MAHARISHI UNIVERSITY OF INFORMATION TECHNOLOGY

Evaluation Scheme & Syllabus for

Master in Science (M. Sc.)
(Computer Science)

On

Choice Based Credit System
(Effective from the Session: 2020-21)

MAHARISHI SCHOOL OF SCIENCE

Evaluation Scheme
M. Sc. (Computer Science)
First Semester

Sl. No.	Course Category	Course Code	Course Title	L-T-P	CIA Marks	ESE Marks	Total	Credit
1	Core Courses	SPA-101	Computer and Communication Fundamentals	4-0-0	30	70	100	4
2		SPA-102	Programming and Problem Solving Using C	4-0-0	30	70	100	4
3		SPA-103	Operating Systems	4-0-0	30	70	100	4
4		SPA-104	Discrete Structures & Graph Theory	4-0-0	30	70	100	4
5		SPA-112	Programming in C lab	0-0-4	50	50	100	4
6		SPA-113	Operating System Lab	0-0-4	50	50	100	4
		TOTAL					**600**	**24**
Qualifying Non-Creditable Course								
7	Self-Development courses/ Science for Consciousness (SOC)	TPC 101	Basics of Transcendental Meditation and Yoga	2-1-1	70	30	100	4

TEACHING-LEARNING PLAN

Course Title: COMPUTER AND COMMUNICATION FUNDAMENTALS
Course Code: SPA -101
Pre-requisites, **if any**: NA

L	T	P	C.U.
4	0	0	4

Course Description:
This course give an over view of computer and their components including software and hardware components and introduces the principles of computer organization. The course emphasizes performance and cost analysis, logic gates, Flowcharts & Algorithms, Programming Languages instruction set design, Processor Unit Organization, memory technology, memory hierarchy, virtual memory management, and I/O systems. Basic hardware component, working simulation and writing skills are also taught in this class.

Course Objective(s):
This course will enable students to:

1. Grasp the basic concepts of computer architecture and organization.
2. Understand the key skills of constructing cost-effective computer systems.
3. Able to understand Working of logic gates and its families
4. Understand programming languages and their evolution.
5. In-depth understanding of why computers are essential components.
6. Articulate design issues in the development of processor.
7. Understand the components that satisfy design requirements and objectives.

Expected Course Outcome (COs):
After completion of this course, the student will be able to

CO 1: Design and describe flowcharts & algorithms, able to classify Levels of Programming Language- Machine, Assembly & High Level Languages.
CO 2: Demonstrate working of logic gates and their families.
CO 3: Examine the impact of instruction set architecture on cost-performance of computer design.
CO 4: Distinguish alternatives in cache design and their impacts on cost/performance
CO 5: Understand memory hierarchy and its impact on computer cost/performance.
CO 6: Demonstrate the various ways of I/O systems.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	S	W						
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			S
CO 6	M							

Course Contents:

Unit-1:

Computer Organization: Digital and Analog computers, Major components of a digital computer, Memory addressing capability of a CPU, Word length of a computer, Processing speed of a CPU, Definitions of Hardware, Software and Firmware. Definitions of Dumb, Smart and Intelligent terminals. **Binary Systems**: Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes: BCD code, Gray Code, ASCII code, Excess 3 Code, Error detecting Code.

Unit-2:

Computer Arithmetic: Binary representation of Negative Integers using 2's complement and Signed magnitude representation, Fixed point Arithmetic operations on Positive and Signed (Negative) Integers like addition, subtraction, multiplication, Booth algorithm for multiplication, Division of positive and negative binary numbers. **Boolean Algebra and Logic Gates:** Basic Definitions, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Digital Logic gates.

Unit-3:

Gate-Level Minimization: The K-Map Method, 3 and 4 variable K-Map, Combinational Circuits, Decoders, Encoders, Multiplexes, and De -multiplexers, Synchronous Sequential logic: Sequential circuits, Latches, Flip Flops: SR, D, JK, T. Master Slave JK Flip flop, Integrated Circuits. Shift Registers- Serial in Serial out, Serial in Parallel out, Parallel in Serial out and Parallel in Parallel out. Designing of Asynchronous (Ripple) Counters, Design of Synchronous Counters.

Unit-4:

Introduction of 8085 Microprocessor: Architecture of 8085 processor. Register Architecture: Accumulator, Temporally Register and Flag Register. Program Counter, Stack pointer and Instruction register.

Addressing Modes: Direct addressing mode and Register direct Addressing Mode. Register Indirect Addressing Mode, Immediate Addressing Mode and Implicit or Implied Addressing Mode.

Introduction to Assembly Language Programming: Various Instructions Classifications: Instruction Format, Opcode, Operand and Hex code. Instruction Operation Status, Various Instruction Sets: Data Transfer Group Instructions, Arithmetic Group Instructions, Logical Group Instruction, Branch Group Instructions: Conditional and Unconditional and Machine control Instructions.

Text Book(s):

1. Microprocessor Architecture, Programming and Applications with 8085/8080 by Ramesh S. Gaonkar.
2. Digital Design by M. Morris Mano. Publication: PHI Eastern economy edition.

Reference:

1. Fundamentals of Computers by B Ram Publication : PHI , Fourth edition
2. Microprocessor and Its applications by R Theagrajan, S Dhanapal

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5	CO6
C	S	M	S	M	S	
H	S		M		W	W
Sessional Exam (T)		S	M	W		S
ESE	S	M		S	M	

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3- curriculum Development).

Course Title: PROGRAMMING AND PROBLEM SOLVING USING C
Course Code: SPA -102
Pre-requisites, if any: NA

L	T	P	C.U.
4	0	0	4

Course Description:

This course deals with fundamentals of computer and programming skills. It includes basics of Computing Environments and Computer Languages. It also deals with different number systems and an insight to develop structured programming skill.

Course Objective(s):

This course will enable students to:

1. Develop the programming skills of students
2. Able to know the principles of designing structured programs
3. Able to write basic C programs using
   i) Selection statements
   ii) Repetitive statements
   iii) Functions
   iv) Pointers
   v) Arrays
   vi) Strings

Course Outcome (COs):

After completion of this course, the student will be able to

CO 1: Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming.
CO 2: Write, Compile and Debug programs in C language and use different data types for writing the programs.
CO 3: Design programs connecting decision structures, loops and functions.
CO 4: Explain the difference between call by value and call by address.
CO 5: Understand the dynamic behavior of memory by the use of pointers.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9
CO 1	S	W							
CO 2			S				M		
CO 3		M				S			
CO 4				W					M
CO 5					S			S	

Course Content:

Unit-1:

Introduction to Computer based Problem Solving; Algorithms and flowcharts; Programming Languages; Classification of Programming Languages; Characteristics of a program; Rules/conventions of coding, documentation, naming convention; Structured Programming; Modular Programming; Programming Environment: Assembler, Interpreter, Compiler, Linker and Loader.

Unit-2:

Fundamentals of C programming; History of C; Structure of C Program; Character set, Identifiers and Keywords; Data types; Constants and Variables; Operators and Expressions, Type Conversion, Operator Precedence and Associatively; Basic Input/output operations; Decision control structures: if-else, switch-case; Loop control structure: while, do-while, for; Jump statement: Break, continue; go-to statement.

Unit-3:

Array: One dimensional array **-**Declaration, initialization of one dimensional arrays; Two dimensional array**-** Declaration, initialization of two dimensional arrays; multi-dimensional array. Strings: Declaring and initializing string, reading and writing strings, string manipulation functions, array of strings. Function: Need of user-defined function, Arguments, return value, return statement; passing parameters call by value, call by reference; Scope, visibility and lifetime of variables; Nesting of functions; passing arrays to function; passing strings to function. Recursion: basics, comparison with iteration, types of recursion, Storage Classes**.**

Unit-4:

Pointer: Declaring and initializing pointer variables, chain of pointers, Pointer expression, Pointer arithmetic, Array of pointer and its limitations; Pointers as Function arguments.

Structure: Array in structure, Array of Structure, Structure within structure, Pointer to structure. **Union:** Defining union, Declaring & initializing union Variables; Command line arguments; File handling: Defining, opening and closing a file, input/output operation son file, merging files; C preprocessors: Macro substitution, file inclusion, compiler control directive.

Text Book(s):

1. Herbert Schildt, "C The Complete Reference", Osborne/McGraw-Hill,.
2. Yashavant Kanetkar, "Let us C", BPB Publications,.

Reference:

1. B.W. Kernigha, D.M. Ritchie, "The C Programming Language", Prentice Hall of India.
2. E Balagurusami, "Programming in ANSI C", Tata McGraw-Hill.

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5
C	S	M	S	M	S
H	S		M		W
Sessional Exam (T)		S	M	W	
ESE	S	M		S	M

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3- curriculum Development).

Course Title: PROGRAMMING IN C LAB
Course Code: SPA-112
Pre-requisites, **if any**: NA

L	T	P	C.U.
0	0	4	4

Course Description: This Laboratory course deals with basic programming skills in C Language.

Course Objective(s):

This course will enable students to:

1. To gain knowledge about the concepts of python programming.
2. To understand the concepts of Built-in functions and User-defined functions.
3. To develop programs using String functions.

Course Outcome (COs):

After completion of this course student will be able to:

CO 1: Remember different types of operators in programming.
CO 2: Implement the concepts of built-in functions in programming.
CO 3: Analyze the use control structures in programming.
CO 4: Apply the concepts of Structure and Unions in programs.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				

List of Experiments:

1. Write a program to find factorial of a number.
2. Write a program to print the Fibonacci series.
3. Write a program to print the prime numbers between 1 to n.
4. Write a program to check if it a Palindrome (e.g., madam).
5. Write a program to check if it is an Armstrong number. (An Armstrong number of three digits is an integer such that the sum of the cubes of its digits is equal to the number itself)
6. Write program to reverse the digits of an input number.
7. Write a program to find the sum of digits of a number.
8. Write a program to find the GCD and LCM of two numbers.
9. Write a program to perform different arithmetic operations using switch….case.
10. Write a program to count the number bits “1” in a given binary number.
11. Write a program to find the factorial of a number using function.
12. Write a program to perform the arithmetic operations using function.
13. Write a program to find the largest element in an array.
14. Write a program to add two matrices.
15. Write a program to multiply two matrices.
16. Write a program to find the position of a given character in a string.
17. Write a program to count the number of times a character occurs in a string.
18. Write a program to create records of 10 students using structure.
19. Write a program to count the number of words, number of lines in a text file.
20. Write a Program to Search an element in array.
21. Write a Program to perform addition of all elements in Array.

22. Write a Program to find the largest and smallest element in Array.
23. Write a Program to reverse the array elements in C Programming.
24. Write a Program for deletion of an element from the specified location from Array.
25. Write a Program to access an element in 2-D Array.
26. Write a program for addition of two matrices of any order in C.
27. Write a Program to multiply two 3 X 3 Matrices.
28. Write a program to read a string and check for palindrome without using string related function (a string is palindrome if its half is mirror by itself eg: abcdcba).
29. Write a program to accept a string and count the number of vowels present in this string.

Text Book(s):

1. Herbert Schildt, "C The Complete Reference", Osborne/McGraw-Hill.
2. Yashavant Kanetkar, "Let us C", BPB Publications.

Reference:

1. B.W. Kernigha, D.M. Ritchie, "The C Programming Language", Prentice Hall of India.
2. E Balagurusami, "Programming in ANSI C", Tata McGraw-Hill.

Assessment Scheme:

- Internal Assessment (IA) consisting of:
  - Lab Attendance (L) 10 Marks
  - Quantity and Quality of Experiments Performed (Q) 10 Marks
  - Laboratory Record (R) 30 Marks
- External Assessment:
  - End Semester Lab-Viva/Test (ESL) 50 Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO4
L	S		S	W
Q		M		
R	W			
ESL			W	

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3-curriculum development)

Course Title: OPERATING SYSTEMS

L	T	P	C.U.
4	0	0	4

Course Code: SPA -103

Pre-requisites, **if any**: NA

Course Description:
This course will introduce the core concepts of operating systems, such as processes and threads, scheduling, synchronization, memory management, file systems, input and output device management and security.

Course Objective(s):
This course will enable students:

1. To understand the services provided by and the design of an operating system.
2. To understand the structure and organization of the file system.
3. To understand what a process is and how processes are synchronized and scheduled.
4. To understand different approaches to memory management.
5. Students should be able to use system calls for managing processes, memory and the file system.
6. Students should understand the data structures and algorithms used to implement an OS.

Expected Course Outcome (COs):
After completion of this course, the student will be able to

CO 1: Describe how computing resources such as CPU, memory and I/O are managed by the operating system.
CO 2: Analyze kernel and user mode in an operating system.
CO 3: Solve different CPU scheduling problem to achieve specific scheduling criteria.
CO 4: Apply the knowledge of process management, synchronization, deadlock to solve basic problems.
CO 5: Evaluate and report appropriate design choices when solving real-world problems.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	S	W						
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			S

Course Content:

Unit 1:
Introduction: Definition, functions and services of operating system. Evolution of operating systems: Early Computers and Operating Systems, Resident Monitors, Offline I/O, Spooling Systems, Multiprogramming, Timesharing, Interactive systems, Multi-users systems, Multiprocessor, Network and Distributed systems. Operating system concepts: activities, functions and services system calls, system structures, kernel functions, process management concepts.

Unit-2:
CPU Scheduling: concepts, scheduling criteria, scheduling algorithms, algorithm evaluation. Multithreading: Implementation, User level and Kernel level threads, Thread Scheduling. Inter-process communication, Mutual exclusion problem and critical section. Process synchronization, Classical IPC problems: Producer Consumer

problem, Dinning Philosophers problem; IPC Techniques: Synchronization hardware, semaphores, Monitors, Message passing. Deadlock: Necessary Conditions, deadlock handling methods: Deadlock Prevention, Deadlock detection and recovery, Deadlock avoidance, Bankers Algorithm.

Unit 3:

Memory Management: Concepts, single user memory management. Partition memory allocation: paging, segmentation and segmentation with paging, Virtual memory management: Concepts, Storage hierarchy, demand paging, process creation, page replacement, allocation of frames and thrashing.

Unit 4:

File Management: File concepts, access methods, directory structure, sharing and protection of files. File system structure and implementation, allocation methods, free space management, reliability of file system. Unix file system. Device Management: Goals of input/output software design, structure of device hardware and software. layers of I/O software, structure of device drivers, disk driver, disk arm scheduling algorithms, terminal driver, clock driver etc. Note: Case study of Windows /UNIX/Linux operating systems will be used to explain the above topic.

Text Book(s):

1. A. Silberschatz, P. Galvin and Gagne, Operating System Concepts, Addison Wesley, 6th Edition, 1994.
2. A.S.Tanenbaumb, Modern Operating System Concepts, Prentice Hall, 2nd Edition, 2001.

