned number in memory location 2200H by the 8-bit unsigned number in memory location 2201H. Store the 8 least significant bits of the result in memory location 2300H and the 8 most significant bits in memory location 2301H. d. Divide the 16-bit unsigned number in memory locations 2200H and 2201H (most significant bits in 2201H) by the B-bit unsigned number in memory location 2300H store the quotient in memory location 2400H and remainder in 2401H e. DAA instruction is not present. Write a sub routine which will perform the same task as DAA.	3
9	**Calculations on memory locations**.	3

	a. To test RAM by writing '1' and reading it back and later writing '0' (zero) and reading it back. RAM addresses to be checked are 40FFH to 40FFH. In case of any error, it is indicated by writing 01H at port 10 b. Arrange an array of 8-bit unsigned no in descending order c. Transfer ten bytes of data from one memory to another memory block. Source memory block starts from memory location 2200H whereas destination memory block starts from memory location 2300H d. Write a program to find the Square Root of an 8-bit binary number. The binary number is stored in memory location 4200H and store the square root in 4201H. e. Write a simple program to Split a HEX data into two nibbles and store it in memory	
10	1. Write a program to add two numbers present in two consecutive memory locations and store the result in next memory location. 2. Develop a program to read a character from console and echo it. 3. Develop and execute aprogram to read 10 characters from console 4. Write aprogram to exchange two memory variables using MOV and XCHG instruction. a. A. perform with only *XCHG* Using MASM on DOSBOX	3
	Total	30

Reference Books:

Books and References:				
Sr. No.	Title	Author/s Publisher	Publisher	Edition	Year
1	Microprocessors Architecture, Programming and Applications with the 808	Ramesh Gaokar	Penram	fifth	2012
2	Computer System Architecture	Morris Mano	PHI		1998
3	Structured Computer Organization	Andrew C. Tanenbaum	PHI		
4	introduction to 8086 microprocessor	Sunil mathur	PHI		
5	*The 8088 and 8086 Microprocessors*: *Programming,Interfacing, Software,Hardware and Applications,*	Walter A. Triebel, Avtar Singh and N.K. Srinath.	Pearson		

Core Course
Web Programming

Sr.No.	Modules/Units	No. of Lectures
1	Introduction to Internet and HTML5.	12 Lectures
	Internet and the World Wide Web: What is Internet? Introduction to internet and its applications, E-mail, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, internet address, World Wide Web (WWW): World Wide Web and its evolution, uniform resource locator (URL), browsers – internet explorer, Netscape navigator, opera, Firefox, chrome, Mozilla. search engine, web saver – Apache, IIS, proxy server, HTTP protocol **HTML5:** Introduction, Why HTML5? Formatting text by using tags, using lists and backgrounds, Creating hyperlinks and anchors. Style sheets, CSS formatting text using style sheets, formatting paragraphs using style sheets	
2	HTML5 Page layout, navigation, Tables, Forms and Media	12 Lectures
	HTML5 Page layout and navigation: Creating navigational aids: planning site organization, creating text-based navigation bar, creating graphics-based navigation bar, creating graphical navigation bar, creating image map, redirecting to another URL, creating division-based layouts: HTML5 semantic tags, creating divisions, creating HTML5 semantic layout, positioning and formatting divisions. **HTML5 Tables, Forms and Media:** Creating tables: creating simple table, specifying the size of the table, specifying the width of the column, merging table cells, using tables for page layout, formatting tables: applying table borders, applying background and foreground fills, changing cell padding, spacing and alignment, creating user forms: creating basic form, using check boxes and option buttons, creating lists, additional input types in HTML5, Incorporating sound and video: audio and video in HTML5, HTML multimedia basics, embedding video clips, incorporating audio on web page	

