Shree H. V. P. Mandal's

Degree College of Physical Education, Amravati.

(Multi-faculty Autonomous College)

FACULTY OF SCIENCE AND TECHNOLOGY

(SCIENCE GROUP)

CURRICULUM SCHEME AND SYLLABUS OF

FIRST YEAR

MASTER OF SCIENCE (COMPUTER SCIENCE)

(Choice Based Credit System)

Program Code: MSC2022

Introduced from the Session 2022-2023

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

Programme Outcomes (PO): The following Programme Outcomes are attained after completion of this programme:

PO1. Develop skilled professionals for industry, government, academia, research and entrepreneurial pursuit.

PO2. Cultivatean ability to contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise.

PO3. Build ability to apply appropriate techniques, resources, modern computing and IT tools to solve complex scientific and real life problems.

PO4. Attain the ability to identify the recent research developments, future possibilities and limitations.

PO5. Build the ability to acquire multidisciplinary knowledge and the capability to work in multidisciplinary system.

Programme Specific Outcomes (PSO): M.Sc. (Comp. Sci.) has been designed to prepare graduates for attaining the following Programme Specific Outcomes:

PSO1. Able to identify, analyze, formulate and develop computer based solutions to meet desired needs within realistic constraints such as safety, security and applicability.

PSO2. Develop the capability to achieve peer-recognition; as an individual or in a team; through demonstration of good programming, analytical, designing, logical and implementation skills.

PSO3. Able to select modern computing tools and techniques and use them with dexterity to solve industrial and real life problems.

PSO4. Identify research and development areas in multiple disciplines of computer science and able to devise and conduct experiments, interpret data and provide well informed conclusions.

PSO5. Able to communicate effectively and present the knowledge in fruitful manner.

PSO6. Able to accumulate knowledge from online platforms.

PSO7. To make student capable to undertake research in computer science and prepare them for TET like SET/NET.

Degree College of Physical Education,

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SPECIAL NOTE FOR THE STUDENTS

1) This is notified for general information and guidance of all concerned for admission and examination to Master of Science in Computer Science.

2) All the students desirous to take examinations for which this prospectus has been prescribed should if found necessary for any other information regarding examinations etc. refer the examination rules of this autonomous college.

Pattern of Question Papers for Semester/Final Examinations of MSc Programme in Choice Based Credit System

For Theory Examination

1. Under the CBCS curriculum, the semester/final theory examination shall be conducted for each course (Subject) as per the schedule declared by the Examination Section.
2. The question paper shall be of maximum 70 marks, containing ten questions, two questions on each unit and students are required to attempt any one of two.
3. No objective type multiple choices question allowed.
4. Every question will be of fourteen marks and may contain sub questions. Distribution of marks shall be given on the right of each question.
5. The questions' numbering will be as follows: Q. 1: or Q. 2:, Q. 3: or Q. 4:, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q.10
6. The question shall be target to evaluate knowledge, skill, thinking ability and application. Weightage shall be given in decreasing order of Knowledge, thinking ability, application and skill.

For Practical Examination

1. Question paper for practical examination will be of 20 Marks, two questions of ten marks each.
2. Question number one shall contain six problems/programs/experiments and student attempt any two out of these questions.
3. Question number two contain two sub questions (a) and (b) each of five mark.
4. Question number 2(a) contain five MCQ. Question number 2(b) contain one logical question/problem to test students' ability of solving problems (Setter may ask to solve real life problems based on case study)

Examination Leading to the
Degree of Master of Science
(Computer Science)
(Bi-annual Pattern)
(Two Year Course)

Whereas, it is expedient to prepare a new rule for Examination leading to the Degree of Master of Science (Computer Science) (Bi-annual) (Two Year Course) under CBCS for the purposes hereinafter appearing in the Academic Council and Governing Body.

1. This Rule may be called "Examination Leading to the Degree of Master of Science (Computer Science) (Bi-Annual Pattern) (Two Year Course) CBCS.
2. This rule shall come into force w.e.f. the Session 2022-23 for the Degree of Master of Science (Computer Science) (Bi-Annual Pattern) (Two Year Course) under CBCS.
3. Subject to their compliance with the provisions rules in force from time to time. The following person shall be eligible for admission to M.Sc. first year (Computer Science).
    a) A person who has passed the degree of Bachelor of Science of any statutory University with Computer Science / Computer Application as one of the subjects.

    OR

    b) A Person who has passed B.A. / B.Sc. with Mathematics plus post Graduate Diploma in Computer Science of S.G.B. Amravati University.

    OR

    c) A person who has passed a Degree of Bachelor of Computer Science or Bachelor of Computer Application.
4. A person who has passed M.Sc. First Year Computer Science of this Autonomous College or any other affiliated colleges of S.G.B. Amravati University shall be eligible for admission to M.Sc. Second Year (Computer Science).
5. The Degree of Master of Science (Computer Science) shall be awarded to an examinee who, in accordance with the provisions of this rule qualifies for the degree.
6. Duration of the Programme shall be two academic Years. The First Year M.Sc. (Computer Science) divided into two semesters called as Semester I, Semester II. The Second Year M.Sc. (Computer Science) also divided into two semesters called as Semester III and Semester IV. The College shall hold Examination in Winter and in Summer every year for both the even and odd semester.
7. The regular Examination of Semester–I and Semester- III shall be conducted in winter & the regular Examination of Semester- II and Semester- IV shall be conducted in summer every year. Supplementary Examination for Semester– I and Semester- III shall be held in summer and the supplementary examination for Semester–II and Semester-IV shall be held in winter every year.
8. For purpose of instructions and Examinations the students shall study sequentially.
9. The period of academic session / term shall be such as may be notified by this

Autonomous College.

10. The Examinations as given in Para – 7 above shall be held at such dates as may be notified by this autonomous college.
11. Subjects to his/her compliance with the provision of this rule and of other rules pertaining to examinations in force from time to time the applicant for admission at the end of the course of study of a particular term shall be eligible to appear at it, if,

(i) He/She satisfied the conditions in the table and the provisions there under.