Reference:

1. W. Stallings, Operating systems, 4th Edition, Pearson Education, 2003.
2. M. Back, Design of Unix Operating System, Prentice Hall, 1986.

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5
C	S	M	S	M	S
H	S		M		W
Sessional Exam (T)		S	M	W	
ESE	S	M		S	M

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3- curriculum Development)

Course Title: OPERATING SYSTEM LAB
Course Code: SPA-113
Pre-requisites, if any: NA

L	T	P	C.U.
0	0	4	4

Course Description:

This Laboratory course deals with demonstration of basic Operating System Concepts.

Course Objective(s):

This course will enable students:

1. To understand the main components of an OS & their functions.
2. To study the process management and scheduling.
3. To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.
4. To understand the concepts and implementation Memory management policies and virtual memory.
5. To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS
6. To study the need for special purpose operating system with the advent of new emerging technologies role of operating system in their management policies and algorithms.

Course Outcome (COs):
After completion of this course student will be able to:

CO 1: Exposure to different OS
CO 2: Awareness of concepts of multiprogramming, multithreading and multitasking.
CO 3: Demonstration of memory management algorithms
CO 4: Demonstration of file-handling concepts by implementing suitable algorithms.
CO 5: Awareness of computational issues, resources in distributed environment.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			

List of Experiments:

1. Comparative Study of different operating systems
2. Demonstration of multitasking concept.
3. Implementing various process creation algorithms(FCFS, SJF and Round-Robin Scheduling)
4. Implementation of memory allocation policies.
5. Implementing Page replacement algorithms(FIFO, LIFO)
6. Implementing segmentation algorithms
7. Implementing file-handling algorithms
8. Implementing file-handling algorithms
9. Implementing file-handling algorithms
10. Demonstration of working of distributed OS environment.

Text Book(s):

1. A. Silberschatz, P. Galvin and Gagne, Operating System Concepts, Addison Wesley, 6th Edition, 1994.
2. A.S.Tanenbaumb, Modern Operating System Concepts, Prentice Hall, 2nd Edition, 2001.

Reference:

1. W. Stallings, Operating systems, 4th Edition, Pearson Education, 2003.
2. M. Back, Design of Unix Operating System, Prentice Hall, 1986.

Assessment Scheme:

- Internal Assessment (IA) consisting of:
  - Lab Attendance (L) 10 Marks
  - Quantity and Quality of Experiments Performed (Q) 10 Marks
  - Laboratory Record (R) 30 Marks
- External Assessment:
  - End Semester Lab-Viva/Test (ESL) 50 Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO4	CO 5
L	S		S	W	S
Q		M			
R	W				
ESL			W		W

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3-curriculum development).

Course Title: DISCRETE STRUCTURES & GRAPH THEORY
Course Code: SPA -104
Pre-requisites, **if any**: NA

L	T	P	C.U.
4	0	0	4

Course Description:
The purpose of this course is to understand and use (abstract) discrete structures that are backbones of computer science. In particular, this class is meant to introduce logic, proofs, sets, relations, functions, counting, and probability, with an emphasis on applications in computer science.

Course Objective(s):
This course will enable students to:

1. Gain intense foundational introduction to fundamental concepts in discrete mathematics.
2. Interpret, identify, and apply the language associated with logical structure, sets, relations and functions, modular arithmetic.
3. Write and interpret logical statements using quantifiers.
4. Understand and apply the concepts of group and coding theory and applications.

Course Outcome (COs):
After completion of this course, the student will be able to

CO 1: Reason mathematically about basic data types and structures (such as numbers, sets, graphs, and trees) used in computer algorithms and systems.
CO 2: Model and analyze computational processes using analytic and combinatorial methods.
CO 3: Use abstract structures to represent discrete objects and their interrelationships.
CO 4: Apply the mathematical concepts learned to various areas of computer science.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	S	W						
CO 2			S				M	
CO 3		M				S		
CO 4				W				

Course Content:

Unit-1:
Set Theory: Introduction, Combination of sets, Multi sets, ordered pairs, Set Identities. Relations: Definition, Operations on relations, Properties of relations, Composite Relations, Equality of relations, Order of relations. Functions: Definition, Classification of functions, Operations on functions, recursively defined functions. Natural Numbers: Introduction, Mathematical Induction, Variants of Induction, Induction with Nonzero Base cases.

Unit-2:
Algebraic Structures: Definition, Groups, Sub groups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Sub groups, Permutation and Symmetric groups, Group Homomorphism. Definition and elementary properties of Rings and Fields, Integers Modulo.

Unit-3:
Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram. Lattices: Definition, Properties of lattices–Bounded, Complemented, Modular and Complete Lattice, Morphisms of lattices.
Boolean algebra: Introduction, Axioms and Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Propositional Logic: Proposition, well-formed formula, Truth

tables, Tautology, Satisfiability, Contradiction, Algebra of proposition, Theory of Inference, Natural Deduction. Predicate Logic: First or depreciate, well-formed formula of predicate, quantifiers, Inference theory of predicate logic.

Unit-4:

Trees: Definition, Binary tree, Binary tree traversal, binary search tree. Graphs: Definition and terminology, Representation of graphs, Multi graphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian paths, Graph coloring.

Recurrence Relation & Generating function: Recursive definition of functions, Recursive algorithms, Method of solving recurrences. Combinatory: Introduction, Counting Techniques, Pigeonhole Principle.

Text Books:

1. Lipschutz "Discrete Mathematics" McGrawHill

References:

1. Biswal, "Discrete Mathematics and Graph Theory, PHI Learning Private Limited, Delhi India

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4
C	S	M	S	M
H	S		M	
Sessional Exam (T)		S	M	W
ESE	S	M		S

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules **(**2.3- curriculum Development).

Course Title: BASICS OF TRANSCENDENTAL MEDITATION AND YOGA
Course Code: TPC -101
Pre-requisites: NA

L	T	P	C.U.
2	1	1	4

Course Description:
With the changing environment, it becomes essential for an individual to adapt to the change and cope up with it. The capability of an individual to deal with these challenges with a positive attitude is the need of today which can only be achieved successfully through a holistic approach towards life. As a first step this course starts with basic asanas of Transcendental Meditation (TM) and Yoga.

Course Objectives:
The objective of this course is to enable students to recognize the need of knowledge of the self, as a basis to achievement and fulfillment. They will be introduced to the basics of TM and yoga and practice basic asanas.

Course Outcomes (COs): At the end of this course students will be able to:
CO 1: Define the concept of TM and yoga
CO 2: Recognize the importance of yoga as a means to achieve fulfilment in life
CO 3: Perform basic asana
CO 4: Compare with others as to how his/her life becomes better aligned with the environment

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5
CO 1	M	W			
CO 2			S		
CO 3		M			
CO 4				W	S

Course Contents:

Unit – 1:
Science of Consciousness and Transcendental Meditation
Introduction to Science of Consciousness and its practical aspect, Concept of Knower, Known, Object of Knowing, Introduction to Transcendental Meditation, Scientific Research on Transcendental Meditation, How Transcendental Meditation differs from other forms of meditation, Introducing CBE - Transcendental Meditation around the world, Preparation to start learning Transcendental Meditation

Unit – 2:
Learning Transcendental Meditation
Preparation to learn Transcendental Meditation, Personal Instruction, Supplying Practical Understanding of Correct Meditation, Effects of Transcendental Meditation on Mind and Body, Development of Higher States of Consciousness

Unit – 3:
Consciousness-based Education (CBE)
Introduction to Consciousness-based Education, CBE around the world and in India

Unit – 4:
Enrichment of Experiences I
Follow-up Sessions and Group Checking, Understanding Nature of Life and Natural Tendency of Transcendental Meditation, Personal Checkings , Refresher of the Practice

Unit – 5:
Maharishi Yoga Asanas
Introduction to Maharishi Yoga Asanas, Practice Yoga Asanas that promote integration of mind and body, Learn about the influence and benefits of each posture on your physiology

Unit – 6:
Basics of Communication
Purpose and process of communication, Communication and self , Types of Communication in relation to environment, Barriers to communication and how TM and yoga helps in overcoming the barriers, Communication and Human Emotions

Text Book(s):
- Denniston Denise. (1986). The TM book. Fairfield Press Inc.
- Truby John. (2008). The Anatomy of Story: 22 Steps to Becoming a Master Storyteller. Farrar, Straus and Giroux

References:
- https://www.tm.org/
- https://indiatm.org/

Assessment Scheme:

Sl. No.	Component	Weightage (%)
AC 1	Participation in Practice	20
AC 2	Teachers' Evaluation	20
AC 3	Outbound Visit & Report	10
AC 4	Field Based Project	20
AC 5	End Semester Examination	30

Mapping Assessment Components with COs

	CO1	CO2	CO3	CO4
AC 1	X	X	X	X
AC 2	X	X	X	X
AC 3		X	X	
AC 4		X		X
AC 5		X	X	X

Details of Projects/Activities

Dumb Charade story telling competition in the light of Consciousness

The group of 10 students is created and individually they have to tell the story to the whole class without speaking a word by using props, sign language and the class has to guess the story. The group further explains the knowledge behind the story to the rest of the class. The group that performs and articulates in an appropriate

manner shall be appreciated and the teacher will conclude the class by connecting the learning to the Maharishi Knowledge.

Ping pong ball and knowledge

- All students will be provided with the one ping pong ball each
- The glasses will be placed on the table at a distance of 10 foot
- The students have to throw the ball towards the glass and it should directly fall into the glass.

The learning behind this activity is that the more you practice or rehearse any skill the more you become efficient and coefficient in that skill, consequently regular practice of any skill leads to perfection.

Each student (individually or in groups of 2-3 students) will undertake a project where they will be working in the external environment (like village community, MSMEs, NGOs, civil authorities etc.) on identified issues. They will work under the guidance of an assigned faculty member and will be assessed on the basis of how they are able to effectively understand their relationship with the external environment. Students will have to prepare the schedule of interaction with the identified external contacts and execute the assigned task keeping in mind the intended learning outcomes. They will maintain a project diary/ register as per following format and this will be scrutinized by the faculty guide weekly/ fortnightly as decided.

Sl. No.	Topic Learnt in Class or Practice of TM	How I applied it during project/ field practice/ Outbound visit	My Understanding	Remarks
1.				
2.				

Outbound Visit/ Activity:

It is mandatory that all students will have to participate in outbound visit/ activity and attend all the planned activities strictly. With the guidance of faculty members, the will participate with clear cut intended learning outcome and submit a report on completion so that attainment of outcomes can be assessed. This assessment will have weightage as mentioned in the assessment scheme.

Class Participation:
Student's participation in practice Sessions: 10 Marks

S.No	Rubrics for Practice Sessions	Marks
1	Student regularly attends the practice session once a day	2
2	Student regularly attends the practice session twice a day	4
3	Student attends the session regularly but does not initiate contribution & needs instructor to solicit input.	6
4	Student's comments are constructive, with signs of insight and relevant to discussion	8
5	Student listens attentively and hears what others say and contributes to the learning and knowledge.	10

Student's participation in the Theory Classes: 10 Marks

S.No	Rubrics for Theory Sessions	Marks
1	Student regularly attends the class but is quite disruptive	2
2	Student attends the class but does not listen to others, both in groups and in class	4
3	Student attends the class with some participation	6
4	Student attends the class proactively and contributes to the class	8
5	Student attends the class proactively, consistently and add value to the learning process	10

Attendance in all the classes and practice sessions is mandatory. Participation will be evaluated based on attendance, active engagement in discussions and interaction and contribution towards overall learning. This component will have 20% weightage as mentioned in the assessment scheme.

Other Details:

While it is expected that students should attend all classes but to cater to emergencies, illness, unavoidable social commitments and family responsibilities, a relaxation of up to 25% may be considered. Under no circumstances, attendance should fall below 75% else they will be debarred from taking examinations and will be declared fail in the course. Students can meet the faculty/ guide for consultations between 3:30 PM to 4:30 PM or else with prior appointment. Students are expected to be regular and punctual in all activities including completion of work, submission schedules, appointments etc. and should be professionally dressed.

Important Note for faculty: Assessment rubrics will have to be written for each Assessment component.

Evaluation Scheme
M. Sc. (Computer Science)
Second Semester

Sl. No.	Course Category	Course Code	Course Title	L-T-P	CIA Marks	ESE Marks	Total	Credit
1	Core Courses	SPA-201	Data Structures using C++	4-0-0	30	70	100	4
2		SPA-202	Database Management System	4-0-0	30	70	100	4
3		SPA-203	Software Engineering	4-0-0	30	70	100	4
4		SPA-204	Computer Architecture & Parallel Processing	4-0-0	30	70	100	4
5		SPA-211	Data Structure Lab	0-0-4	50	50	100	4
6		SPA-212	Database Management System Lab	0-0-4	50	50	100	4
							600	24
Qualifying Non-Creditable Course								
7	Self-Development courses/ Science for Consciousness (SOC)	TPC-102	Increasing Coherence in Society by Maharishi's Knowledge	2-1-1	70	30	100	4

Course Title: DATA STRUCTURE USING C++
Course Code: SPA -201
Pre-requisites, **if any**: Programming Language.

L	T	P	C.U.
4	0	0	4

Course Description:
This course give an over view of computer Data organization in the form of different data structures. The course emphasizes on linear and non- linear data structures, various searching and sorting techniques. It covers the design and implementation of data structures and algorithms to solve engineering problems using an object-oriented programming language. Topics include elementary data structures, (including arrays, stacks, queues, and lists), advanced data structures (including trees and graphs), the algorithms used to manipulate these structures, and their application to solving practical engineering problems.

Course Objective(s):
This course will enable students:

1. To learn the basics of abstract data types.
2. To learn the principles of linear and nonlinear data structures.
3. To build an application using sorting and searching.

Expected Course Outcome (COs):
After completion of this course, the student will be able to:

CO 1: Differentiate how the choices of data structure & algorithm methods impact the performance of program.

CO 2: Solve problems based upon different data structure & also write programs.

CO 3: Identify appropriate data structure & algorithmic methods in solving problem.

CO 4: Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

CO 5: Compare and contrast the benefits of dynamic and static data structures implementations.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	S	W						
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			S

Course Contents:

Unit- 1:
Introduction to C++ & Introduction to Data Structures
C++ Basics, Structures, Variables in C++, References, Functions, Function Overloading, Default Values for Formal Arguments of Functions, Inline Functions. Introduction to Classes and Objects Constructors, destructors, friend function, dynamic memory allocation, Inheritance, Overloading, Polymorphism, Templates. Definition of data structures and abstract data types. Static and Dynamic implementations. Examples and real life applications, Data Structures: Arrays, Address calculation in a single and multi-dimensional array, Sparse matrices.