3	JavaScript	12 Lectures
	Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security **Operators:** Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++(Increment), --(Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ?: (Conditional operator), , (Comma operator), delete, new, this, void Statements: Break, comment, continue, delete, do...while, export, for, for...in, function, if...else, import, labelled, return, switch, var, while **Core JavaScript (Properties and Methods of Each):** Array, Boolean, Date, Function, Math, Number, Object, String, regExp **Document and its associated objects:** document, Link, Area, Anchor, Image, Applet, Layer **Events and Event Handlers:** General Information about Events, Defining Event Handlers, event	
4	PHP	12 Lectures
	Why PHP and MySQL? Server-side scripting, PHP syntax and variables, comments, types, control structures, branching, looping, termination, functions, passing information with PHP, GET, POST, formatting form variables, super global arrays, strings and string functions, regular expressions, arrays, number handling, basic PHP errors/problems	
5	Advanced PHP and MySQL	12 Lectures
	PHP/MySQL Functions, integrating web forms and databases, displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, E-Mail	

List of Practicals

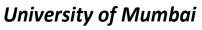| Practical no.	Title	No of lectures
1	**Use of Basic Tags** a) Design a web page using different text formatting tags. b) Design a web page with links to different pages and allow navigation between web pages. c) Design a web page demonstrating all Style sheet types	3
2	**Image maps, Tables, Forms and Media** a) Design a web page with Imagemaps. b) Design a web page demonstrating different semantics c) Design a web page with different tables. Design a webpage using table so that the content appears well placed. d) Design a web page with a form that uses all types of controls. e) Design a web page embedding with multimedia features.	3
3	**Basic Programs using JavaScript (Debugging with Chrome Tool)** a) Using JavaScript design, a web page that prints factorial/Fibonacci series/any b) given series. c) Design a form and validate all the controls placed on the form using Java Script. d) Write a JavaScript program to display all the prime numbers between 1 and 100. e) Write a JavaScript program to accept a number from the user and display the sum f) of its digits. g) Write a program in JavaScript to accept a sentence from the user and display the number of words in it. (Do not use split () function). h) Write a java script program to design simple calculator.	3

4	**Control and looping statements using Java Script** a) Design a web page demonstrating different conditional statements. b) Design a web page demonstrating different looping statements. c) Design a web page demonstrating different Core JavaScript references (Array, Boolean, Date, Function, Math, Number, Object, String, regExp).	3
5	**Basic PHP -I** a) Write a PHP Program to accept a number from the user and print it factorial. b) Write a PHP program to accept a number from the user and print whether it is prime or not.	3
6	**Basic PHP- II** a) Write a PHP code to find the greater of 2 numbers. Accept the no. from the user. b) Write a PHP program to display the following Binary Pyramid: 1 0 1 1 0 1 0 1 0 1	3
7	**String Functions and arrays** a) Write a PHP program to demonstrate different string functions. b) Write a PHP program to create one dimensional array.	3

8	**PHP and Database**
	
	a) Write a PHP code to create:
	  • Create a database College
	  • Create a table Department (Dname,Dno,Number_Of_faculty)
	b) Write a PHP program to create a database named "College". Create a tablenamed "Student" with following fields (sno, sname, percentage). Insert 3 records of your choice. Display the names of the students whose percentage is between 35 to75 in a tabular format.
	c) Design a PHP page for authenticating a user.
		3

9	**Advanced PHP Programs** a) Write a program to send email with attachment. b) Hosting a website	3
10	**Sessions and Cookies** a) Write a program to demonstrate use of sessions and cookies.	3
	Total	**30**

Reference Books:

Books and References:					
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edition**	**Year**
1.	HTML5 Step by Step	FaitheWempen	Microsoft Press		2011
2.	JavaScript 2.0: The Complete Reference	Thomas Powell and Fritz Schneider	Tata McGraw Hill	2nd	
3.	PHP 5.1 for Beginners	Ivan Bayross Sharanam Shah,	SPD		2013
4.	Murach's PHP and MySQL	Joel Murach Ray Harris	SPD		2011