(ii) He/She has prosecuted a regular course of study in this college.

(iii) He/She has in the opinion of the Head of the Department/Principal shown satisfactory progress in his / her studies.

Sr. No	Course and Level	Type of Admission	Eligibility	Remark
1	MSc Semester-I	Direct Admission	As mentioned in Para-3	
2	MSc Semester-II	Natural Growth	---	
3	MSc Semeste-III	Natural Growth	Having Passed Minimum 50% of total passing heads collectively of MSc Semester-I and Semester-II	
5	MSc Semester IV	Natural Growth	---	

12. The papers and practical in which an examinee is to be examined. The maximum marks for these and the minimum pass marks which an examinee must obtain in order to pass in the subject and the examination shall be as per the curriculum.
13. (i) The scope of the subjects is as indicated in the syllabus.
    (ii) The Medium of instruction and examination shall be English.
14. There shall be no classification of examinees successful in M.Sc. Semester –I, M.Sc. Semester–II, M.Sc. Semester-III and M.Sc. Semester-IV examination separately.
15. Examinees those who are successful in M.Sc. (Computer Science) Semester-IV Examination and all other three previous Semester examinations shall be declared passed and CGPA and programme grade will be computed as per the provision and rules of examinations under CBCS for this autonomous college.
16. An examinee who does not pass or who fails to present himself/herself for the examination shall be eligible for re-admission to the same examination, on payment of fresh fees and such other fees as may be prescribed.
17. As soon as possible after the examinations the Examination Committee shall publish a result of the examinees. The result of final M.Sc. Examination shall be declared as

mentioned in para-15 above and merit list shall be notified as per the rules.

18. Notwithstanding anything to the contrary in this rule no one shall be admitted to an examination under this rule, if he/ she has already passed the same examination or an equivalent examination of any statutory University.
19. (i) The examinees who have passed in all the subject prescribed for all the examinations shall be eligible for award of the Degree of Master of Science (Computer Science) by S. G. B. Amravati University, Amravati.

    (ii) The Degree Certificate in the prescribed from will be signed by the Honorable Vice-Chancellorof S. G. B. Amravati University, Amravati.

Curriculum Scheme for First Year MSC (Programme Code MSC2022)

Sr. No.	Course Category	Course Code No.	Course	Short Name	Credit	Teaching Scheme (Hours/Week)				Examination Scheme										Total Marks
										Theory					Practical					
						Lectures	Tutorials	Practical	Total Hours / Week	Duration of Paper (Hrs)	Max Marks Theory Papers	Max Marks Sessional	Total	Min Pass Marks	Duration of Exam (Hrs)	External Marks	Sessional Marks	Total	Min Pass Marks	
Semester-I																				
1	CCT	22MSC101	Programming Methodology & OOPs using JAVA	OOPJ	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
2	CCT	22MSC102	Data Structures and File Design	DSFD	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
3	CCT	22MSC103	Computer Organization and Operating System	COOS	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
4	DST	22MSC104	Elective-1	Ele1	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
5	CCP	22MSC105	LAB1: OOP using JAVA	LAB1	2	-	-	2	4	-	-	-	-	-	3	25	25	50	20	
6	CCP	22MSC106	LAB2: Data Structures	LAB2	2	-	-	2	4	-	-	-	-	-	3	25	25	50	20	
7	DSP	22MSC107	Lab3: Practical based on Elective-1	LAB3	2	-	-	2	4	-	-	-	-	-	3	25	25	50	20	
8	DSP	22MSC108	Seminar-1	SEM1	1	-	-	1	2	-	-	-	-	-	3	-	50	50	20	
			Total		23	16		7	30		280	120	**400**			75	125	**200**		**600**
Semester-II																				
1	CCT	22MSC201	Database Management Systems	DBMS	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
2	CCT	22MSC202	Software Engineering & Project Management	SEPM	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
3	GIT	22MSC203	Elective-2	Ele-2	4	4	-	-	4	3	-	100	100	40	-	-	-	-	-	
4	AECC	22MSC204	Soft Skill Development	SSD	2	2	-	-	2	2	25	25	50	20	-	-	-	-	-	
5	CCP	22MSC205	LAB4: DBMS	LAB4	2	-	-	2	4	-	-	-	-	-	3	25	25	50	20	
6	GIP	22MSC206	LAB5: Generic Course Practical	LAB5	2	-	-	2	4	-	-	-	-	-	3	-	50	50	20	
7	CCP	22MSC207	Project -1	PRJ1	2	-	-	2	4	-	-	-	-	-	3	25	25	50	20	
			Total		20	14		6	26		165	185	**350**			50	100	**150**		**500**

CCT: Core Course Theory, CCP: Core Course Practical, GIT: Generic/Interdisciplinary Theory, GIP: Generic/Interdisciplinary Practical, DST: Discipline Specific Theory, DSP: Discipline Specific Practical, AECC: Ability Enhancement Compulsory Course, SEC: Skill Enhancement Course.

Note: • (22MSC108) Seminar-1 should have topic related to Computer Science.