Unit- 2:
Stacks, Queues and Lists
Definition, Array based implementation of stacks, Linked List based implementation of stacks, Examples : Infix, postfix, prefix representation, Applications : Mathematical expression Evaluation Definition: Queues & Lists: Array

based implementation of Queues / Lists, Linked List implementation of Queues / Lists, Circular implementation of Queues and Singly linked Lists, Straight / circular implementation of doubly linked Queues / Lists, Priority queues , Applications.

Unit- 3:

Running time & Searching Algorithms

Time Complexity, Big – Oh - notation, Running Times, Best Case, Worst Case, Average Case, Factors depends on running time, Introduction to Recursion, Divide and Conquer Algorithm, Evaluating time Complexity. Straight Sequential Search, Binary Search, non –recursive Algorithms, recursive Algorithms, Indexed Sequential Search. Definition, Hash function, Collision Resolution Techniques, Hashing Applications.

Unit- 4:

Sorting Algorithms

Introduction, Sorting by exchange, selection, insertions, Bubble sort, Selection sort, Insertion sort, Pseudo code algorithm and their C++ implementation, Efficiency of above algorithms, Shell sort, Performance of shell sort, Merge sort, Merging of sorted arrays, The merge sort Algorithms, Quick sort Algorithm, Analysis of Quick sort, Picking a Pivot, A partitioning strategy, Heap sort, Heap Construction, Heap sort, bottom – up, Top– down Heap sort approach, Radix sort.

Text Book(s):

1. Horowitz and Sahani,"Fundamentals of Data Structures",Galgotia Publications Pvt Ltd Delhi India

Reference Books:

1. Lipschutz ,"Data Structures "Schaum's Outline Series, Tata Mcgraw-hill Education (India) Pvt. Ltd.

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5
C	S	M	S	M	S
H	S		M		W
Sessional Exam (T)		S	M	W	
ESE	S	M		S	M

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3- curriculum Development).

Course Title: DATA STRUCTURE LAB
Course Code: SPA -211
Pre-requisites, **if any**: Programming Language.

L	T	P	C.U.
0	0	4	4

Course Description: This course is laboratory/ practical implementation of data structure core course.

Course Objective(s):

This course will enable students:

1. To write and execute programs in C to solve problems using data structures such as arrays, linked lists, stacks, queues, trees, graphs, hash tables and search trees.
2. To write and execute write programs in C to implement various sorting and searching methods.

Course Outcome (COs):

CO 1: Choose appropriate data structure as applied to specified problem definition.
CO 2: Handle operations like searching, insertion, deletion, traversing mechanism on various data structures.
CO 3: Have practical knowledge on the applications of data structures.
CO 4: Able to store, manipulate and arrange data in an efficient manner.
CO 5: Able to implement queue and stack using arrays and linked list. Implementation of queue, binary tree and binary search tree.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	S	W						
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			S

List of Experiments:

1. Write a C program using arrays that uses functions to perform the following:

   a. Create a Stack of integers.

   b. Push element in Stack.

   c. POP element from Stack.

   c. Display the contents of the above stack after deletion.

2. Write a C program using linked list that uses functions to perform the following:

   a. Create a Stack of integers.

   b. Push element in Stack.

   c. POP element from Stack.

   c. Display the contents of the above stack after deletion.

3. Write a C program using arrays that uses functions to perform the following:

a. Create a Queue of integers.

b. Insert element in Queue.

c. Delete element from Queue.

c. Display the contents of the above Queue after deletion.

4. Write a C program using linked list that uses functions to perform the following:

a. Create a Queue of integers.

b. Insert element in Queue.

c. Delete element from Queue.

c. Display the contents of the above Queue after deletion.

5. Write a C program that uses functions to perform the following:

a. Create a singly linked list of integers.

b. Delete a given integer from the above linked list.

c. Display the contents of the above list after deletion.

6. Write a C program that uses functions to perform the following:

a. Create a doubly linked list of integers.

b. Delete a given integer from the above doubly linked list.

c. Display the contents of the above list after deletion.

7. Write C programs for implementing the following sorting methods to arrange a list of integers in ascending order:

a. Insertion sort

b. Merge sort

8. Write C programs for implementing the following searching methods to arrange a list of integers in ascending order:

a. Linear Search

b. Binary Search

Text Book(s):

1. Horowitz and Sahani,"Fundamentals of Data Structures",Galgotia Publications Pvt Ltd Delhi India

Reference:

2. Lipschutz ,"Data Structures "Schaum's Outline Series, Tata Mcgraw-hill Education (India) Pvt. Ltd.

Assessment Scheme:

- Internal Assessment (IA) consisting of:
  - Lab Attendance (L) 10 Marks
  - Quantity and Quality of Experiments Performed (Q) 10 Marks
  - Laboratory Record (R) 30 Marks
- External Assessment:
  - End Semester Lab-Viva/Test (ESL) 50 Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO4	CO5
L	S		S	W	
Q		M			M
R	W				
ESL			W		

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3-curriculum development).

Course Title: DATABASE MANAGEMENT SYSTEM
Course Code: SPA -202
Pre-requisites, **if any**: NA.

L	T	P	C.U.
4	0	0	4

Course Description:
The course emphasizes the understanding of the fundamentals of relational systems including data models, database architectures, and database manipulations. The course also provides an understanding of new developments and trends such as Internet database environment and transaction processing.

Course Objective(s):
This course will enable students:

1. To learn the data models, conceptualize and depict a database system
2. To design system using E-R diagram.
3. To learn SQL & relational database design.
4. Tounderstandtheinternalstoragestructuresusingdifferentfileandindexingtechniques.
5. To know the concepts of transaction processing, concurrency control techniques and recovery procedure**.**

Expected Course Outcome (COs):
After completion of this course, the student will be able to

CO 1: Apply the knowledge of Entity Relationship (E-R) diagram for an application.
CO 2: Create a normalized relational database model
CO 3: Analyze real world queries to generate reports from it.
CO 4: Determine whether the transaction satisfies the ACID properties.
CO 5: Create and maintain the database of an organization.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	S	W						
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			S

Course Content:

Unit-1:
Introduction and Relational Model: Advantages of DBMS approach, Various views of data, data independence, schema & sub-schema, primary concept of data models, database languages, transaction management, database administrator & user, data dictionary, database structure & architectures.
Relational Model: Domains, relation, kind of relation, Relational databases, Various types of keys: candidate, primary, alternate & foreign keys, relational algebra with fundamental and extended operations, modification of database.

Unit-2:
ER Model and SQL: Basic concept, design issues, mapping constraint, keys, ER diagram, weak& strong entity-sets, specialization & generalization, aggregation, inheritance, design of ER schema, Reduction of ER Schema to tables.
SQL: Basic structure of SQL, Set operation, Aggregate functions,
Null values, Nested Sub queries, derived relations, views, Modification of database, join relation, Domain, relation & keys, DDL in SQL. Programming concepts of PL/SQL, Stored procedure, Database connectivity with ODBC/JDBC.

Unit-3:
Functional Dependencies: Basic definitions, Trivial & non trivial dependencies, closure set of dependencies & of attributes, Irreducible set of dependencies, FD diagram. Normalization: Introduction to normalization, non-loss decomposition, First, second and third normal forms, dependency preservation, BCNF, multivalve dependencies and fourth normal form, join dependencies and fifth normal form.

Unit-4:
Transaction Management: Basic concept, ACID properties, transaction state, Implementation of atomicity & durability, Concurrent execution, Basic idea of Serializability. Concurrency & Recovery: Basic idea of concurrency control, basic idea of deadlock, Failure Classification, storage structure types, stable storage implementation, data access, recovery & Atomicity: log based recovery, deferred database modification, immediate database modification, checkpoints.
Database Integrity, Storage Structure & File Organization: general idea, integrity rules, Domain rules, Attributes rules, assertion, triggers, integrity & SQL. Storage Structure: overview of physical storage media, magnetic disk: performance & optimization, RAID. File Organization: File organization, Organization of records in files, basic concept of Indexing, ordered indices: B+ tree & B tree index files.

Text Books:

1. Database System concepts – Henry F. Korth , Tata McGraw Hill 5th Edition. Delhi India

Reference Books:

1. An introduction to Database System - C.J. Date

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5
C	S	M	S	M	S
H	S		M		W
Sessional Exam (T)		S	M	W	
ESE	S	M		S	M

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3- curriculum Development).

Course Title: DATABASE MANAGEMENT SYSTEM LAB
Course Code: SPA-212
Pre-requisites, if any: NA.

L	T	P	C.U.
0	0	4	4

Course Description:

This Laboratory course deals with demonstration of basic Operating System Concepts.

Course Objective(s):
This course will enable students:

1. To learn the data models, conceptualize and depict a database system
2. To design system using E-R diagram.
3. To learn SQL & relational database design.
4. Tounderstandtheinternalstoragestructuresusingdifferentfileandindexingtechniques.
5. To know the concepts of transaction processing, concurrency control techniques and recovery procedure**.**

Expected Course Outcome (COs):
After completion of this course, the student will be able to

CO 1: Apply the knowledge of Entity Relationship (E-R) diagram for an application.
CO 2: Create a normalized relational database model
CO 3: Analyze real world queries to generate reports from it.
CO 4: Determine whether the transaction satisfies the ACID properties.
CO 5: Create and maintain the database of an organization.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			

List of Experiments:

1. Create employee table with emp_id, emp_name, empadd, empsal fields and enter at least 10 records into it.
2. Display all the record of employee table with select query.
3. Use different select query clauses with different condition and display the output.
4. Create a table **employee** (emp_id : integer, emp_name: string) **department** (dept_id: integer, dept_name: string) **pay details** (emp_id : integer, dept_id: integer, basic: integer, deductions: integer, additions: integer, DOJ: date) **payroll** (emp_id : integer, pay_date: date)
    a. Create the tables with the appropriate integrity constraints
    b. Insert around 10 records in each of the tables
    c. List all the employee names who joined after particular date
    d. List the details of employees whose basic salary is between 10,000 and 20,000
    e. Give a count of how many employees are working in each department
    f. Give a names of the employees whose netsalary >10,000
    g. List the details for an employee_id=5
    h. Create a view which lists out the emp_name, department, basic, dedeuctions, netsalary
    i. Create a view which lists the emp_name and his netsalary.
5. Adding primary, foreign keys at the table creation time as well as with the alter query.
6. Joining the different tables and fields of the table using Join.

7. Creating users and giving and removing permissions with grant and revoke.
8. Write a program to demonstrate %type and % rowtype attributes
9. Write a PL/SQL program to check whether the given number is Armstrong or not
10. Write PL/SQL program for displaying the data from tables on the screen.
11. Write PL/SQL program for updating the table contents using different conditions
12. Create a PL/SQL procedure to find reverse of a given number
13. Create a PL/SQL procedure to update the salaries of all employees as per the given data
14. Create a cursor, which update the salaries of all employees as per the given data.
15. Create a cursor, which displays all employee numbers and names from the EMP table.
16. Create a cursor, which displays names of employees having salary > 50000.
17. Create a trigger before/after delete on employee table for each row/statement.
18. Create a trigger before/after insert on employee table for each row/statement.

Text Books:

1. Database System concepts – Henry F. Korth , Tata McGraw Hill 5th Edition. Delhi India

Reference Books:

1. An introduction to Database System - C.J. Date

Assessment Scheme:

- Internal Assessment (IA) consisting of:
  - Lab Attendance (L) 10 Marks
  - Quantity and Quality of Experiments Performed (Q) 10 Marks
  - Laboratory Record (R) 30 Marks
- External Assessment:
  - End Semester Lab-Viva/Test (ESL) 50 Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO4	CO 5
L	S		S	W	S
Q		M			
R	W				
ESL			W		W

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3-curriculum development).

Course Title: SOFTWARE ENGINEERING
Course Code: SPA -203
Pre-requisites, **if any**: NA.

L	T	P	C.U.
4	0	0	4

Course Description:

Software engineering is a course that allows students to apply engineering and computer science concepts in the development and maintenance of reliable, usable, and dependable software. The course provides an introduction to software engineering, giving you a definition of this body of knowledge, as well as a discussion of the main methodologies of software engineering.

Course Objective(s):

This course will enable students:

1. To develop basic Knowledge in Software Engineering and its applications.
2. To understand software Engineering layered architecture and the process frame work.
3. To analyze software process models such as the waterfall, spiral, evolutionary models and agile method for software development.
4. To design software requirements and specifications of documents.
5. To understand project planning, scheduling, cost estimation, risk management.
6. To describe data models, object models, context models and behavioral models.
7. To learn coding style and testing issues.
8. To know about the quality checking mechanism for software process and product.

Course Outcome (COs):

After completion of this course, the student will be able to:

CO 1: To identify, formulate, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements

CO 2: To analyze, elicit and specify software requirements through a productive working relationship with various stakeholders of the project

CO 3: To design applicable solutions in one or more application domains using software engineering approaches that integrates ethical, social, legal and economic concerns.

CO 4: To develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice.

CO 5: To identify modern engineering tools necessary for software project management, time management and software reuse, and an ability to engage in life-long learning.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	S	W						
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			S

Course Content:

Unit-1:

Introduction to Software Engineering & Software Process: Software problem, Software Engineering Problem, Software Engineering Approach, Software Characteristics and Application. Software Processes: Components & Characteristics, Software Development Processes: Waterfall Model, Prototyping Model, Iterative Enhancement

Model, Spiral Model, Time-boxing model, RAD Model, CBD Model, Comparative Study of Various Development Models.

Unit-2:
Project Management Process & Project Planning: The People, Product, Process and Project, Phases of Project Management Process, Project Life Cycle, W5HH Principle. Software Configuration Management Process, Process Management Process. Metrics and Measurements, Project Estimation (size & cost), Project Scheduling, Staffing and Personnel Planning, Risk Management, Miscellaneous Plans.

Unit-3:
Software Requirement Analysis and Specification: Software Requirements, Problem Analysis (Structured Analysis and Object Oriented Analysis), Requirements Specification, Validation and Verification, Metrics, Case Study. Software Design: Design principles: Problem Partitioning and Hierarchy, Abstraction, Modularity, Top-down and Bottom-up strategies, Effective Modular Design: Functional Independency, Cohesion, Coupling. Structured Design Methodology, Overview of Object-Oriented Design, Case Study.

Unit-4:
Software Testing & Quality Assurance: Testing Fundamentals, Test Case Design: White Box Testing, Black Box Testing, Levels of Testing: Unit Testing, Integration Testing, System Testing and Acceptance Testing, The art of Debugging. Quality Concept, Quality Management System, Quality Assurance Activities, Quality Standards: Capability Maturity Model (CMM), ISO 9000, Six Sigma. SQA plan, Software Reliability, Best Software Engineering Practices.

Text Book(s):
1. Pankaj Jalote, Software Engineering, Wiley.
2. K.K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers

Reference:
1. R. S. Pressman, Software Engineering: A Practitioners Approach, Mc-GrawHill.