Core Course

Numerical and Statistical Methods

Sr.No.	Modules/Units	No. of Lectures
1	**Mathematical Modeling and Engineering Problem**	12 Lectures
	Mathematical Modeling and Engineering Problem Solving: A Simple Mathematical Model, Conservation Laws and Engineering Problems. **Approximations and Round-Off Errors:** Significant Figures, Accuracy and Precision, Error Definitions, Round-Off Errors Truncation Errors and the **Taylor Series:** The Taylor Series, Error Propagation, Total Numerical Errors, Formulation Errors and Data Uncertainty	
2	**Solutions of Algebraic and Transcendental Equations, Interpolation**	12 Lectures
	Solutions of Algebraic and Transcendental Equations: The Bisection Method, The Newton-Raphson Method, The Regula-falsi method, The Secant Method. **Interpolation:** Forward Difference, Backward Difference, Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Lagrange's Interpolation	
3	**Solution of simultaneous algebraic equations (linear)**	12 Lectures
	Solution of simultaneous algebraic equations (linear) using iterative methods: Gauss-Jordan Method, Gauss-Seidel Method. **Numerical differentiation and Integration:** Numberical differentiation, Numerical integration using Trapezoidal Rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules. **Numerical solution of 1st and 2nd order differential equations:** Taylor series, Euler's Method, Modified Euler's Method, Runge-Kutta Method for 1st and 2nd Order Differential Equations	
4	**Vector Algebra, Vector Differentiation**	12 Lectures
	Vector Algebra: Introduction, Scaler Product, Vector Product, Resolve part of a vector force, Vector Product as determinant, Scaler Triple product, Vector Triple Product. **Vector Differentiation:** Introduction, Point Function, Vector Operator – Del, Gradient, Geometrical meaning of Gradient, Standard Result, Divergence and Curl, Solenoidal and In rotational field.	

5	Linear Programming, Random variables	12 Lectures
	Linear Programming: Linear optimization problem, Formulation and Graphical solution, Basic solution and Feasible solution. **Random variables:** Discrete and Continuous random variables, Probability density function, Probability distribution of random Variables, Expected value, Variance.	

List of practicals

List of Practical: Write the programs for the following using SCILAB	
1.	**Iterative Calculation**
a.	Program for iterative calculation.
b.	Program to calculate the roots of a quadratic equation using the formula.
c.	Program to evaluate *e* using infinite series.
2.	**Solution of algebraic and transcendental equations:**
a.	Program to solve algebraic and transcendental equation by bisection method.
b.	Program to solve algebraic and transcendental equation by false position method.
c.	Program to solve algebraic and transcendental equation by Secant method.
d.	Program to solve algebraic and transcendental equation by Newton Raphson
3.	**Interpolation**
a.	Program for Newton's forward interpolation.
b.	Program for Newton's backward interpolation.
c.	Program for Lagrange's interpolation.
4.	**Solving linear system of equations by iterative methods**
a.	Program for solving linear system of equations using Gauss Jordan method.
b.	Program for solving linear system of equations using Gauss Seidel method.
5.	**Numerical Differentiation**
a.	Programming to obtain derivatives numerically.

6.	**Numerical Integration**
a.	Program for numerical integration using Trapezoidal rule.
b.	Program for numerical integration using Simpson's $1/3^{rd}$ rule.
c.	Program for numerical integration using Simpson's $3/8^{th}$ rule.
7.	**Solution of differential equations**
a.	Program to solve differential equation using Euler's method

b.	Program to solve differential equation using modified Euler'smethod.
c.	Program to solve differential equation using Runge-kutta2ndorder and 4thorder
8.	**Random Variables**
a.	Program to generate Random Variables.
b.	Probability distribution of a Random Variable.
9.	**Expected value and variance**
a.	Expectation of a Random variables
b.	Variance and Standard deviation of a Random variables.
10.	**Product of Vectors**
a.	Operations of vectors (Addition, Multiplication, Transpose)
b.	Scalar product
c.	Cross Product
d.	Angle between two Vectors

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Introductory Methods of Numerical Methods	S. S. Shastri	PHI	Vol – 2	
2.	Numerical Methods for Engineers	Steven C. Chapra, Raymond P. Canale	Tata Mc Graw Hill	6th	2010
3.	Numerical Analysis	Richard L. Burden, J. Douglas Faires	Cengage Learning	9th	2011
4.	Fundamentals of Mathematical Statistics	S. C. Gupta, V. K. Kapoor			
5.	Elements of Applied Mathematics	P.N.Wartikar and J.N.Wartikar	A. V. Griha, Pune	Volume 1 and 2	