DST: (22MSC104) Elective -1		**GIT: (22MSC203) Elective-2 and GIP: (22MSC206) Lab5**
Mathematical Foundation (MF)		The Generic Interdisciplinary courses can be selected from the list of Short Term Courses provided with the syllabus. Open Elective Course will also be available under Generic Interdisciplinary courses which students can finalize with the help of Guide/Mentor at starting of session. Internal evaluation of these courses will be done as below: 1) 50% of internal marks will be based on the Marks/Grade given by the course conducting department. (In case of grade the marks will be converted as per decided by the committee constituted by Head of Department.) 2) 50% of internal marks will be based on the Presentation exam.
Computer Graphics (CG)		
Data Communication Networks (DCN)		

Curriculum Scheme for Second Year MSC (Programme Code MSC2022)

Sr. No.	Course Category	Course Code No.	Course	Short Name	Credit	Teaching Scheme (Hours/Week)				Examination Scheme										Total Marks
										Theory					Practical					
						Lectures	Tutorials	Practicals	Total Hours / Week	Duration of Paper (Hrs)	Max Marks Theory Papers	Max Marks Sessional	Total	Min Pass Marks	Duration of Exam (Hrs)	External Marks	Sessional Marks	Total	Min Pass Marks	
Semester-III																				
1	CCT	22MSC301	Data Science	DS	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
2	CCT	22MSC302	Python	PYT	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
3	DST	22MSC303	Elective-3	Ele-3	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
4	SEC	22MSC304	Research Methodology & Report Writing	RMRW	2	2	-	-	2	2	40	10	50	20	-	-	-	-	-	
5	CCP	22MSC305	LAB6: DS	LAB6	2	-	-	2	4	-	-	-	-	-	3	25	25	50	20	
6	CCP	22MSC306	LAB7: Python	LAB7	2	-	-	2	4	-	-	-	-	-	3	25	25	50	20	
7	DSP	22MSC307	LAB8: Practical based on Elective 3	LAB8	2	-	-	2	4	-	-	-	-	-	3	25	25	50	20	
8	DSP	22MSC308	Seminar-2 (Based on Research topic)	SEM2	1	-	-	1	2	-	-	-	-	-	3	25	25	50	20	
			Total		21	14	-		28		250	100	**350**		12	100	100	**200**		**550**
Semester-IV																				
1	CCT	22MSC401	Artificial Intelligence and Machine Learning	AIML	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
2	CCT	22MSC402	Web Technologies	WT	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
3	DST	22MSC403	Elective-4	Ele-4	4	4	-	-	4	3	70	30	100	40	-	-	-	-	-	
4	SEC	22MSC404	Online Course	OC	2	-	-	2	4	-	-	-	-	-	3	-	50	50	20	
5	CCP	22MSC405	LAB9: AIML and WT	LAB9	2	-	-	2	4	-	-	-	-	-	3	25	25	50	20	
6	DSP	22MSC406	Lab10: Practical based on Elective-4	LAB10	2	-	-	2	4	-	-	-	-	-	3	25	25	50	20	
7	CCP	22MSC407	Project-2 (Research Project)	PRJ2	4	-	-	4	4	-	-	-	-	-	3	75	25	100	40	
			Total		22	12	-	10	28		210	90	**300**		12	125	125	**250**		**550**

CCT: Core Course Theory, CCP: Core Course Practical, GIT: Generic/Interdisciplinary Theory, GIP: Generic/Interdisciplinary Practical, DST: Discipline Specific Theory, DSP: Discipline Specific Practical, AECC: Ability Enhancement Compulsory Course, SEC: Skill Enhancement Course.

DST: (22MSC303) Elective -3	**DST: (22MSC403) Elective - 4**
Advanced Database Systems (ADS)	Cloud Computing (CC)
Image Processing (IP)	Computer Vision (CV)
Mobile Computing (MC)	Cyber and Information Security (CIS)

Note :
- (22MSC308) Seminar should be based on Research topic. The Internal Evaluation will be done as below:
  - i.) If student publishes research paper in any national/international journal, 100% internal marks will be awarded.
  - ii) If student presents paper in Conference then 80% internal marks will be awarded and remaining 20% will be based on report and presentation.
  - iii) If student doesn't publish paper or present paper then the internal evaluation will be done on the basis of report and presentation.
- (22MSC407) Project-2 will be a research project which shall be developed on topic formulated in (22MSC308) Seminar-2.
- (22MSC404) Online Course can be opted from online learning platforms like Swayam/MOOC/NPTEL/COURSERA. These courses should be based on Computer Science and student can complete it in Semester III or Semester IV.

Syllabus of First Year M. Sc. (Computer Science)
Semester I

Course Category	**Core Course Theory**
Course Code	**22MSC101**
Course Name	**Programming Methodology and OOP's using JAVA**
Course Short Name	**JAVA**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:
- Students should be familiar with Object Oriented Programming.
- Basic concepts related to programming are required.

Course Objectives:
- To make the student understand the concept of programming, stepwise refinement in problem solving and decomposing complex problems into sub-problems.
- To be able to explain and implement basic Programming techniques.
- To learn basics of java language.
- To implement classes, inheritance, interfaces, applets, graphics and AWT.
- To learn handling exceptions.

Mapping of Programme Outcome: PO1, PO2, PO3	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3

Course Outcomes (CO):

CO1. Students will gain the ability to illustrate solutions to model solutions to the problem through flowchart and algorithm.
CO2. Learn programming language constructs and techniques to write programs for a given problem.
CO3. Ability to identify and implement Object Oriented concepts in programming.
CO4. Skill to write java application programs using OOP principles, applet programming.
CO5. Understanding of the concepts of polymorphism and inheritance principles of Interface, Exception Handling, Applets, Graphics Programming, Java Imaging and Generic Programming.
CO6. Ability to use Abstract Window Toolkit (AWT), an Application programming interface (API) for creating Graphical User Interface (GUI) in Java.