Assessment Scheme:
- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5
C	S	M	S	M	S
H	S		M		W
Sessional Exam (T)		S	M	W	
ESE	S	M		S	M

Note:
- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: COMPUTER ARCHITECTURE & PARALLEL PROCESSING
Course Code: SPA -204
Pre-requisites, **if any**: NA.

L	T	P	C.U.
4	0	0	4

Course Description:
This course gives an overview of computer architecture and their components including software and hardware components and introduces the principles of parallel processing. The course emphasizes performance and cost analysis, Algorithms, Programming Languages instruction set design, Processor Unit Organization, memory technology, memory hierarchy, virtual memory management, and I/O systems.

Course Objective(s):
This course will enable students to:

1. Grasp the basic concepts of computer architecture and organization.
2. Understand the key skills of constructing cost-effective computer systems.
3. Able to understand Working of logic gates and its families
4. Understand programming languages and their evolution.
5. In-depth understanding of why computers are essential components.
6. Able to articulate design issues in the development of processor.
7. Understand the components that satisfy design requirements and objectives.

Course Outcome (COs):
After completion of this course, the student will be able to

CO 1: Solve problems based on computer arithmetic.
CO 2: Explain processor structure & its functions Obtain knowledge about micro-programming of a processor.
CO 3: Understand concepts related to memory & IO organization.
CO 4: Acquire knowledge about instruction level parallelism & parallel organization of multi-processors & multi- core systems.
CO 5: Understand the Direct Memory Access Transfer and CPU-IOP communication.
CO 6: Explain and Summarize Asynchronous Serial Transfer.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	S	W						
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			S
CO 6	M							

Course Content:

Unit-1:
Central Processing Unit: General Register and Stack Organization - Instruction formats - Addressing Modes - Data Transfer and Manipulation - Program Control - RISC - Pipelining - Arithmetic, Instruction and RISC Pipelining - Vector Processing - Array Processor.

Unit-2:
Input-Output organization - Peripheral devices - I/O Interface - Asynchronous Data Transfer - Modes of Transfer - Priority Interrupt - DMA - I/O Processor - Serial Communication - Memory Organization - Memory Hierarchy - Auxiliary Memory - Associative Memory and Virtual Memory .

Unit-3:
Need for parallel computers, Modules of Computation, Analyzing Algorithms, Expressing Algorithms - Broadcast, All sum and selection algorithms and SIMD model - Searching a sorted sequence: EREW, CREW SMSIMD algorithms, Searching a Random sequence on shared memory SIMD, Tree and mesh interconnected computers.

Unit-4:
Sorting on a Linear array, Sorting a Mesh, Sorting on EREW SIMD computer, MIMD Enumeration sort, MIMD Quick sort, Sorting on other Networks. Matrix by matrix multiplication: Mesh Multiplication, Cube multiplication - Solving numerical problems, Solving systems of Linear equations: An SIMD algorithm, An MIMD algorithm.

Text Book(s):

1. M. Morris Mano - Computer System Architecture PHI -1993
2. V.C. Hamacher, G. Vranesic, S.G. Zaky - Computer Organisation, TMG, 1990
3. J.P.Hayes, Computer Architecture, McGraw Hill, 1988'
4. Selim G.AKL - The Design and Analysis of parallel Algorithms - PHI.
5. Mechael Quinn - Parallel Algorithms - McGraw Hill.

Reference:

1. Nicholas Carter, "Computer Architecture", TMG, 2006.
2. Kai Hwang, "Advance computer architecture", TMG, 2006.

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6
C	S	M	S	M	S	S
H	S		M		W	M
Sessional Exam (T)		S	M	W		M
ESE	S	M		S	M	

Note:

- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: INCREASING COHERENCE IN SOCIETY BY MAHARISHI'S KNOWLEDGE
Course Code: TPC -201
Pre-requisites, **if any**: TPC- 101

L	T	P	C.U.
2	1	1	4

Course Description:
The course describes the value of wholeness and creating coherence to unfold the full potential of an individual to make the society much more fulfilling, efficient and productive by Maharishi's Knowledge of Transcendental meditation and even a small percentage of people practicing in groups can bring a huge change in the society

Course Objectives:
The objective of this course is to enable the students to realize the importance of an Individual and its impact on the society by understanding the concept of Maharishi Effect which is scientifically verified along with Behavioural communication and social responsibility. They will also be introduced to the concepts of World plan of Maharishi for different countries.

Course Outcomes (COs): At the end of this course students will be able to:

CO 1: Identify the concepts of Maharishi Effect in the light of Modern Science verified by scientific research
CO 2: Illustrate the important role of Maharishi in the contribution of revival of Vedic Knowledge
CO 3: Employ regular practice of meditation in daily life.
CO 4: Distinguish between various components of Non- Verbal Communication and their application in enhancement of the Behavioral Communication.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5
CO 1	M	W			
CO 2			S		
CO 3		M			
CO 4				W	S

Course Contents:

Unit – 1:
Increasing Positivity & Coherence in the Society I
Introduction to Maharishi Effect, Maharishi Effect draws parallels with Modern Science, Maharishi Effect verified by Scientific Research

Unit – 2:
Enrichment of Experiences II
Advance Lectures on the Transcendental Meditation Program, Follow-up Sessions and Group Checkings, Personal Checkings

Unit – 3:
Maharishi in the World
Who is Maharishi Mahesh Yogi, Narratives from Maharishi's Life, Timeline of the Achievements, Contribution in the revival of Vedic Knowledge, Maharishi's World Plan

Unit - 4:

Non-Verbal Communication

Gestures : An embodied view of social interaction, Postures related to Yoga and meditation, Role of Facial Expression in social interaction , Eye Contacts, Meeting the self, Body Language with respect to work place morale, Time Language: Space, time and sign language , Silence: Key to true communication with higher self, Tips for Improving Non- verbal Communication

Text Book (s):

- Gilpin Geoff. (2006). The Maharishi Effect: A Personal Journey through the Movement That Transformed American Spirituality. Penguin Group (USA). Tarcher Perigee
- Aron Elaine & Aron Arthur. (1986). The Maharishi Effect: A Revolution Through Meditation. Stillpoint Publishing, New Hampshire. E P Dutton.
- Burgoon K. J, Floyd Kory & Guerrero Laura. (2009) Non-Verbal Communication. Allyn & Bacon
- McNeill David. (2005). Gesture and Thought. University of Chicago Press

References:

- Halley Susi (2019, March 25). The Maharishi Effect as a Solution to the problem of antisemitism in America from https://www.researchgate.net/publication/333356375

- Orme-Johnson, D. W., & Fergusson, L. (2018). Global impact of the Maharishi Effect from 1974 to 2017: Theory and research. Journal of Maharishi Vedic Research Institute

Assessment Scheme:

Sl. No.	Component	Weightage (%)
AC 1	Participation in Practice	20
AC 2	Teachers' Evaluation	20
AC 3	Outbound Visit & Report	10
AC 4	Field Based Project	20
AC 5	End Semester Examination	30

Mapping Assessment Components with COs

	CO1	CO2	CO3	CO4
AC 1	X	X	X	X
AC 2	X	X	X	X
AC 3			X	
AC 4			X	X
AC 5	X	X	X	X

Details of Projects/Activities

Dart Game

Dart Game with Balloons: - In this activity balloons are considered as ignorance and students are supposed to write the habits they want to eliminate from their life on the balloons. When a student bursts that balloon, Knowledge comes out in form of Maharishi quotes. The learning was hitting the dart is considered as the action taken to remove the ignorance by gaining the inside knowledge.

Solve the knowledge Puzzles

To start this activity we take 5 students in one group and there can be multiple number of groups created and each group is provided with set of words related to Maharishi's quote to frame exact Maharishi's quote in complete. The learning behind the activity is teamwork and enhancement of communication skills as well as brain storming.

Human Knot Team Building Activity

Starting in a circle, participants connect hands with two others people in the group to form the human knot. As a team they must then try to unravel the "human knot" by untangling themselves without breaking the chain of hands.

1. Get the group to form a circle.
2. Tell them to put their right hand up in the air, and then grab the hand of someone across the circle from them.
3. Then repeat this with the left hand, ensuring they grab a different person's hand.
4. Check to make sure that everyone is holding the hands of two different people and they are not holding hands with someone either side of them.
5. That they must now try to untangle themselves to form a circle without breaking the chain of hands. Allocate a specific time to complete this challenge (generally ten to fifteen minutes)
6. Get participants to take their time in order to limit injuries. Ask the group not to tug or pull on each other and spot participants as they pass over other participants. Monitor throughout the challenge and stop them if you need to.
7. If the chain of hands is broken at any point, they must then start over again.

The Learning outcome behind this activity as the life entangles itself, it can be resolved by having calm and stable mind, and this state of awareness can be easily achieved by diving inward to the level of consciousness by practice of Transcendental Meditation which further leads to better Cooperation, Leadership and Time Management.

Each student (individually or in groups of 2-3 students) will undertake a project where they will be working in the external environment (like village community, MSMEs, NGOs, civil authorities etc.) on identified issues. They will work under the guidance of an assigned faculty member and will be assessed on the basis of how they are able to effectively understand their relationship with the external environment. Students will have to prepare the schedule of interaction with the identified external contacts and execute the assigned task keeping in mind the intended learning outcomes. They will maintain a project diary/ register as per following format and this will be scrutinized by the faculty guide weekly/ fortnightly as decided.

Sl. No.	Topic Learnt in Class or Practice of TM	How I applied it during project/ field practice/ Outbound visit	My Understanding	Remarks
1.				
2.				

Outbound Visit/ Activity:

One Outbound Activity/Visit every month of Institutional, Corporates, Seminars, Conferences or (Guest Lectures (Inside or outside)) to be organized and conducted by Teacher's.

It is mandatory that all students will have to participate in outbound visit/ activity and attend all the planned activities strictly. With the guidance of faculty members, the will participate with clear cut intended learning outcome and submit a report on completion so that attainment of outcomes can be assessed. This assessment will have weightage as mentioned in the assessment scheme.

Class Participation:

Student's participation in practice Sessions: 10 Marks

S.No	Rubrics for Practice Sessions	Marks
1	Student regularly attends the practice session once a day	2
2	Student regularly attends the practice session twice a day	4
3	Student attends the session regularly but does not initiate contribution & needs instructor to solicit input.	6
4	Student's comments are constructive, with signs of insight and relevant to discussion	8
5	Student listens attentively and hears what others say and contributes to the learning and knowledge.	10

Student's participation in the Theory Classes: 10 Marks

S.No	Rubrics for Theory Sessions	Marks
1	Student regularly attends the class but is quite disruptive	2
2	Student attends the class but does not listen to others, both in groups and in class	4
3	Student attends the class with some participation	6
4	Student attends the class proactively and contributes to the class	8
5	Student attends the class proactively, consistently and add value to the learning	10

Attendance in all the classes and practice sessions is mandatory. Participation will be evaluated based on attendance, active engagement in discussions and interaction and contribution towards overall
Learning. This component will have 20% weightage as mentioned in the assessment scheme.

Other Details:

While it is expected that students should attend all classes but to cater to emergencies, illness, unavoidable social commitments and family responsibilities, a relaxation of up to 25% may be considered. Under no circumstances, attendance should fall below 75% else they will be debarred from taking examinations and will be declared fail in the course. Students can meet the faculty/ guide for consultations between **3:30 PM to 4:30 PM** or **else with prior appointment**. Students are expected to be regular and punctual in all activities including completion of work, submission schedules, appointments etc. and should be professionally dressed.

Important Note for faculty: Assessment rubrics will have to be written for each Assessment component.

Evaluation Scheme
M. Sc. (Computer Science)
Third Semester

Sl. No.	Course Category	Course Code	Course Title	L-T-P	CIA Marks	ESE Marks	Total	Credit
1	Discipline Specific Course	SPA-301	Object Oriented Programming Using Java	4-0-0	30	70	100	4
2		SPA-302	Data Communication and Computer Network	4-0-0	30	70	100	4
3		SPA-303	Theory of Computation	4-0-0	30	70	100	4
4	Elective-I (ANY ONE)	SPA-304/SPA-305/SPA-306	i) Computer Graphics and Multimedia ii) Compiler Design iii) Artificial Intelligence and Expert Systems	4-0-0	30	70	100	4
5	LAB	SPA-311	Java Programming Lab	0-0-4	50	50	100	4
6		SPA-312	HTML & PHP programming Lab	0-0-4	50	50	100	4
		TOTAL					**600**	**24**
Qualifying Non-Creditable Course								
7	Self-Development courses/ Science for Consciousness (SOC)	TPC-301	Science of Being for Effective Communication	2-1-1	70	30	100	4

Course Title: OBJECT ORIENTED PROGRAMMING USING JAVA
Course Code: SPA-301
Pre-requisites, **if any**: Programming Language

L	T	P	C.U.
4	0	0	4

Course Description:

This course develops advanced Java programming skills that are required to fully utilize the capabilities of this object-oriented, general-purpose programming language. Topics covered include exception handling, streams and file input/output, dynamic data structures, recursion, inheritance, and graphics. The student will create sophisticated applications using java servlets, JSP and Applets.

Course Objective:

This course will enable students to:

1. Introduces object oriented concepts like abstraction, inheritance, Polymorphism.
2. Utilize Classes and objects, Function prototyping, Array of objects, Constructors, Constructor overloading, Inheritance, Streams
3. Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling, database connectivity and web based application development

Course Outcome (COs):

After completion of this course, student will be able to:

CO 1: Learn the Internet Programming, using Java Applets
CO 2: Create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings
CO 3: Apply event handling on AWT and Swing components.
CO 4: Learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
CO 5: Create dynamic web pages, using Servlets and JSP.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			

Course Content:

Unit-1:

Introduction to Java: Features of Java, Object-oriented programming overview, Introduction of Java Technologies, Data Types, Variables, Memory concepts, decision making operators, Naming Conventions, Introduction to Class, Objects, Methods and Instance Variables, Primitive type Vs Reference Type, Initializing Objects with Constructors. Type conversion & casting, Operators, Control Statements, Static Method, Argument Promotion and Casting, Scope of declaration.

Unit-2:

String Handling, Using Command-line Arguments. Final Instance Variables, this reference, static import, overloaded Constructors, Garbage collection and method finalize, Overloading methods, Parameter passing. Inheritance: Relationship between Super classes and Subclasses, Using super, Constructor in Subclasses, Polymorphism:

Method overriding, up casting, Abstract classes and Methods, instance of operator, down casting, class, Runtime type Identification.

Unit-3:

Packages and Interfaces: Defining a Package, Understanding CLASSPATH, Access Protection, Importing packages, creating own packages. Defining an Interface, achieving multiple inheritances through interfaces, Exception Handling Java chained exceptions, declaring new exception types, Streams and Files.