Core Course
Green Computing

Sr.No.	Modules/Units	No. of Lectures
1	**Overview and Issues And Initiatives and Standards**	12 Lectures
	Overview and Issues: Problems: Toxins, Power Consumption, Equipment Disposal, And Company's Carbon Footprint: Measuring, Details, reasons to bother, Plan for the Future, Cost Savings: Hardware, Power. **Initiatives and Standards:** Global Initiatives: United Nations, Basel Action Network, Basel Convention, North America: The United States, Canada, Australia, Europe, WEEE Directive, RoHS, National Adoption, Asia: China , **IndiaThe Green 'I' Initiative, Trash 2 Cash**	
2	**Minimizing Power Usage And Cooling**	12 Lectures
	Minimizing Power Usage: Power Problems, Monitoring Power Usage, Servers, Low-Cost Options, Reducing Power Use, Data De-Duplication, Virtualization, Management, Bigger Drives, Involving the Utility Company, Low- Power Computers, PCs, Linux, Components, Servers, Computer Settings, Storage, Monitors, Power Supplies, Wireless Devices, Software. **Cooling:** Cooling Costs, Power Cost, Causes of Cost, Calculating Cooling Needs, Reducing Cooling Costs, Economizers, On-Demand Cooling, HP's Solution, Optimizing Airflow, Hot Aisle/Cold Aisle, Raised Floors, Cable Management, Vapour Seal, Prevent Recirculation of Equipment Exhaust, Supply Air Directly to Heat Sources, Fans, Humidity, Adding Cooling, Fluid Considerations, System Design, Datacenter Design, Centralized Control, Design for Your Needs	
3	**Changing the Way of Work And Going Paperless**	12 Lectures
	Changing the Way of Work: Old Behaviors, starting at the Top, Process Reengineering with Green in Mind, Analyzing the Global Impact of Local Actions, Steps: Water, Recycling, Energy, Pollutants, Tele workers and Outsourcing, Telecommuting, Outsourcing, how to Outsource. **Energy Efficient Coding** **Going Paperless:** Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless, Organizational Realities, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Unified Communications, Intranets, What to Include, Building an Intranet, Microsoft Office SharePoint Server 2007, Electronic Data Interchange (EDI),**DigitalIndia initiative : obstacles, Advantages**	

4	**Recycling And Hardware Considerations**	12 Lectures
	Recycling: Problems, China, **India**, Materials, Means of Disposal, Recycling, Refurbishing, Make the Decision, Life Cycle, from beginning to end, Life, Cost, Green Design, Recycling Companies, Finding the Best One, Checklist, Certifications, Hard Drive Recycling, Consequences, cleaning a Hard Drive, Pros and cons of each method, CDs and DVDs, good and bad about CD and DVDs disposal, Change the mind-set, David vs. America Online **Hardware Considerations:** Certification Programs, EPEAT, RoHS, Energy Star, Computers, Monitors, Printers, Scanners, All-in-Ones, Thin Clients, Servers, Blade Servers, Consolidation, Products, Hardware Considerations, Planned Obsolescence, Packaging, Toxins, Other Factors, Remote Desktop, Using Remote Desktop, Establishing a Connection, In Practice	
5	**Greening Your Information Systems And StayingGreen**	12 Lectures
	Greening Your Information Systems: Initial Improvement Calculations Metrics, Tracking Progress, Change Business Processes, Customer Interaction, Paper Reduction, And Green Supply Chain, Improve Technology Infrastructure, and Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling. **Staying Green:** Organizational Check-ups, Chief Green Officer, Evolution, Sell the CEO, SMART Goals, Equipment Check-ups, Gather Data, Tracking the data, Baseline Data, Bench marking, Analyze Data, Conduct Audits, Certifications, Benefits, Realities, Helpful Organizations.	