Units	Contents	Total Lectures (60 hrs)
I	**Introduction to Programming:** How to develop a program, Algorithms, Flow-charts, Testing and Debugging a program, Documentation. **Basics of Programming :** Data types, constants, variables, macros, overflow and underflow of data, Operators, Expressions, precedence and associativity of operators, type conversion. **Input and Output:** Character I/O, formatted I/O, **Decision Making, Branching and Algorithm:** if, if..else, goto, conditional operator, switch statement. **Mapping of Course Outcomes:** CO1, CO2	12
II	**Java Basics:** History, Features, JDK, JVM, Difference between C++ & Java, Structure of Java Program, Data Types, Operators & Expression, Decision Making Statements, Creating Classes & Objects, Constructor, Constructor Overloading, Method Overloading, Use of *new*, *delete* & *this* keywords. **Inheritance:** Implementation of Inheritance, Super & Extended class, Abstract class & methods, Method Overriding, Final variables, methods & classes. **Mapping of Course Outcomes:** CO2, CO3, CO5	12
III	**Package & Interface:** Package concept, Creating user defined Packages, Java built-in Packages. Interface concept, Defining & Implementing Interface. **Access Protection:** public, private & protected. **Exception Handling & Multithreading:** Exception concept, types, Using try- -catch, Multiple catch, nested try, use of throw block. String class, String Buffer and String Tokenizer class and its method Multithreading concept, Thread Life cycle, Creating & running threads, thread properties. **Mapping of CO:** CO2, CO3, CO5	12

IV	**Applet & Graphics:** Applet concept, Applet Life cycle, HTML Applet tag with all attributes, passing parameters to Applet, Displaying it using Applet viewer, Advantages & Disadvantages of Applet Vs Application. Graphics concept, Graphics class, Drawing Lines, Circle, Polygon, Rectangle, Ellipses, Arcs, Working with colors.	12
	Mapping of CO: CO2, CO4, CO5	
V	**AWT:**AWT concept, AWT components, Containers, Frames & Panels, Event Delegation Model, Event source & Handler, Event categories, Listeners & Interfaces.	12
	Mapping of CO: CO2, CO3, CO6	
	Books: 1. Herbert Schildt, "Complete Reference Java2", TMH	
	References: 1. E. Balagurusamy, "Programming with Java", TMH 2. Dietel & Dietel, "Java How to Program", Pearson 3. D. R. Collaway, "Inside Servlets", Pearson 4. Steven Holzner, "Java2 Programming Black Book", DreamTech Press	

Course Category	**Core Course Theory**
Course Code	**22MSC102**
Course Name	**Data Structures and File Design**
Course Short Name	**DSFD**
Total Lectures	**60**
Total Credits	**4**

Prerequisites :
- Knowledge of C and C++

Course Objectives:
- To analyze the algorithms to determine time and space complexity.
- To build and manipulate linear and non-linear data structure, including Stack, Array, Linkedlist, Queues, Tree and Graphs.
- To be able to Sort, Search and merge data.
- To be able to choose the appropriate data structure to use in solving typical computer science problem.

Mapping of Programme Outcome: PO1, PO2, PO3	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3

Course Outcomes:

CO1. Ability to evaluate algorithms and data structures in terms of time and complexity of basic operations.
CO2. Ability to analyze algorithms and algorithm corrections, to describe stack, queue and linked list.
CO3. Gain Knowledge of basic and dynamic data structures.
CO4. Understands searching and sorting techniques.
CO5. Gain Knowledge of file system.

Units	Contents	Total Lectures
I	**Introduction**, Types of Data Structures: Linear & Nonlinear data structures,Abstract data types. **Arrays:** Linear arrays, Memory Representation of linear Arrays, Operations onLinear Arrays, Multidimensional Arrays, Matrices, sparse matrices, Applications. **Linked List:** Concept, Operations: Insert, Delete, Traversal, Static implementation using Arrays, Dynamic implementation, Doubly Linked list,Circular linked list, Linked list applications: Merging of two linked lists. File structure, File Type, Records, Attribute.	12
	Mapping of Course Outcomes: CO1, CO2	
II	**Stacks :** Introduction to stack, primitive operation on stack, Stackimplementation using arrays and linked list. Stack's applications - Infix, post fix & Prefix expressions, Infix to postfixconversion, evaluation of postfix expression, Recursion. **Queues :** Introduction to queues, Primitive Operations on the Queues, Dqueue, Circular Queue, Priority Queues. **Queue applications:** CPU Scheduling algorithms FCFS, Round Robin algorithm.	12
	Mapping of Course Outcomes: CO1, CO2	
III	**Searching:** Introduction to Searching and sorting, Concept and need, Linear search, Binary search, Indexed sequential search, **Sorting:** Bubble sort,Insertion Sort, Selection Sort, **Merging:** Merge Sort, Radix Sort, Heap Sort.	10
	Mapping of Course Outcomes: CO1, CO4	
IV	**Trees:** Terminology and Concepts, Binary Tree. Representation, Linked representation of binary trees, Binary Search Tree, Operations on Binary Search trees: Insert, Delete. Tree Traversals: Preorder, Inorder, Postorder, AVL Search Trees, B Trees. **Graphs:** Terminology and Graph Representation: Adjacency matrix, Adjacency list, Adjacency multi-list, Traversals: Depth first and Breadth first. Minimum spanning tree, shortest path algorithm, topological ordering **Indexing and Hashing:** B-tree indexing, multilevel indexing, B+ tree, Hashing, Collision processing, Bucket hashing, dynamic hashing, Linear Probing, Linear hashing, Extendible hashing.	14
	Mapping of Course Outcomes: CO1, CO3	

V	**File Concepts:** Files, Types of file : Master file, Transaction file, Work file,Text file, Binary file, Program file, File processing operations : open, close, read, write, seek. **File Organizations:** Sequential organizations, Random Organizations, Linked Organizations, Inverted Files.	12
	Mapping of Course Outcomes: CO5	
	Books : 1. Seymour Lipschutz, "Data Structures", Tata McGraw Hill Education Private Limited, NEW DELHI. 2. SartajSahani, "Data structure algorithms and Applications in C++", McGraw Hill	
	References : 1. Tanenbaum, Langsam, Augustein, "Data structures using C", PHI 2. D. Samanta, "Classic Data Structures", PHI Mark Allan Welss, "Data structure and algorithm analysis in C++", Addison Weslay 4. Bhagat Singh & T.L. Naps, "Introduction to Data Structures" 5. S.B.Kishor, "Data Structures"	

Course Category	**Core Course Theory**
Course Code	**22MSC103**
Course Name	**Computer Organization and Operating System**
Course Short Name	**COOS**
Total Lectures	**60**
Total Credits	**4**

Prerequisites :

- Basic knowledge about computers and its components and their function is essential.
- Knowledge of Operating System.