Unit-4:

Multithreading: Thread priorities, Thread life cycle, Thread Synchronization, producer-consumer problem without Synchronization, Thread Groups, Synchronization, Introduction To GUI: Introduction, Overview of swing Components, Event Handling, Layout Managers, Applets, **Generic and Collection API:** Introduction, Motivation for Generic Methods, Generic Methods :Implementation and Compile- time Translation Issues, Overloading Generic Methods, Generic Classes, Raw Types, Generic and Inheritance **Database connectivity:** JDBC, JDBC Drivers, Basic JDBC Programming concepts, Executing Queries.

Text Book(s):

1. Java2: The Complete Reference by Herbert Schildt, Tata McGraw- Hill, 8th Edition, 2011.

Reference:

1. Java Programming Language, Ken Arnold, James Gosling, David Holmes, 3rd Edition, Person Education, 2000.

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5
C	S	M	S	M	S
H	S		M		W
Sessional Exam (T)		S	M	W	
ESE	S	M		S	M

Note:

- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: JAVA PROGRAMMING LAB
Course Code: SPA-311
Pre-requisites, if any: NA

L	T	P	C.U.
0	0	4	4

Course Description:
This Laboratory course deals with programming skills of Java Programming.

Course Objective(s):
This course will enable students to:

1. Introduces object oriented concepts like abstraction, inheritance, Polymorphism.
2. Utilize Classes and objects, Function prototyping, Array of objects, Constructors, Constructor overloading, Inheritance, Streams
3. Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling, database connectivity and web based application development.

Course Outcome (COs):
After completion of this course, student will be able to:

CO 1: Understand OOP concepts and basics of Java programming.
CO 2: Create Java programs using inheritance and polymorphism.
CO 3: Implement error-handling techniques using exception handling and multithreading.
CO 4: Differentiate various collections.
CO 5: Build files and establish database connection.
CO 6: Develop GUI using Swing components.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			
CO 6			M			W		

List of Experiments:

1. Write a java program to find the Fibonacci series using recursive and non-recursive functions
2. Write a java program to multiply two given matrices.
3. Write a java program for Method overloading and Constructor overloading
4. Write a java program that prompts the user for an integer and then printouts all prime numbers up to that integer
5. Write a java program to display the employee details using Scanner class
6. Write a java program that checks whether a given string is palindrome or not
7. Write a java program to represent Abstract class with example.
8. Write a java program to create user defined package
9. Write a java program for creating multiple catch blocks
10. Write a Java program that implements a multi-thread application that has three threads
11. Write a java program to display File class properties
12. Write an applet program that displays a simple message
13. Write a Java program compute factorial value using Applet
14. Write a java program for handling Mouse events and Key events
15. Write a java program that connects to a database using JDBC
16. Write a java program to connect to a database using JDBC and
17. Write a java program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits and

for the + - * % operations. Add a text field to display the result

Text book(s):

1. Java 6 Programming, Black Book, Dreamtech
2. Java Server Programming, Java EE6 (J2EE 1.6), Black Book, Dreamtech
3. Advanced Java Technology, By M.T. Savaliya, Dreamtech

Assessment Scheme:

- Internal Assessment (IA) consisting of:
  - Lab Attendance (L) 5 Marks
  - Quantity and Quality of Experiments Performed (Q) 5 Marks
  - Laboratory Record (R) 10 Marks
- External Assessment:
  - End Semester Lab-Viva/Test (ESL) 30 Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO4	CO 5	CO6
L	S		S	W	S	S
Q		M				S
R	W					
ESL			W		W	

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3-curriculum development).

Course Title: DATA COMMUNICATION AND COMPUTER NETWORK
Course Code: SPA-302
Pre-requisites, **if any**: NA

L	T	P	C.U.
4	0	0	4

Course Description:
This course introduces the architecture, functions, components, and models of the computer networks and Internet. The principles of IP addressing and fundamentals of Ethernet concepts, media, and operations are introduced. Students will be able to build simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes.

Course Objective(s):

This course will enable students to:

1. Demonstrate knowledge of principles of computer networking
2. Understand details and functionality of layered network architecture
3. Know Internet applications and their protocols
4. Understanding applications (e.g. Client Server applications, Web Services)
5. Describe and use of Multimedia Information.

Course Outcome (COs):
After completion of this course, the student will be able to

CO 1: Describe various protocols, models in Networks
CO 2: Comprehend Network hardware, Media Types (cables, Wireless),
CO 3: Compare UTP, Connectors, and Network interface Card
CO 4: Design, implement and analyze simple computer networks.
CO 5: Apply the different strategies Operations of TCP/UDP, FTP, HTTP, SMTP, SNMP

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			

Course Content:

Unit-1:
Introduction: Overview, Goal and Applications of Computer Networks; Network Hardware - LAN, MAN, WAN and topologies; LAN components – File server, Workstations, Network Adapter Cards; Network Software - Protocol hierarchies, Design issues for the layers, Connection Oriented and Connection less services, Service primitives, Relationship between Services and Protocols; Switching Techniques – Circuit Switching and Packet Switching; Reference models – OSI and TCP/IP, comparison and critique of OSI and TCP/IP reference models.

Unit-2:
Data Link Layer: Design issues – Services, Framing, Error Control and Flow Control; Error Detection Techniques - Parity Check and Cyclic Redundancy Check (CRC); Error Correction Technique - Hamming code; Elementary Data Link Protocols - Unrestricted Simplex Protocol, Simplex Stop-and-Wait Protocol, Sliding Window Protocols: One-Bit Sliding Window Protocol, protocol using Go Back N and Selective Repeat; HDLC protocol; Data link layer in the Internet - SLIP and PPP.

Unit-3:

Medium Access Sublayer: Channel Allocation problem; Multiple access protocols: Pure Aloha, Slotted Aloha, CSMA Protocols, CSMA/CD, Collision-Free Protocols; IEEE MAC Sublayer protocols - 802.3, 802.4, 802.5 and their management; High speed LANs – Fast Ethernet, FDDI; Wireless LANs; Data Link Layer Switching – Bridges and Switches, their difference with Repeaters, Hubs, Routers and Gateways. **Network Layer:** Design issues; Routing algorithms - Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcasting Routing, Multicast Routing; The Network Layer in the Internet - Internet Protocol, Internet addressing and Internet Control protocols.

Unit-4:

Transport Layer: Transport Service; Elements of transport protocols - Addressing, Connection establishment, Connection release, Flow control and Buffering, Multiplexing; The Internet Transport Protocols - UDP and TCP, The TCP Service Model, The TCP Protocol.

Application layer: Client Server Architecture, DNS, WWW and HTTP, E-mail Protocols (SMTP, POP3, IMAP, MIME), FTP, TELNET. **Network Security:** Cryptography, Symmetric Key Algorithms, Public key Algorithms and Digital Signatures.

Text Book(s):

1. Computer Networks, Andrew S. Tanenbaum, Addison-Wesley, 4th Ed.

Reference:

1. Data Communications and Networking, B.A. Frouzan, McGraw-Hill.
2. Data and Computer Communications: W.Stallings, Prentice-Hall, 5th Ed., 1997

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5
C	S	M	S	M	S
H	S		M		W
Sessional Exam (T)		S	M	W	
ESE	S	M		S	M

Note:

- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: THEORY OF COMPUTATION
Course Code: SPA-303
Pre-requisites, **if any**: NA

L	T	P	C.U.
4	0	0	4

Course Description:

Formal languages and automata theory deals with the concepts of automata, formal languages, grammar, computability and decidability. The reasons to study Formal Languages and Automata Theory are Automata Theory provides a simple, elegant view of the complex machine that we call a computer. Automata Theory possesses a high degree of permanence and stability, in contrast with the ever-changing paradigms of the technology, development, and management of computer systems. Further, parts of the Automata theory have direct bearing on practice, such as Automata on circuit design, compiler design, and search algorithms; Formal Languages and Grammars on compiler design; and Complexity on cryptography and optimization problems in manufacturing, business, and management. Last, but not least, research oriented students will make good use of the Automata theory studied in this course.

Course Objective(s):

This course will enable students:

1. To give an overview of the theoretical foundations of computer science from the perspective of formal languages
2. To illustrate finite state machines to solve problems in computing
3. To explain the hierarchy of problems arising in the computer sciences.
4. To familiarize Regular grammars, context frees grammar.

Course Outcome (COs):

At the end of the course students will be able to:

CO 1: To use basic concepts of formal languages of finite automata techniques
CO 2: To Design Finite Automata's for different Regular Expressions and Languages
CO 3: To Construct context free grammar for various languages
CO 4: To solve various problems of applying normal form techniques, push down automata and Turing Machines.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				

Course Contents:

Unit-1:

Theory of Automata: String, Alphabet and Languages, Finite Automata, Finite State Machine, Basic Definition. Description of a Finite Automaton, Deterministic Finite Accepters Transition Graphs, Languages, Non-deterministic Finite Acceptors- Definition, Finite Automata with ϵ-moves, Equivalence of Deterministic and Non-deterministic Finite Accepters, Conversion of NDFA to DFA, Removal of ϵ transition from ϵ – NDFA, Minimization of Finite Automata Definition and Construction. Mealy and Moore models Definitions, Transformation of Mealy Machine into Moore Machine and vice-versa.

Unit-2:

Properties of Regular Sets: Pumping lemma for regular set, Closure properties of regular set.

Formal Language: Basic Definition, Chomsky Classification of languages, Initialization of Finite Automata Regular Expression and Language Regular Expressions, Connection between Regular Expressions and Regular Languages.

Unit-3:
Regular Grammars – Right and Left Linear Grammars, Equivalence between Regular Languages and Regular Grammars. Context-Free Grammars: Leftmost and Rightmost Derivations,
Derivation Trees, Parsing and Ambiguity, Simplification of CFGs. Chomsky Normal Form, Greibach Normal Form, Cocke-Kasami- Younger Algorithm, Properties of Context-Free Languages.

Unit-4:
Pushdown Automata: Definition, Non-deterministic Pushdown Automata, Pushdown Automata for Context Free Languages Context-Free Grammars for Pushdown Automata. Deterministic Pushdown Automata and Deterministic Context-Free Languages.
Turing Machine: Definition of Standard Turing Machine, Turing Machine as Language Accepters and Transducers.

Text Book(s):
1. Mishra and Chandrasekaran, Theory of Computer Science (Automata, language and Computation), 2nd Ed. Prentice Hall of India.

Reference Book(s):
1. J. E. Hopcroft, R. Motwani and J.D Ullman, Introduction to Theory, Languages and Computation; Second Edition, Addison-Wesley, 2001 Narosa Publishing House.

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4
C	S	M	S	M
H	S		M	
Sessional Exam (T)		S	M	W
ESE	S	M		S

Note:

- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: COMPUTER GRAPHICS & MULTIMEDIA
Course Code: SPA-304
Pre-requisites, if any: NA

L	T	P	C.U.
4	0	0	4

Course Description:
This course will introduce students to all aspects of computer graphics including hardware, software and applications. Students will gain experience using a graphics application programming interface by completing several programming projects.

Course Objective:
This course will enable students:

1. To study the terminologies, types and forms of computer graphics.
2. To know algorithms for rendering and shapes and polygons.
3. To understand the principles of 2D and 3D graphics.
4. To Understand the principles of 3D computer graphics

Course Outcome (COs):
After completion of this course, student will be able to:

CO 1: Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO 2: Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
CO 3: Use of geometric transformations on graphics objects and their application in composite form.
CO 4: Extract scene with different clipping methods and its transformation to graphics display device.
CO 5: Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
CO 6: Render projected objects to naturalize the scene in 2D view and use of illumination models for this.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			
CO6			S			M		W

Course Content:

Unit-1:
Introduction to Computer Graphics, Application of Graphics, Display Devices: Refresh Cathode - Ray Tubes, Raster Scan Displays, Random Scan Displays, Color CRT Monitors, And Flat Panel Displays. Video cards/display cards, Input Devices: Mouse, Trackball, Space ball, Data Glove, Joystick, Light pen, Scanner, Digital Camera, Touch Panels, Voice Systems. Hardcopy Devices: Printers and Plotters.

Unit-2:
Graphics Primitives: Line Generation Algorithms: DDA algorithm, Bresenham's algorithm. Circle Generation Algorithms: Midpoint Circle algorithm, Bresenham's circle generation algorithm. Ellipse Generation algorithm. Displaying Lines, characters and polygon. Polygon filling Algorithms: Scan Line Polygon fill algorithm, Inside - Outside Tests, Boundary-Fill algorithm, Flood-Fill algorithm. Fundamentals of aliasing and Antialiasing Techniques.

Unit-3:
Two Dimensional Viewing: Window to Viewport coordinates transformation. Clipping: Clipping operations, Point clipping, Line clipping: Cohen Sutherland Algorithm, Liang Barsky Algorithm, Nicholl-Lee-Nicholl Algorithm. Polygon clipping: Sutherland-Hodgeman Algorithm, Weiler Atherton Algorithm. Text clipping, Exterior clipping. Two Dimensional Transformations: Translation, Scaling, Rotation, Reflection, Shear, Homogenous coordinate system, Composite transformations, Raster method of transformation. Three Dimensional Viewing: 3D Geometry, 3D display techniques, transformations. Projections: Parallel Projection, Perspective Projection.

Unit-4:
Advancements in the technology in Computer Graphics, Multimedia: Introduction, Multimedia applications, Multimedia data and File formats, Multimedia tools. Advancements in the technology in Computer graphics and Multimedia, Graphics Visualization.

Text Book(s):

1. Donald Hearn and M. Pauline Baker, Computer Graphics: C Version, Second Edition, Prentice Hall of India.

Reference:

1. David F. Rogers, Procedural Elements for Computer Graphics,TataMc-Graw-Hill Publishing Company Ltd.,New Delhi,2001.

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5	CO 6
C	S	M	S	M	S	M
H	S		M		W	
Sessional Exam (T)		S	M	W		S
ESE	S	M		S	M	M

Note:

- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: COMPILER DESIGN
Course Code: SPA-305

L	T	P	C.U.
4	0	0	4

Pre-requisites, if any: Brief knowledge of programming languages, data structure, and algorithm design

Course Description:
This Course describes the theory and practice of compilation, in particular, the lexical analysis, parsing and code generation and optimization phases of compilation, and design ab compiler for a concise programming language.

Course Objective(s):
This course will enable students:

1. To implement Lexical Analyzer using Lex tool & Syntax Analyzer or parser using YACC Tool
2. To implement NFA and DFA from a given regular expression
3. To implement front end of the compiler by means of generating Intermediate codes.
4. To implement code optimization techniques.