List of Practicals

Guidance for Project Dissertation and Project Presentation

Practical no.	Title	No
1	**Project Selection and Analysis**	3
2	**Project Review and Literature**	3
3	**Project Methodology**	3
4	**Recycling the e-waste**	3
5	**Virtualization**	3
6	**Research Based Project topics**	3
7	**Guidance for Documentation**	3
8	**Power point Presentation**	3
9	**Presentation Skills**	3
10	**Review of Project**	3
	Total	30

Reference Books:

Title	Author(s)	Publisher
Green IT	Toby Velte, Anthony Velte, Robert Elsenpeter	McGraw Hill
Green Data Center: Steps for the Journey	Alvin Galea, Michael Schaefer, Mike Ebbers	Shroff Publishers and Distributers
Green Computing and Green IT Best Practice	Jason Harris	Emereo
Green Computing Tools and Techniques for Saving Energy, Money and Resources	Bud E. Smith	CRC Press
Digital India Website		

Scheme of Evaluation

The performance of the learners will be evaluated in two Components. One component will be the Internal Assessment component carrying 40% marks and the second component will be the Semester-wise End Examination component carrying 60% marks. The allocation of marks for the Internal Assessment and Semester End Examinations will be as shown below:-

A) **Internal Assessment**: 40 **%**

Question Paper Pattern

(Internal Assessment- Courses without Practical Courses)

Sr. No.	Particular	Marks
1	**One class test (20 Marks)**	
	Match the Column/ Fill in the Blanks/ Multiple Choice Questions *(1 Mark each)*	08 Marks
	Answer in Brief (Attempt Any Three of the Five) *(04 Marks each)*	12 Marks
02	One case study / project with presentation based on curriculum to be assessed by the teacher concerned	10 Marks
03	Presentation/ Viva / Active participation in routine class instructional deliveries and overall conduct as a responsible learner, mannerism and articulationand exhibit of leadership qualities in organizing related academic activities	10 Marks

Practical Exam: 50marks   **Time 2½ Hrs**

A Certified copy journal is essential to appear for the practical examination.

1.	Practical Question 1	20
2.	Practical Question 2	20
3.	Journal	5
4.	Viva Voce	5

OR

1.	Practical Question	40
2.	Journal	5
3.	Viva Voce	5

B) Semester End Examination: 60 %
   i) Duration: The examination shall be of 2 Hours duration
   ii) Theory question paper pattern
   - There shall be five questions each of 12 marks.
   - All questions shall be compulsory with internal choice within the questions.
   - Question may be subdivided into sub-questions a, b, c… and the allocation of marks depends on the weightage of the topic.
     (Detail question paper pattern has been given separately)

Passing Standard

The learners to pass a course shall have to obtain a minimum of 40% marks in aggregate for each course where the course consists of Internal Assessment and Semester End Examination. The learners shall obtain minimum of 40% marks (i.e. 16 out of 40) in the Internal Assessment and 40% marks in Semester End Examination (i.e. 24 Out of 60) separately, to pass a particular semester A learner will be said to have passed the course if the learner passes the Internal Assessment and Semester End Examination together.

Question Paper Pattern

(Practical Courses)

Maximum Marks: 60

Questions to be set: 03

Duration: 2 Hrs.

All Questions are Compulsory Carrying 12 Marks each.

	All questions are compulsory	
Q1	**(Based on Unit 1) Attempt *any three*of the following:**	**12**
a.		
b.		
c.		
d.		
e.		
Q2	**(Based on Unit 2) Attempt *any three*of the following:**	**12**
Q3	**(Based on Unit 3) Attempt *any three*of the following:**	**12**
Q4	**(Based on Unit 4) Attempt *any three*of the following:**	**12**
Q5	**(Based on Unit 5) Attempt *any three*of the following:**	**12**

Note:
Practical question of 12 marks may be divided into two sub questions of 6/6 and 4/4/4 Marks. If the topic demands, instead of practical questions, appropriate theory question may be asked.

Evaluation pattern of the Project Work (150 Marks)

The Project Report shall be evaluated in two stages viz..

Evaluation of Project Report (Bound Copy)	**100 Marks**
Introduction and other areas covered	25 Marks
Research Methodology, Presentation, Analysis and interpretation of data	50 Marks
Conclusion & Recommendations	25 Marks
Conduct of Viva-voce	**50 Marks**
In the course of Viva-voce, the questions may be asked such as	20 Marks
importance / relevance of the study, objective of the study, methodology of the study/ mode of Enquiry (question responses)	
Ability to explain the analysis, findings, concluding observations, recommendation, limitations of the Study	20 Marks
Overall Impression (including Communication Skill)	10 Marks