Course Objectives:

1. To understand the structure, function and characteristics of computer systems.
2. To understand the design of the various functional units and components of computers.
3. To understand the role of operating systems.
4. To understand the fundamental principles of operating system design and kernel implementation.
5. To understand key features of operating systems of practical importance, including Linux and Windows.

Mapping of Programme Outcome: PO1, PO2, PO3	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3

Course Outcomes:

CO1. To increase students' awareness about the basic architecture of the system and system component.
CO2.Students would be familiar with advanced microprocessor architecture, supercomputer architecture, Vector processor and Array processor.
CO3. Students can distinguish between the different types of operating system Structure and services.
CO4. Understanding of the concepts of process scheduling and memory management
CO5. Comfortably use Linux and Windows Operating System.

Units	Contents	Total Lectures
I	Distinction between Organization and Architecture Functional block diagram of computer system. Function of I/O, memory, CPU. Bus structure. A complete processor organization. RISC and CISC Architecture. Design of ALU, Co-processor. Instruction pipelining and parallel processing. Instruction pipelining Hazard. Control and structural Hazard. Overcoming Hazard.	13
	Mapping of Course Outcomes: CO1	
II	Parallel Processing. Instruction level parallelism. Types of parallel processor system. SISD, SIMD, MISD, MIMD. VLIW processor, Vector processor, Data Level parallelism, Array processor, Multi-threaded processor.	13
	Mapping of Course Outcomes: CO2	
III	**Basics of Operating Systems:** Operating System Structure, Operations and Services; System Calls, Operating-System Design and Implementation; System Boot. **Process Management:** Process Scheduling and Operations; Inter-process Communication, Communication in Client–Server Systems, Process Synchronization, Critical-Section Problem, Peterson's Solution, Semaphores, Synchronization.	10
	Mapping of Course Outcomes: CO3	
IV	**CPU Scheduling:** Scheduling Criteria and Algorithms; Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling. **Memory Management:** Contiguous Memory Allocation, Swapping, Paging, Segmentation, Demand Paging, Page Replacement algorithms, Allocation of Frames, Thrashing, Memory-Mapped Files.	12
	Mapping of Course Outcomes: CO4	
V	**Linux Operating Systems:** Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output; Inter-process Communication, Network Structure. **Windows Operating Systems:** Design Principles, System Components, Terminal Services and Fast User Switching; File System, Networking. **Distributed Systems:** Types of Network based operating Systems, Network Structure, Communication Structure and Protocols; Robustness, Design Issues and Distributed File Systems.	12

	Mapping of Course Outcomes: CO5	
	Text Books : 1. Computer Architecture and organization. By Subrata Ghoshal, Pearson. 2. Operating System Concepts By Avi Silberschatz, Greg Gagne, and Peter Baer Galvin,John Wiley & Sons 3. A. Silberschatz, P. B. Galvin, "Operating system Concepts", Wiley publication. 4. D.M. Dhamdhere, "System software and operating system". 5. H.M. Dietel, "Operating system"	
	References : 1. Computer Architecture and Organization. By Nicholas P Carter. Schaum's Outlines Series. 2. Modern Operating S Ystems ,Andrew S. Tanenbaum ,Herbert Bos 3. Milan Milenkovic, "Operating systems concept and design", TMH 4. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Principles" 5. Achyut Godbole, "Operating systems with case studies in UNIX NetWare Windows NT", TMH	

Course Category	**Discipline Specific Theory**
Course Code	**22MSC104**
Course Name	**Elective - 1: Mathematical Foundation**
Course Short Name	**Ele1:MF**
Total Lectures	**60**
Total Credits	**4**

Prerequisites :

- Basic concept of Mathematical Logic, Connective, Knowledge of derivatives, integration, matrix, basic knowledge of data structure like tree, stack, array, queue, etc.

Course Objectives:

1. To understand and be able to use fundamental concept of mathematics in computational science.
2. To learn understand the basic concept of Mathematical modeling.
3. To make students able to apply mathematical and statistical techniques to solve some real life problems.
4. To acquire knowledge of Numerical Computation.

Mapping of Programme Outcome: PO1, PO2, PO3	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3

Course Outcomes:

CO1. Ability to apply mathematical and statistical techniques to solve some real life problems.
CO2. Students are able to apply mathematical techniques for data analysis.

Units	Contents	Total Lectures
I	**Mathematical Logic:** Introduction to Discrete mathematics Proposition, Connectives, Conditional and Biconditional Proposition, Normal Forms, Disjunctive and Conjunctive Normal Form and Principles. **Set Theory:** Basic concepts and Notation, Ordered pairs and Cartesian Products. **Relation :** Types of relation, operations on relation, Properties of relation, Hasse diagrams for partial orderings.	13
	Mapping of Course Outcomes: CO1	
II	**Function:** Representation of function, Classification of Function, types of function. **Lattice:** Properties of Lattice, Principle of Duality, Properties of Lattices. **Graph Theory:** Introduction to Graph, Matrix representation of a graph, Transport network, Minimal cost flow, Finite state machine with output, Finite state machine with no output.	13
	Mapping of Course Outcomes: CO1, CO2	
III	**Computer Arithmetic:** Structure of a Computer, Errors in Numerical Computations, Floating-point representation of numbers, arithmetic operations with normalized floating point numbers and their consequences. **Iterative Methods:** Bisection, False position, Newton-Raphson methods, Secant method.	10
	Mapping of Course Outcomes: CO1, CO2	
IV	**Matrices:** Matrix operations, transpose of matrix, inverse of matrix, rank of a matrix, **Solution of linear system:** Matrix Inversion method, Gaussian elimination Method, Method of Factorization, The Gauss Seidel iterative method	12
	Mapping of Course Outcomes: CO1, CO2	
V	**Interpolation:** Introduction, Lagrange Interpolation, Difference Tables, Truncation Error in Interpolation, Spline Interpolation, **Numerical Integration:** Trapezoidal rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Taylor Series method, Runge-kutta method. **Testing of Hypothesis:** Null and alternative hypothesis, Type I and II errors, power function, method of finding test, likelihood ratio test, Ump test, Heyman Pearson lemma.	12
	Mapping of Course Outcomes: CO1, CO2	
	Text Books : 1. T Veerarajan, "Discrete mathematics with graph theory and combinatorics." McGraw Hill Education 2. V. Rajaraman, "Computer Oriented Numerical Methods", Third Edition, PHI.	