Course Outcome (COs):
After completion of this course, student will be able to:

CO 1: Understand the major phases of compilation and to understand the knowledge of Lex tool & YAAC tool
CO 2: Develop the parsers and experiment the knowledge of different parsers design without automated tools
CO 3: Construct the intermediate code representations and generation
CO 4: Convert source code for a novel language into machine code for a novel computer
CO 5: Apply for various optimization techniques for dataflow analysis

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			

Course Contents:

Unit-1:
Basics of Compilers and Lexical Analysis: Compilers and Translators, Bootstrap compiler, Phases of Compiler, Compiler writing tools, Bootstrapping, Overview of one pass compiler, Finite Automation, Basics of DFA, NFA, Regular sets and Regular expressions.

Unit-2:
Syntax analysis & Parsing techniques: Basics of context free grammars and derivation of parse trees, Top down parsing and its implementation, Operator precedence parsing, Predicative top down parser, Bottom up parsing, Handel of right sentential form, LR parser, Canonical collection of sets, Construction of parsing action and GOTO table, Construction of LALR parsing table, Handling ambiguous grammar.

Unit-3:
Syntax directed definition and Translation: L-attributed definition, Syntax directed translation scheme, Intermediate code generation, Representing three address statements, Syntax directed translation scheme to specify the translation of various programming language construct, Implementing increment and decrement operators, Array reference, Switch/case.

Unit-4:
Symbol table management & Error Handling: Various approaches to symbol table organization, Representation of scope information in symbol table, Storage allocation activation of procedure and record, Static allocation and stack allocation. Error recovery, Error recovery in LR parsing, Predicative parsing error recovery.

Code Optimization and Code Generation : Introduction, Loop optimization, Eliminating induction variable, Eliminating local common sub expression, DAG, Eliminating global common sub expression, loop unrolling, loop jamming, Problems hindering code generation, Using DAG for code generation.

Text Book(s):

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman. "Compilers Principles, Techniques and Tools". Pearson Education, 2008.
2. O. G Kakde, "Compiler Design", 2005, Laxmi Publication.
3. Adesh K. Pandey" Concepts of Compiler Design ", First Edition, S.K. Kataria & Sons Publication.

References:

1. Steven S. Muchnick, "Advanced Compiler Design Implementation", Morgan Koffman,1997.
2. Allen Holub, "Compiler Design in C", Prentice Hall of India, 1990.

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5
C	S	M	S	M	S
H	S		M		W
Sessional Exam (T)		S	M	W	
ESE	S	M		S	M

Note:

- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS
Course Code: SPA-306
Pre-requisites, if any: Brief knowledge of programming languages, data structure.

L	T	P	C.U.
4	0	0	4

Course Description:
The course demonstrates use of computers in problem solving involving information representation, searching, theorem proving, and pattern matching with substitution, Methods for knowledge representation, searching, spatial, temporal and common sense reasoning, and logic and probabilistic inferencing, Applications in Expert Systems.

Course Objective(s):
The goal of this course is to have students:
1. Develop concepts and skills associated with problems that are classified as requiring intelligence for their solution.
2. Learn strategies that use searching, pattern matching, knowledge representation, machine learning, reasoning, uncertainty.
3. Ability to perform "common sense" processing.

Course Outcome (COs):
CO 1: Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems.
CO 2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO 3: Demonstrate Predicate and propositional logics.
CO 4: Discuss the awareness of different pattern Recognition Techniques.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				

Course Contents:

Unit-1:
Introduction: Definitions and approaches, Foundation of A.I., Challenges in AI, Area and Applications of A.I., Intelligent Agents: meaning, types, environments, examples.

Unit-2:
Problem Solving: Problem solving as state space search, production system, writing production system and solution for a Water jug problem; some AI classical problems (statements only) cannibal missionaries, tower of Hanoi, tic tac toe, 8-puzzle, Search techniques: Breadth First, and Depth-first, Best-First Search, Hill-climbing, Heuristics, A* algorithm, local and global maxima(minima),

Unit-3:
Knowledge Representation and Reasoning: Predicate and prepositional logic, conversion of sentences to wffs of predicate logic, Resolution, clause form, Skolem functions, Unification, Resolution in Propositional and predicate logic, Semantic Nets.

Unit-4:
Pattern Recognition: Meaning of pattern, Pattern Recognition, Classification, Supervised & Unsupervised Learning of classifiers, K-NN, K-MEANS algorithms.
Expert Systems: Introduction, Advantages, components and participants in an expert system, Application

Text Book(s):
1. Artificial Intelligence: E. Rich and K. Knight, Tata McGraw Hill.
2. Artificial Intelligence: A New Synthesis By Nilsson, Morgan Kaufmann.

Reference:
1. Pattern Classification 2nd Edition By R.O. Duda, Hart, Stork (2001), John Wiley, New York.
2. Pattern Recognition: Technique and Applications By Shinghal (2006),Oxford University Press, New Delhi.

Assessment Scheme:
- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4
C	S	M	S	M
H	S		M	
Sessional Exam (T)		S	M	W
ESE	S	M		S

Note:
- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: HTML AND PHP PROGRAMMING LAB
Course Code: SPA-312

L	T	P	C.U.
0	0	4	4

Pre-requisites, if any: NA

Course Description: This Laboratory course deals with basic programming to the open source Web scripting language HTML and PHP, Build dynamic Web applications, CSS and Java Script, Semantics and syntax of the PHP language, including discussion on the practical problems that PHP solves. Write server-side cross-platform HTML-embedded scripts to implement dynamic Web pages that interact with databases and files.

Course Objective(s):
This course will enable students to:

1. Develop an ability to design and implement static website.
2. Develop an ability to design and implement dynamic website.

Course Outcome (COs):
After completion of this course student will be able to:

CO 1: Introduce the creation of static webpage using HTML
CO 2: Describe the importance of CSS in web development
CO 3: Describe the function of JavaScript as a dynamic webpage creating tool
CO 4: Distinguish PHP as a server side programming language
CO 5: Outline the principles behind using MySQL as a backend DBMS with PHP

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5	S		W		M			

List of Experiments:

1. Design the following static web pages required for an online book store web site.
   a. HOME PAGE: The static home page must contain three frames.
   b. LOGIN PAGE
   c. CATOLOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table.
   d. REGISTRATION PAGE

2. Write JavaScript to validate the following fields of the Registration page.
   a. First Name (Name should contains alphabets and the length should not be less than 6 characters).
   b. Password (Password should not be less than 6 characters length).
   c. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
   d. Mobile Number (Phone number should contain 10 digits only).
   e. Last Name and Address (should not be Empty).

3. Develop and demonstrate the usage of inline, internal and external style sheet using CSS

4. Develop and demonstrate JavaScript with POP-UP boxes and functions for the following problems:
    a. Input: Click on Display Date button using onclick( ) function
       Output: Display date in the textbox
    b. Input: A number n obtained using prompt
       Output: Factorial of n number using alert
    c. Input: A number n obtained using prompt
       Output: A multiplication table of numbers from 1 to 10 of n using alert
    d. Input: A number n obtained using prompt and add another number using confirm
       Output: Sum of the entire n numbers using alert

5. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next in the list. Add CSS to customize the properties of the font of the capital (color,bold and font size).

6. Write an HTML page including any required JavaScript that takes a number from text field in the range of 0 to 999 and shows it in words. It should not accept four and above digits, alphabets and special characters.

7. Develop and demonstrate PHP Script for the following problems:
    a. Write a PHP Script to find out the Sum of the Individual Digits.
    b. Write a PHP Script to check whether the given number is Palindrome or not

8. Create an XML document that contains 10 users information. Write a Java Program, which takes User Id as input and returns the user details by taking the user information from XML document using DOM parser or SAX parser.

9. Implement the following web applications using
   (a) PHP
   (b) Servlets
   (c) JSP
    I. A web application that takes a name as input and on submit it shows a hello <name> page where name is taken from the request. It shows the start time at the right top corner of the page and provides a logout button. On clicking this button, it should show a logout page with Thank You <name > message with the duration of usage (hint: Use session to store name and time).
    II. Write a PHP Program to display current Date, Time and Day.
    III. A web application that takes name and age from an HTML page. If the age is less than 18, it should send a page with "Hello <name>, you are not authorized to visit the site" message, where <name> should be replaced with the entered name. Otherwise it should send "Welcome <name> to this site" message.
    IV. A web application that lists all cookies stored in the browser on clicking "List Cookies" button. Add cookies if necessary.

10. Implement the web applications with Database using
    (a) PHP, (b) Servlets and (c) JSP.

11. Modify the above PHP program to use an xml instead of database

12. Write a program to design a simple calculator using (a) JavaScript (b) PHP (c) Servlet and (d) JSP.

Text books:

1. Burdman, Jessica, "Collaborative Web Development" Addison Wesley
2. Xavier, C, "Web Technology and Design" , New Age International

3. Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication
4. Bhave, "Programming with Java", Pearson Education
5. PHP: The Complete Reference-Steven Holzner
6. Open Source Development with LAMP- James Lee

Reference:

1. Ramesh Bangia, "Internet and Web Design" , New Age International
2. Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication
3. Deitel, "Java for programmers", Pearson Education

Assessment Scheme:

- Internal Assessment (IA) consisting of:
  - Lab Attendance (L) 10 Marks
  - Quantity and Quality of Experiments Performed (Q) 10 Marks
  - Laboratory Record (R) 30 Marks
- External Assessment:
  - End Semester Lab-Viva/Test (ESL) 50 Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO4	CO5
L	S		S	W	
Q		M			S
R	W				W
ESL			W		

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3-curriculum development).

Course Title: SCIENCE OF BEING FOR EFFECTIVE COMMUNICATION
Course Code: TPC -301
Pre-requisites: TPC- 201

L	T	P	C.U.
2	1	1	4

Course Description:
The course lays the groundwork for understanding the nature of life and living. It explains that life is dynamic, not static and the purpose of life is the expansion of happiness which can be attained through the process of Cosmic Evolution. This course enable the students to understand what others want, respond strategically to their wants and needs, craft convincing and clear messages, and develop the critical communication skills you need to get ahead in business and in life.

Course Objectives:
The objective of this course is to make them aware of the importance of "Self" through the scientifically proven technique which empowers them to perform action in spontaneity. Also this course will bring the very important aspect of mindful listening by which they can capitalize on their constructive communication and demonstrate the ability to be self-aware.

Course Outcomes (COs): At the end of this course students will be able to:
CO 1: Define the basis of all living and understand the value of relative and absolute life.
CO 2: Discuss about communication in various facets which involves scientific studies on effortless communication.
CO 3: Classify listening skills in the light of consciousness which enables them to imbibe the important aspect of mindful listening which is integral part of communication.
CO 4: Demonstrate critical and innovative thinking, displaying an understanding of opportunity in the field of communication
CO 5: List the important factors which enable the students to amplify their listening skill by undergoing into the depth of their own consciousness

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5
CO 1	M	W			
CO 2			S		
CO 3		M			
CO 4				W	S

Course Contents:

Unit - 1: Science of Being
Being, the basis of all Living, Being, the Absolute and the Relative, How to contact and live Being

Unit - 2:
Effortless Communication: Frictionless flow of Information
What is Communication, Keys to effective communication, Consciousness as the basis of the Spontaneous Right Communication, Overview of Scientific Studies on Effortless Communication

Unit – 3:
Listening Skills
Listening as a process for Self-Regulation, Classification of Listening based on Conscious thinking, Purpose of Listening pertaining to expand Knowledge, Barriers and Measures to Mindful Listening, Listening is an important skill to enhance empathetic conversation

Unit - 4:

Enrichment of Experiences III

Advance Lectures on the Transcendental Meditation Program, Follow-up Sessions and Group Checkings, Personal Checkings

Text Book (s):

- Yogi.M. Maharishi. (1963). Science of Being and Art of Living. Plume; Reissue edition.
- Rosenthal Norman. (2016).Super Mind: How to Boost Performance and Live a Richer and Happier Life through Transcendental Meditation. Tarcher Perigee
- Angelo Gabriel. (2014). The 7 Effective Communication Skills: How to Be a Better Communicator Now. Createspace Independent

References:

- Strahan, J., Fogarty, G.J., Machin, A.M. (2005). Predicting performance on a situational judgement test: The role of communication skills, listening skills, and expertise. Proceedings of the 40 Annual Conference of the Australian Psychological Society, pp. 323-327, Sydney, Australia.

Assessment Scheme:

Sl. No.	Component	Weightage (%)
AC 1	Participation in Practice	20
AC 2	Teachers' Evaluation	20
AC 3	Outbound Visit & Report	10
AC 4	Field Based Project	20
AC 5	End Semester Examination	30

Mapping Assessment Components with COs

	CO1	CO2	CO3	CO4	CO5
AC 1	X	X	X	X	X
AC 2		X	X	X	X
AC 3			X	X	
AC 4			X	X	
AC 5	X	X	X	X	X

Details of Projects/Activities

Effective Listening Activity

Communication Game Balloon Activity listening skills

Before the start of the activity (These instructions will be given)

- The students will be given the flat balloons to blow up and tie the knot.
- They will be instructed to protect their own balloon
- The Instructor will give them only 1 min to save their balloons
- Whosoever remains last with their balloons safe and intact he/she will win the activity

Learning from this game

During the activity of 1 min usually students tend to burst the balloons of others to protect their own. They were only instructed to save their balloon but due to passive listening instead they start bursting balloons of team mates

and create mess. The goal is not to burst any balloons of your fellow participants but just keep standing still with their own balloon and by this whole class can be the winner.

Knowledge:

This activity teaches to be a mindful listener because if everybody listen carefully and imbibe this knowledge in themselves they can be relieved from any suffering in near future.

Another learning from this activity based class:

When life becomes hard and uncertain, then listen to the voice of your inner consciousness to boost resilience and build persistence.

Human Tic-Tac-Toe

- Line three rows of three chairs like a tic tac toe board.
- Divide the group into two teams of nine students on each side, one is noughts and the other is crosses
- Give them each numbers starting at one and so on, so that each team has one of each number.
- Have a team on each side of the chairs.
- Have someone or yourself call out a number.
- The two people with that number race to the chairs and take a seat. It is a race between the each member of each team to get a seat and make their X or O first.
- Whichever one gets there first gets to stay
- Keep calling numbers until a team lines up three people from their team in a row.

Learning:

God has bestowed upon everyone enormous opportunities to grow and evolve. It is our responsibility to recognize them, grab them and then act on them sensibly. Keep that in mind to avoid missing opportunity's knock. So go ahead, grab the opportunity, step up to the challenges, hurdles and obstacles and add more meaning and value to life.

Protect the Self

In this activity 4 individual will participate and there can be multiple groups like this

- 2 person will be defender
- 1 person will be attacker
- 1 person will be protectee

How to begin this activity?

The two defenders and the protectee hold hands of each other and the attacker from outside has to touch the protectee to win the game, simultaneously defenders defends him for about 2 minutes so that they can win the game.