References :

1. Steven C. Chapra, Raymond P. Canale, "Numerical Methods for Engineers", Tata McGraw Hill.
2. M.Goyal, "Computer Based Numerical & Statistical Techniques", ISP
3. J.P.Tremblay, R. Manohar, "Discrete mathematical structures with applications to computer science ", TMH
4. Narsingh Deo ,"Graph theory with applications to engineering and computer science"PHI
5. S. S. Sastry, "Introductory Methods of Numerical Analysis", Fifth Edition, PHI

Course Category	**Discipline Specific Theory**
Course Code	**22MSC104**
Course Name	**Elective-1: Computer Graphics**
Course Short Name	**Ele1:CG**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:
- Basic Knowledge about computer system, it's components and function.

Course Objectives:
- To learn and understand Computer Graphics.
- To learn basic I/O devices and software for Computer Graphics.
- To learn methods of drawing computer graphics and components of graphics.
- To learn methods of basic operations on Computer Graphics.

Mapping of Programme Outcome: PO1, PO2, PO3	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3

Course Outcomes:
CO1. To gain the preliminary concepts about computer graphics.
CO2. To gain knowledge of basic I/O devices used in computer graphics.
CO3. Able to draw graphics using line, curves, and polygon.
CO4. Able to perform operations on computer graphics.
CO5. Knowledge about 2 Dimensional and 3 Dimensional display methods.

Units	Contents	Total Lectures
I	**Introduction to Computer Graphics:** Introduction, Types, Characteristics, Application, Advantage, Input Devices, Hard copy devices, Graphics Software, Coordinate Representation, Software Standards, computer graphics metafile, Rendering, Image Resolution.	10
	Mapping of Course Outcomes: CO1, CO2	
II	**Video Display Devices:** CRT , Raster scan display, Random scan display, Color CRT Monitors, Virtual Reality System **Output Primitives**: Points and Line, DDA Algorithms, Bresenham's Line Algorithm, Circle Generating Algorithms, Midpoint Circle Algorithm **Filled Area Primitives**: Scan Line, Polygon Fill Algorithm, Boundary Fill Algorithm, Character Generation.	14
	Mapping of Course Outcomes: CO3, CO4	
III	**Attributes of Output Primitives**: Line Attributes, Curve Attributes, Color Table, Area Fill Attributes, Character Attributes, Bundled Attributes **2D Geometric Transformation:** Basic Transformation (Translation, Rotation Scaling).General Pivot Point Rotation, General Fixed Point Scaling, Reflection Shear **2Dimensional Viewing**: Viewing Pipeline, Windows to Viewport Coordinate Transformation.	12
	Mapping of Course Outcomes: CO3, CO4, CO5	
IV	**Clipping**: Point Clipping, Line Clipping, Cohen-Sutherland Line Clipping, Polygon Clipping, Sutherland-Hodgeman Polygon Clipping Text Clipping, Exterior Clipping. **Structure**: Basic Structure Function, Editing Structure Function.	12
	Mapping of Course Outcomes: CO3, CO4, CO5	
V	**GUI and interactive Input Method**: User Dialogue, Logical Classification of Input Devices. Interactive Picture Construction Techniques **Three Dimensional Concepts**: 3 Dimensional Display Methods, Polygon Table, Blobby Object, Bezier Curve, B-Spline Curve.	12
	Mapping of Course Outcomes: CO3, CO4, CO5	
	Text Books: 1. Donald Hearn & M.P.Baker: Computer Graphics 2/e(PHI)	
	References: 1. S.Harrington : Computer Graphics : A programming Approach (McGraw Hills) 2. Roger : Procedural Elements for Computer Graphics (McGraw Hills)	

Course Category	**Discipline Specific Theory**
Course Code	**22MSC104**
Course Name	**Elective-1: Data Communication Networks**
Course Short Name	**Ele1: DCN**
Total Lectures	**60**
Total Credits	**4**

Prerequisites :

- Knowledge of computer network and types of communication network.
- Different network Types and their features.
- Frequency modulation techniques.

Course Objectives:

- To understand the role of Computer Network.
- To learn the Network's OSI Models and different protocols used in its layers.
- To understand the routing and Multimedia Networking.

Mapping of Programme Outcome: PO1, PO2, PO3	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3

Course Outcomes:

CO1. Student will understand the concept of computer network technology.
CO2. Ability to identify the different types of network topologies and protocols.
CO3. Knowledge about OSI model, threats in network and Counter measures.

Units	Contents	Total Lectures
I	**Introduction:** Data communication Network, Component of data communication network, Types of Network, Topologies, Client- Server Model. **Transmission Media:** Copper Wires, Glass Fibers, Radio, Satellite, Geosynchronous Satellite, Low earth Orbit Satellite array, Microwave, Infrared. **Local Asynchronous Communication:** The need of asynchronous Communication, Baud Rate, Framing, and Error, Full Duplex Asynchronous Communication. **Mapping of Course Outcomes:** CO1, CO2	11
II	**Introduction to OSI Model:** Layers of OSI Model. **Application Layer:** Principles of Application-Layer Protocols, The World Wide Web: HTTP, File Transfer: FTP, The Internet's Directory Service: DNS. **Transport Layer:** Transport-Layer Services and Principles, Principles of Reliable of Data Transfer, Connection-Oriented TCP, Principles of Congestion Control **Mapping of Course Outcomes:** CO2, CO3	12
III	**Internet Protocol:** IP Design, IP Address, IP-subnet Address, IP Fragmentation, introductionto IPv6. **Network Layer and Routing:** Introduction and Network Service Model, Routing Principles, Broadcast and multicast routing Algorithms **Mapping of Course Outcomes:** CO2, CO3	12
IV	**Link Layer and Local Area Networks:** The Data Link Layer: Introduction, Services, Error Detection and Correction, Multiple Access Protocols and LANs, Ethernet, CDMA/CD, Hubs, Bridges and Switches **Wireless LANs:** IEEE 802.11 Introduction to wireless LAN's. **Mapping of Course Outcomes:** CO2, CO3	11
V	**Multimedia Networking**: Multimedia Networking Applications, Streaming Stored Audio and Video, Protocols for Real Time Interactive Application, Scheduling and Policing Mechanisms, Differentiated Services. **Security in Computer Networks:** Introduction to Network Security, Principles of Cryptography, Authentication, Integrity Key Distribution and Certification, Access Control: Firewalls, Attacks and Countermeasures. **Mapping of Course Outcomes:** CO2, CO3	14
	Text Books: 1. James F. Kurose and Keith W. Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Pearson Education. 2. Jerry Fitzgerald and Alan Dennis, "Business Data Communications and Networking", Eighth Edition, Wiley Publication, India.	

	3. Behrouz A. Forouzan, ”Data Communications and Networking”, Fourth Edition	
	References : 1. V. B. Black, “Data Communications and distributed Networks”	

Course Category	**Core Course Practical**
Course Code	**22MSC105**
Course Name	**Lab1 : OOP using JAVA**
Course Short Name	**Lab1**
Total Lectures	**30**
Total Credits	**2**
Practical List will be freshly prepared by subject teacher in every session. So the list is not mentioned.	

Course Category	**Core Course Practical**
Course Code	**22MSC106**
Course Name	**LAB2: Data Structures**
Course Short Name	**Lab2**
Total Lectures	**30**
Total Credits	**2**
Practical List will be freshly prepared by subject teacher in every session. So the list is not mentioned.	

Course Category	**Discipline Specific Practical**
Course Code	**22MSC107**
Course Name	**Lab3: Practical based on Elective-1**
Course Short Name	**Lab3**
Total Lectures	**30**
Total Credits	**2**
Practical List will be freshly prepared by subject teacher in every session. So the list is not mentioned.	

Course Category	**Discipline Specific Practical**
Course Code	**22MSC108**
Course Name	**Seminar**
Course Short Name	**SEM**
Total Teaching Hours	**15**
Total Credits	**1**

Prerequisites
Knowledge of Power Point or other presentation tools.

Course Objectives:
- To learn new topics by self-learning.
- To study and review the research papers, magazines, etc.
- To develop communication, interpersonal and presenting skills.

Mapping of Programme Outcome: PO1, PO2, PO4	**Mapping of Programme Specific Outcome:** PSO2, PSO4, PSO5, PSO6

Course Outcomes (CO): Students will :
CO1. Be able to learn new technologies by themselves.
CO2. Attain knowledge about various cutting edge technologies and ongoing work of various researchers.
CO2. Gain presentation skill to showcase their work.

Synopsis format:

1. Abstract
2. Introduction
3. Technology focus
4. Future scope
5. Conclusion
6. References

Seminar Report Format:

1. Title page
2. Certificate
3. Acknowledgement
4. Index
5. Abstract
6. Introduction
7. Technology Focus
8. Applications
9. Future Scope
10. Conclusion
11. References

Rules:

1. Topic should be based on recent technology.
2. Topic should be research oriented.
3. The topic may be out of the scope of syllabus.
1. Synopsis should be hand written.
2. Synopsis should not exceed more than 2 pages, it should cover the summary of whole topic in brief.
3. It will be responsibility of guide and students to communicate about selection/ rejection/ preparation of the topic to each other.
4. Synopsis should be submitted within the time span specified by Seminar In-charge.
5. Student should submit the synopsis in the given format for approval by the department.
6. The Title page and certificate format is given in next page.
7. Seminar report should be minimum of 20 pages.
8. Seminar report should be duly signed by seminar guide.
9. Student should bring two copies of seminar report for Examination. One hard binded copy should be submitted to Department's Library. One spiral binded copy should be kept near the student.
10. Minimum 10-12 slides presentation should be prepared for seminar.

Seminar Title page:

Seminar Report
On
Seminar Topic Name

A Seminar Submitted in Partial Fulfillment of the Requirement for

Master of Science (Computer Science),

during the academic year [20___- 20___]

Guided By

Prof . _____

Submitted By

Mr./Ms. _____
(FYMSC- Sem I)

Shree H.V.P. MANDAL'S
P. G. Department of Computer Science & Technology
Degree College of Physical Education,
(A Multi Faculty Autonomous College),
Affiliated To S.G.B. Amravati University, Amravati.
Session 20___ - 20___

Seminar Certificate:

Shree H. V. P. MANDAL'S

P. G. Department of Computer Science & Technology,

Degree College of Physical Education,

(A Multi Faculty Autonomous College),

Affiliated To S.G.B. Amravati University, Amravati.

C E R T I F I C A T E

This is to certify that this seminar entitled

Seminar Topic Name

is submitted by

Mr./Ms._____

(FYMSC- Sem III)

A Seminar Report Submitted
In Partial Fulfillment of the requirement for
Master of Science (Computer Science),
Degree College of Physical Education,
Affiliated To S.G.B. Amravati University, Amravati
during the academic year
[20___- 20___]

Seminar Guide	**Principal**
(Prof./Dr.)	(Prof./Dr.)
Seminar Incharge	**Course Coordinator**
(Prof./Dr.)	(Prof./Dr.)
Internal Examiner	**External Examiner**
(Prof./Dr.)	(Prof./Dr.)