Learning

There are no winners and losers in the game. The real teaching of this activity is that the protectee is your "Self" and the defenders are considered to be meditation and good habits in your life and attacker is nothing but the problems encountered. The problems can only be eliminated by making your defense system vigorous and powerful by regular practice of meditation, concurrently when your defense is not strong problems can travel to the nerves.

Video testimonials:

Students have to give video testimonials of their learning and what they like in this subject along with suggestions so that we can inculcate those feasible ideas in our teaching methodology

Video shall be of minimum 2 minutes.

Each student (individually or in groups of 2-3 students) will undertake a project where they will be working in the external environment (like village community, MSMEs, NGOs, civil authorities etc.) on identified issues. They will work under the guidance of an assigned faculty member and will be assessed on the basis of how they are able to

effectively understand their relationship with the external environment. Students will have to prepare the schedule of interaction with the identified external contacts and execute the assigned task keeping in mind the intended learning outcomes. They will maintain a project diary/ register as per following format and this will be scrutinized by the faculty guide weekly/ fortnightly as decided.

Sl. No.	Topic Learnt in Class or Practice of TM	How I applied it during project/ field practice/ Outbound visit	My Understanding	Remarks
1.				
2.				

Outbound Visit/ Activity:

One Outbound Activity/Visit every month of Institutional, Corporates, Seminars, Conferences or (Guest Lectures (Inside or outside)) to be organized and conducted by Teacher's.
It is mandatory that all students will have to participate in outbound visit/ activity and attend all the planned activities strictly. With the guidance of faculty members, the will participate with clear cut intended learning outcome and submit a report on completion so that attainment of outcomes can be assessed. This assessment will have weightage as mentioned in the assessment scheme.

Class Participation:
Student's participation in practice Sessions: 10 Marks

S.No	Rubrics for Practice Sessions	Marks
1	Student regularly attends the practice session once a day	2
2	Student regularly attends the practice session twice a day	4
3	Student attends the session regularly but does not initiate contribution & needs instructor to solicit input.	6
4	Student's comments are constructive, with signs of insight and relevant to discussion	8
5	Student listens attentively and hears what others say and contributes to the learning and knowledge.	10

Student's participation in the Theory Classes: 10 Marks

S.No	Rubrics for Theory Sessions	Marks
1	Student regularly attends the class but is quite disruptive	2
2	Student attends the class but does not listen to others, both in groups and in class	4
3	Student attends the class with some participation	6
4	Student attends the class proactively and contributes to the class	8
5	Student attends the class proactively, consistently and add value to the learning	10

Attendance in all the classes and practice sessions is mandatory. Participation will be evaluated based on attendance, active engagement in discussions and interaction and contribution towards overall learning. This component will have 20% weightage as mentioned in the assessment scheme.

Other Details:

While it is expected that students should attend all classes but to cater to emergencies, illness, unavoidable social commitments and family responsibilities, a relaxation of up to 25% may be considered. Under no circumstances, attendance should fall below 75% else they will be debarred from taking examinations and will be declared fail in the course. Students can meet the faculty/ guide for consultations between **3:30 PM to 4:30 PM** or **else with prior appointment**. Students are expected to be regular and punctual in all activities including completion of work, submission schedules, appointments etc. and should be professionally dressed.

Important Note for faculty: Assessment rubrics will have to be written for each Assessment component.

Evaluation Scheme
M. Sc. (Computer Science)
Fourth Semester

Sl. No.	Course Category	Course Code	Course Title	L-T-P	CIA Marks	ESE Marks	Total	Credit
1	Discipline Specific Course	SPA-401	Programming in Python	4-0-0	30	70	100	4
2	Elective-II (ANY ONE)	SPA-402/SPA-403/ SPA-404	i) Data Mining & Ware Housing ii) Parallel Processing. iii) Network & Internet Security	4-0-0	30	70	100	4
3	Lab/Project	SPA-412	Python Lab	0-0-4	50	50	100	4
4		SPA-421	Major-Project	0-0-12	100	200	300	12
		TOTAL			**220**	**380**	**600**	**24**
Qualifying Non-Creditable Course								
5	Self-Development courses/ Science for Consciousness (SOC)	TPC-104	Art of Living For Fulfilment of Life	2-1-1	70	30	100	4

Course Title: PROGRAMMING IN PYTHON
Course Code: SPA-401
Pre-requisites, if any: NA

L	T	P	C.U.
4	0	0	4

Course Description:
This course is designed to the basic concept of Python. The course also provides the understanding of web based console & windows programming. Python programming make student understand quick development concept with less code.

Course Objective(s):
This course will enable students to:
1. To introduce the fundamentals of Python Programming.
2. To teach about the concept of Functions in Python.
3. To impart the knowledge of Lists, Tuples, Files and Directories.
4. To learn about dictionaries in python.

Course Outcome(COs):
After completion of this course student will be able to:
CO 1: Learn the concept of operators, data types, looping statements in python programming.
CO 2: Understand the concepts of Input / Output operations in file.
CO 3: Apply the concept of functions and exception handling
CO 4: Analyze the structures of list, tuples and maintaining dictionaries.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				

Course Content:

Unit – 1:
Introduction to Python Programming: How a Program Works, Using Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations (Operators. Type conversions, Expressions), More about Data Output. Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops.

Unit – 2:
Functions: Introduction, Defining and Calling a Void Function, Designing a Program to Use Functions, Local Variables, Passing Arguments to Functions, Global Variables and Global Constants, Value-Returning Functions-Generating Random Numbers, Writing Our Own Value-Returning Functions, The math Module, Storing Functions in Modules.
File and Exceptions: Introduction to File Input and Output, Using Loops to Process Files, Processing Records, Exceptions.

Unit – 3:
Lists and Tuples: Sequences, Introduction to Lists, List slicing, Finding Items in Lists with the in Operator, List Methods and Useful Built-in Functions, Copying Lists, Processing Lists, Two-Dimensional Lists, Tuples.

Unit – 4:
Strings: Basic String Operations, String Slicing, Testing, Searching, and Manipulating Strings. Dictionaries and Sets: Dictionaries, Sets, Serializing Objects. Recursion: Introduction, Problem Solving with Recursion, Examples of Recursive Algorithms. GUI Programming: Graphical User Interfaces, Using the tkinter Module, Display text with Label Widgets, Organizing Widgets with Frames, Button Widgets and Info Dialog Boxes, Getting Input with Entry Widget, Using Labels as Output Fields, Radio Buttons, Check Buttons.

Text Book(s):

1. Text Tony Gaddis, Starting Out With Python (3e)

References

1. Kenneth A. Lambert, Fundamentals of Python
2. Clinton W. Brownley, Foundations for Analytics with Python
3. James Payne, Beginning Python using Python 2.6 and Python 3
4. Charles Dierach, Introduction to Computer Science using Python
5. Paul Gries,Practical Programming: An Introduction to Computer Science using Python 3

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4
C	S	M	S	M
H	S		M	
Sessional Exam (T)		S	M	W
ESE	S	M		S

Note:

- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: PYTHON LAB
Course Code: SPA-412

L	T	P	C.U.
0	0	4	4

Pre-requisites, **if any**: NA
Course Description: This Laboratory course deals with basic programming skills in Python Language.

Course Objective(s):
This course will enable students to:

1. To gain knowledge about the concepts of python programming.
2. To understand the concepts of Built-in functions and User-defined functions.
3. To develop programs using String functions.

Course Outcome (COs):
After completion of this course student will be able to:

CO 1: Remember different types of operators in programming.
CO 2: Implement the concepts of built-in functions in programming.
CO 3: Analyze the use control structures in programming.
CO 4: Apply the concepts of exception handling in programs.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				

List of Experiments:

1. Program to demonstrate Constant Variable.
2. Program to demonstrate scope of Variable
3. Program to demonstrate branching statement
4. Program to demonstrate Looping statement
5. Program to demonstrate simple class
6. Program to demonstrate String class and its method.
7. Program to demonstrate String Buffer and its method.
8. Program to demonstrate inheritance and its Types
9. Program to demonstrate package
10. Program to demonstrate polymorphism
11. Program to demonstrate database connectivity
12. Program to demonstrate networking.

Text books:

1. Python in a Nutshell" by Alex Martelli, Oreilly Publication.
2. Think Python" by Allen Downey, Green Tea Press

Reference:

1. Core Python Programming by Wesley J. Chun, Pearson Education

Assessment Scheme:

- Internal Assessment (IA) consisting of:
  - Lab Attendance (L) 10 Marks
  - Quantity and Quality of Experiments Performed (Q) 10 Marks
  - Laboratory Record (R) 30 Marks
- External Assessment:
  - End Semester Lab-Viva/Test (ESL) 50 Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO4
L	S		S	W
Q		M		
R	W			
ESL			W	

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3-curriculum development).

Course Title: DATA MINING & WAREHOUSING

Course Code: SPA-402

L	T	P	C.U.
4	0	0	4

Pre-requisites, **if any**: The knowledge of following subject is essential to understand the subject:

1. Concepts of Data Ware housing and Data Mining Concepts.
2. Methodologies used for analysis of data
3. Various techniques which enhance the data modeling.
4. Various approaches with other techniques in data mining and data ware housing

Course Description:

This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts.

Course Objectives(s):

This course will enable students to:

1. Be familiar with mathematical foundations of data mining tools..
2. Understand and implement classical models and algorithms in data warehouses and data mining
3. Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
4. Master data mining techniques in various applications like social, scientific and environmental context.
5. Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Outcome(COs):

At the end of the course the students will be able to do following:

CO 1: Understand the functionality of the various data mining and data warehousing component
CO 2: Appreciate the strengths and limitations of various data mining and data warehousing models Explain the analyzing techniques of various data
CO 3: Describe different methodologies used in data mining and data ware housing.
CO 4: Compare different approaches of data ware housing and data mining with various technologies.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				

Course Content:

Unit-1:

Data Warehousing: Overview and Concepts: Need for data warehousing, basic elements of data warehousing, Trends in data warehousing. Planning and Requirements: Project planning and management, collecting the requirements, Architecture and Infrastructure: Architectural components, Infrastructure and metadata.

Unit-2:

Data Design And Data Representation: Principles of dimensional modeling, Dimensional modeling advanced topics, data extraction, transformation and loading, data quality. Information Access And Delivery: Matching information to classes of users, OLAP in data warehouse, Data warehousing and the web, Implementation And Maintenance: Physical design process, data warehouse deployment, growth and maintenance.

Unit-3:
Data Mining: Introduction: Basics of data mining, related concepts, Data mining techniques, Data Mining Algorithms: Classification, Clustering, Association rules, Knowledge Discovery: KDD Process, Web Mining: Web Content Mining, Web Structure Mining, Web Usage mining. Advanced Topics: Spatial mining, Temporal mining, Visualization: Data generalization and summarization-based characterization, Analytical characterization: analysis of attribute relevance, Mining class comparisons: Discriminating between different classes, Mining descriptive statistical measures in large databases.

Unit-4:
Data Mining Primitives, Languages, and System Architectures: Data mining primitives, Query language, Designing GUI based on a data mining query language, Architectures of data mining system, Application and Trends in Data Mining: Applications, Systems products and research prototypes, Additional themes in data mining, Trends in data mining.

Text Books:

1. Paulraj Ponnian. Data Warehousing Fundamentals, John Wiley.
2. M.H. Dunham, .Data Mining Introductory and Advanced Topics., Pearson Education.

References:

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Ware Housing Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.
3. The Data Ware House Life Cycle Toolkit- Ralph Kimball, Wiley Student Edition.
4. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University.

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4
C	S	M	S	M
H	S		M	
Sessional Exam (T)		S	M	W
ESE	S	M		S

Note:

- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: PARALLEL PROCESSING
Course Code: SPA-403
Pre-requisites, **if any**: Computer Architecture.

L	T	P	C.U.
4	0	0	4

Course Description:

This is a course on parallel computing with the objective to familiarize students with the fundamental concepts, techniques and tools of parallel computing. Participation in this course will enable students to better use parallel computing in application area.

Course Objective(s):

This course will enable students to:

1. Analyze the parallelism,
2. Identify the conditions of parallelism,
3. Study different parallel interconnection systems. It also focuses on
4. Identifying the pipeline hazards,
5. Gain in-depth knowledge of architecture and learn parallel processing and its applications to solve workloads.

Course Outcome(COs):

At the end of the course the students will be able to do following:

CO 1: Understand the evolution of High Performance Computing (HPC) with respect to laws and the contemporary notion that involves mobility for data, hardware devices and software agents
CO 2: Understand, appreciate and apply parallel and distributed algorithms in problem Solving.
CO 3: Evaluate the impact of network topology on parallel/distributed algorithm formulations and traffic their performance.
CO 4: Gain hand-on experience with the agent-based and Internet-based parallel and distributed programming techniques.
CO 5: Master skills to measure the performance of parallel and distributed programs.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			

Course Content:

Unit-1:

Introduction: Parallel Processing Architectures: Parallelism in sequential machines, Abstract model of parallel computer, Multiprocessor architecture, Pipelining, Array processors. Programmability Issues: An overview, Operating system support, Types of operating systems, Parallel programming models, Software tools.

Unit-2:

Data Dependency Analysis: Types of dependencies loop and array dependences, Loop dependence analysis, Solving diophantine equations, Program transformations, Shared Memory Programming: General model of shared memory programming, Process model under UNIX.

Unit-3:
Algorithms for Parallel Machines: Speedup, Complexity and cost, Histogram computation, Parallel reduction, Quadrature problem, Matrix multiplication, Parallel sorting algorithms, Solving linear systems, Probabilistic algorithms. Message Passing Programming: Introduction, Model, Interface, Circuit satisfiability, Introducing collective, Benchmarking parallel performance Parallel Programming languages: Fortran90, nCUBE C, Occam, C-Linda, Debugging Parallel Programs: Debugging techniques, Debugging message passing parallel programs, Debugging shared memory parallel programs.

Unit-4:
Memory and I/O Subsystems: Hierarchical memory structure, Virtual memory system, Memory allocation and management, Cache allocation and management, Cache memories and management, Input output subsystems, other Parallelism Paradigms: Data flow computing, Systolic architectures, Functional and logic paradigms, Distributed shared memory, Performance of Parallel Processors: Speedup and efficiency, Amdahl's law, Gustafson-Barsis's law, Karf-Flatt metric, Isoefficiency metric.

Text Book(s):
1. Hawang Kai and Briggs F. A., "Computer Architecture and Parallel Processing", McGraw Hill
2. Jorden H. F. and Alaghaband G., "Fundamentals of Parallel Processing"
3. M.J. Quinn, "Parallel Programming", TMH

References:
1. Shasikumar M., "Introduction to Parallel Processing", PHI
2. Wilson G.V., "Practical Parallel Programming", PHI
3. D. E. Culler, J.P. Singh, A. Gupta, "Parallel Computer Architecture", Morgan Kaufman

Assessment Scheme:
- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5
C	S	M	S	M	S
H	S		M		W
Sessional Exam (T)		S	M	W	
ESE	S	M		S	M

Note:
- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: NETWORK & INTERNET SECURITY
Course Code: SPA-404
Pre-requisites, if any: Computer Network

L	T	P	C.U.
4	0	0	4

Course Description:

In this course Students explore how information is exchanged on the Internet and the security issues that arise due to information exchange between different technologies.

Course Objective(s):

This course will enable students to:

1. Learn Concepts Of Authentication, Authorization, Access Control In Computer Networks.
2. Gain Knowledge about use Of Cryptography for data and network security.
3. Introduced To The Topics Such As Firewalls, Public Key Infrastructure, Security Standards And Protocols, Virtual Private Networks, And Wireless Network Security.
4. Explore privacy, legal issues and ethics in context of network security.

Course Outcome(COs):

At the end of the course the students will be able to do following:

CO 1: Analyze and evaluate the cyber security needs of an organization.
CO 2: Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
CO 3: Measure the performance and troubleshoot cyber security systems.
CO 4: Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.
CO 5: Comprehend and execute risk management processes, risk treatment methods, and key risk and performance indicators

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO1	PSO2
CO 1	M	W						M
CO 2			S				M	
CO 3		M				S		
CO 4				W				
CO 5					S			

Course Content:

Unit-1:

Security in Network: Model for Security: Threats in Networks, Stealing Passwords, Social Engineering, Bugs and Backdoors, Authentication Failures, Protocol Failure, Information Leakage. Elementary Cryptography: Terminology and Background, Cryptography and network security. Concepts of Encryption and Decryption. Cryptanalysis, Substation Cipher. Transpositions Good and Secure Encryption Algorithm. Trust worthy Encryption systems Data encryption standards (DES) and Advanced Encryption Standards (AES) Comparison of DES and AES.

Unit-2:

Classical Encryption Technique: Symmetric and Asymmetric Encryption Systems, Stream and Block Ciphers, Contemporary Symmetric Ciphers, Confidentiality using Symmetric Encryption. Public Key Encryption and HASH Functions: Public Key Cryptography and RSA, Message Authentication and Hash Function, Hash Algorithms, Digital Signatures and Authentication Protocols.

Unit-3:
Firewalls: Basic Concepts (for understanding the firewalls rules): TCP Segment format IP Datagram format. Introduction: Kinds of Firewalls, Packet Filters. Packet Filtering. Dynamic Packet Filters. Application-Level Filtering. Circuit-Level Gateways, Firewall Configurations, Demilitarized Zone (DMZ)
Networks, Distributed Firewalls, Limitation of Firewalls. Filtering Services: Reasonable Services to Filter (Filter Rules to be applied): DNS, Web, FTP, NTP. DNS (Domain Name Serve), DNS Security, Web Security: Overview of Web Server Security. Goal of Server Attack. Web site defacement. Data corruption. Data Theft. Types of Attacks. Web Server Protection. FTP (File Transfer Protocol) SMTP (Simple Mail Transfer Protocol). NTP (Network Time Protocol), Intrusion detection systems.

Unit-4:
Wireless Application Protocol Security (WAP): Privacy Enhanced Mail (PEM) How PEM works? Secure Socket Layer (SSL): The Position of SSL in TCP/IP Protocol Suite. How SSL Works? The Handshake Protocol. The Record Protocol. The Alert Protocol. Wireless Application Protocol Security (WAP): The WAP Stack. The Security Layer-Wireless Transport Layer Security (WTLS). IP Security: Introduction and Overview: IPSec Protocols. The Internet Key Exchange (IKE) Protocol. Security Association (SA), Authentication Header (AH), Encapsulating Security Payload (ESP), IPSec Key Management.

Text Book(s):

1. Cryptography and Network Security: Principles and practices., William Stallings-Third Edition.
2. Cryptography and Network Security., Atul Kahate.
3. The complete Reference Network Security by Bragg, Rhodes-Ousley.
4. Firewalls and Internet Security by William R. Cheswick, Steven M. Bellovin, Aviel D. Rubin
5. C. P. Pfleeger, and S. L. Pfleeger, .Security in Computing, Pearson Education.

References:

1. Matt Bishop**, .**Computer Security: Art and Science., Pearson Education
2. Kaufman, Perlman, Speciner, .Network Security.
3. Eric Maiwald, .Network Security : A Beginner.s Guide., TMH
4. Bruce Schneier, Applied Cryptography, John Wiley.
5. Macro Pistoia, .Java Network Security., Pearson Education.

Assessment Scheme:

- Continuous Internal Evaluation (CIA) consisting of:
  - Class Attendance (C): 5 Marks
  - Home Assignment (H): 5 Marks
  - Sessional Examination (T): 20 Marks
- End Semester Examination (ESE): 70Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO 4	CO 5
C	S	M	S	M	S
H	S		M		W
Sessional Exam (T)		S	M	W	
ESE	S	M		S	M

Note:

- CIA can have more components depending on the nature of course.
- The guidelines for all assessment components are as per MUIT Guidelines & Rules (2.3-curriculum development).

Course Title: MAJOR -PROJECT
Course Code: SPA-421

L	T	P	C.U.
0	0	12	12

Pre-requisites, If any: Programming Language, Software Engineering, Web Technology, Database.

Course Description:
This course is designed to encourage experiential and wholesome projects where students take what they've learned throughout the program and apply it to examine a specific idea. It aims to provide the students an exposure to gain proficiency in modeling, implementing and testing nontrivial software applications. It must include a design component, User interface and usefulness for the society or the profession.

Course Objective:
This course is designed to provide a better understanding of theoretical knowledge of quantitative methods and techniques for effective decisions–making; model formulation and applications that are used in solving business decision problems. Each student will enable themselves:

1. To understand and select the task based on their core skills.
2. To get the knowledge about analytical skill for solving the selected task.
3. To get confidence for implementing the task and solving the real time problems.

Course Outcomes (COs):
After the completion of this course, students will be able to: -

CO 1: Identify and formulate the problem
CO 2: Analyze the problem and collect necessary data.
CO 3: Design and develop the project using appropriate software by applying the programming skills.
CO 4: Implement, evaluate and generate reports.

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PSO 1	PSO 2
CO 1	S	S			M		S	M
CO 2			S	M		M	M	M
CO 3	W		M			M	W	
CO 4		M		W				S

Assessment Scheme:

- Internal Assessment (IA) consisting of:
  - Lab Attendance (L) 10 Marks
  - Quantity and Quality of Experiments Performed (Q) 10 Marks
  - Laboratory Record (R) 30 Marks
- External Assessment:
  - End Semester Lab-Viva/Test (ESL) 50 Marks

Mapping Assessment Components to COs:

	CO 1	CO 2	CO 3	CO4
L	S		S	W
Q		M		
R	W			
ESL			W	

Note:

- CIA can have more components depending on the nature of the course.
- The guidelines for all assessment components are as per MUIT Guidelines & rules (2.3-curriculum development).

L	T	P	C.U.
2	1	1	4

Course Title: ART OF LIVING FOR FULFILMENT OF LIFE
Course Code: TPC- 401
Pre-requisites: TPC -301

Course Description:
The core structure revolves and covers the basis aspect of Art of living which suffice the student to be strong, balanced and successful in life by applying basic practice of Maharishi knowledge which focuses on physical, emotional, mental, aesthetic development. It teaches us to live life in harmony and gain a greater vision of your own Self, confidence to stretch and grow beyond limiting beliefs, and ability to lead the deep profound fulfilling life.

Course Objectives:
The objectives of this course is to establish Art of living in reference to the teaching of Maharishi's knowledge where in student not only inculcate the concept of better living but also they become much more professional and possess leadership quality in much more efficient manner with stress free attitude to reach the peak performance.

Course Outcomes (COs): At the end of this course students will be able to:
CO 1: Define various types of ways of art to living to improve the well being
CO 2: Identify the various factors to achieve excellence in professional life
CO 3: Explain the factors which lead to perfection in the field of leadership
CO 4: Recognize the importance of daily practice of meditation which reduces stress at work place and activity becomes as such that student do less and accomplish more in life

Mapping COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5
CO 1	M	W			
CO 2			S		
CO 3		M			
CO 4				W	S

Course Contents:

Unit - 1:
Art of Living and Enjoying Fulfillment
Art of Being: Harmony of Material and Spiritual Values, Art of Being: How to live life in Eternal Freedom while Accomplishing the Maximum in the World, Art of Thinking: Key to Clear, Powerful and Fruitful Thinking, Art of Speaking: Key to Speaking with Maximum Effectiveness, Art of Action: Key to Self-confidence, Increased Efficiency, and Success in undertakings, Art of Behaviour: Key to Fruitful Relationships, Life in Fulfillment: Fulfillment of Life, Religion, Psychology and Philosophy

Unit - 2:
Enrichment of Experiences IV
Advance Lectures on the Transcendental Meditation Program, Follow-up Sessions and Group Checkings, Personal Checkings

Unit - 3:

Achieving Excellence in Professional Life

Introduction to Corporate Development Program, Stress Management at workplace, Achieving peak performance, Success belongs to the power of thought

Unit – 4:

Perfection in Leadership

Leading from the Unified Field, The Role of Consciousness in Creating Successful Leader, Structuring the Quality of Supreme Leadership, Ease in the field of achievement marks the steps of a genius - Do least and accomplish most

Text Book (s):

- Yogi.M. Maharishi. (1963). Science of Being and Art of Living. Plume; Reissue edition.
- Dalio Ray. (2017). Principles: Life and Work. Simon & Schuster

References:

- Tomljenović H, Begić D, Maštrović Z. (2016) "Changes in trait brainwave power and coherence, state and trait anxiety after three-month Transcendental Meditation (TM) practice." Psychiatria Danubina. Vol 28(1):63-72.

Assessment Scheme:

Sl. No.	Component	Weightage (%)
AC 1	Participation in Practice	20
AC 2	Teachers' Evaluation	20
AC 3	Outbound Visit & Report	10
AC 4	Field Based Project	20
AC 5	End Semester Examination	30

Mapping Assessment Components with COs

	CO1	CO2	CO3	CO4
AC 1	X	X	X	X
AC 2	X	X	X	X
AC 3	X	X	X	X
AC 4			X	X
AC 5	X	X	X	X

Details of Projects/Activities

Effective Leadership by Snake activity:

Instruction of this activity

- A group of 10 students will be in one team. Out of them 9 will be blind folded and one will be the leader
- Participants will stand in one line and the leader will be standing at the back
- Nobody is allowed to speak
- The person in the back of the line will guide the participants around a circle by simply tapping the shoulder of the person in front of them, who will further tap the shoulder of the person in front of them, and then be

guided to the desired object and the timer will stop the team who finishes first will win this activity

Learning of this activity

This activity shows the trust among their fellow participants and leader has to show their strength, mental balance and subtle powerful thinking to lead there team all this they can achieve by regular practice of Maharishi transcendental Meditation.

Hula Hoop Activity

Instruction of this activity

- Students will be separated equally in two teams and they have to make a human chain or form a circle, holding hands
- Instructor will put 2 hula hoop at the same time over two student's interlocked hands and they have to pass through it without using the hands
- The team who finishes first win the activity

Learning from this activity

This activity teaches students that you have to wait for your chance/opportunity patiently and when your chance comes to your way then you have to perform your best in limited amount of time so that your team can win. This activity gives the learning of team work and no matter teams win or not you are stress free and not disturbed by the outcome.

Knowledge Tug of War

- There will be two teams divided equally
- The box of goodies will be placed in between the two teams
- A set of questions will be asked by the instructor from both the teams
- To win the game, one team has to give five correct answers consecutively and the other team has to give five wrong answers

Learning from this activity

The learning of this game is not only the knowledge they are going to get from this knowledge tug of war but the real knowledge will come when actually one team claims the prize and celebrate. The real leadership is that of sharing the resources and prizes with other team.

Video testimonials:
Students have to give video testimonials of their learning and what they like in this subject along with suggestions so that we can inculcate those feasible ideas in our teaching methodology
Video shall be of minimum 2 minutes.

Each student (individually or in groups of 2-3 students) will undertake a project where they will be working in the external environment (like village community, MSMEs, NGOs, civil authorities etc.) on identified issues. They will work under the guidance of an assigned faculty member and will be assessed on the basis of how they are able to effectively understand their relationship with the external environment. Students will have to prepare the schedule of interaction with the identified external contacts and execute the assigned task keeping in mind the intended

learning outcomes. They will maintain a project diary/ register as per following format and this will be scrutinized by the faculty guide weekly/ fortnightly as decided.

Sl. No.	Topic Learnt in Class or Practice of TM	How I applied it during project/ field practice/ Outbound visit	My Understanding	Remarks
1.				
2.				

Outbound Visit/ Activity:

One Outbound Activity/Visit every month of Institutional, Corporates, Seminars, Conferences or (Guest Lectures (Inside or outside)) to be organized and conducted by Teacher's.

It is mandatory that all students will have to participate in outbound visit/ activity and attend all the planned activities strictly. With the guidance of faculty members, the will participate with clear cut intended learning outcome and submit a report on completion so that attainment of outcomes can be assessed. This assessment will have weightage as mentioned in the assessment scheme.

Class Participation:

Student's participation in practice Sessions: 10 Marks

S.No	Rubrics for Practice Sessions	Marks
1	Student regularly attends the practice session once a day	2
2	Student regularly attends the practice session twice a day	4
3	Student attends the session regularly but does not initiate contribution & needs instructor to solicit input.	6
4	Student's comments are constructive, with signs of insight and relevant to discussion	8
5	Student listens attentively and hears what others say and contributes to the learning and knowledge.	10

Student's participation in the Theory Classes: 10 Marks

S.No	Rubrics for Theory Sessions	Marks
1	Student regularly attends the class but is quite disruptive	2
2	Student attends the class but does not listen to others, both in groups and in class	4
3	Student attends the class with some participation	6
4	Student attends the class proactively and contributes to the class	8
5	Student attends the class proactively, consistently and add value to the learning	10

Attendance in all the classes and practice sessions is mandatory. Participation will be evaluated based on attendance, active engagement in discussions and interaction and contribution towards overall learning. This component will have 20% weightage as mentioned in the assessment scheme.

Other Details:

While it is expected that students should attend all classes but to cater to emergencies, illness, unavoidable social commitments and family responsibilities, a relaxation of up to 25% may be considered. Under no circumstances, attendance should fall below 75% else they will be debarred from taking examinations and will be declared fail in the course. Students can meet the faculty/ guide for consultations between **3:30 PM to 4:30 PM** or **else with prior appointment**. Students are expected to be regular and punctual in all activities including completion of work, submission schedules, appointments etc. and should be professionally dressed.

Important Note for faculty: Assessment rubrics will have to be written for each Assessment component.