Semester II

Course Category	**Core Course Theory**
Course Code	**22MSC201**
Course Name	**Database Management System**
Course Short Name	**DBMS**
Total Lectures	**60**
Total Credits	**4**

Prerequisites :
-

Course Objectives:

- To understand the role of a database management system in an organization.
- To understand basic database concepts, including the structure and operation of the relational data model.
- To be able to construct simple and moderately advanced database queries using Structured Query Language(SQL).
- To understand and successfully apply logical database design principles, including E-R diagramsand database normalization.
- To understand the concept of a database transaction and related database facilities, includingconcurrency control, backup and recovery, and data object locking and protocols.
- To get aware about database security and advance database systems.

Mapping of Programme Outcome: PO1, PO2, PO3	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3

Course Outcomes: Students will :

CO1. Gain Knowledge about basic concepts, storage medias and various file organizations.
CO2. Understand various indexing and hashing techniques used by DBMS for storing and retrieving the data from database.
CO3. Attain the knowledge about SQL and various database languages.
CO4. Gain understanding of various data objects, command syntaxes, its implementation and rules of Structured Query Language (SQL).
CO5. Knowledge about data modeling using the entity-relationship and developing database designs using normalization.
CO6. Attain concept of a database transaction and related database facilities, including concurrency control.
CO7. Awareness about database security and advance database systems.

Units	Contents	Total Lectures
I	**Introduction:** DBMS, Advantages, Applications. **File Organization**: Introduction, Types of File organization. **Indexing and Hashing**: Ordered Indices, B+ tree Index Files, Static Hashing, Dynamic Hashing.	12
	Mapping of CO: CO1, CO2	
II	**Introduction to SQL and Database Languages and Commands:** DDL, DML, DCL and TCL **Integrity Constraints:** Domain constraints, Referential integrity, Assertion **SQL Queries:** Basic Query structure, set operations, Aggregate functions, null values, nested sub queries, Joins, Views, Stored procedure, Cursors, Functions and Triggers.	12
	Mapping of CO: CO3, CO4	
III	**Entity-Relationship model:** ER designs, ER Entities, attributes, relationship and relationship sets. **Relational Database Design:** Decomposition, Functional Dependency, Normalization, Normal Forms. Converting ER Model to Relational Model.	12
	Mapping of CO: CO5	
IV	**Transaction management:-**The ACID properties, transactions and schedules, concurrent execution of transactions, Deadlock. **Concurrency control:** Lock based protocols, Timestamp-Based Protocols, Validation-Based Protocols.	12
	Mapping of CO: CO6	

V	**Introduction to Database security:** Authentication, Authorization and Access Control, DAC, MAC and RBAC models, Intrusion detection, SQL injection. **Advanced Databases Overview:** Introduction of Centralized System, Client-Server System, Parallel System, Distributed System, Architecture for Parallel Database and Architecture for distributed Database. **Mapping of CO:** CO7	12
	Text Books: 1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concept, Sixth edition, McGraw-Hill, 2011 2. Raghu Ramkrishnan, Johannes Gehrke, Database Management system, Third Edition, McGraw-Hill, 2003 3. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of database systems, Seventh Edition, Addison Wesley, 2011 OR Ramez Elmasri, Shamkant B. Navathe, Fundamentals of database systems, Seventh Edition, Pearson Education, 2017	
	References: 1. C. J. Date, An Introduction to Database system, Third Edition Vol. 1, Narosa publishing House, 1998 2 . Jeffrey A. Hoffer, Marry B. Presscott, Fred R. McFadden, Modern Database Management, Pearson publication, 6th edition.	

Course Category	**Core Course Theory**
Course Code	**22MSC202**
Course Name	**Software Engineering and Project Management**
Course Short Name	**SEPM**
Total Lectures	**60**
Total Credits	**4**

Prerequisites :
-

Course Objectives:
- Knowledge of System Analysis and Design is desirable.

Mapping of Programme Outcome: PO1, PO2, PO3	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3

Course Outcomes: The students will be able to
CO1. Identify suitable life cycle models to be used.
CO2. Analyze a problem and identify and define the computing requirements to the problem.
CO3. Translate a requirement specification to a design using an appropriate software engineering methodology.
CO4. Formulate appropriate testing strategy for the given software system.
CO5. Develop software projects based on current technology, by managing resources economically and keeping ethical values.

Units	Contents	Total Lectures
I	**Introduction to software engineering**, scope of software engineering, historical aspects, economic aspects, maintenance aspects, specification and design aspects, team programming aspects. Software engineering a layered technology – processes, methods and tools. **Software process models:** prototyping models, incremental models, spiral model, waterfall model. Introduction to Agile Development. **Mapping of COs:** CO1	12
II	**Process Framework Models:** Capability maturity model (CMM), ISO 9000. **Phases in Software development:** requirement analysis- requirements elicitation for software, analysis principles, software prototyping, specification. **Planning phase:** project planning objective, software scope, empirical estimation models- COCOMO, single variable model, staffing and personal planning. **Mapping of COs:** CO2, CO3	12
III	**Design phase:** design process, principles, concepts, effective modular design, top down, bottom up strategies, stepwise refinement. **Coding:** programming practice, verification, size measures, complexity analysis, coding standards. **Mapping of COs:** CO2, CO3	10
IV	**Testing:** fundamentals, white box testing, control structure testing, black box testing, basis path testing, code walk-throughs and inspection, **Testing strategies:** Issues, Unit testing, integration testing, Validation testing, System testing. **Maintenance:** Overview of maintenance process, types of maintenance. **Risk management:** software risks, risk identification, risk monitoring and management. **Mapping of COs:** CO4	13
V	**Project Management concept:** People – Product-Process-Project. **Project scheduling and tracking:** Basic concepts-relation between people and effort-defining task set for the software project-selecting software engineering task. **Software configuration management:** Basics and standards, User interface design rules. **Computer aided software engineering tools:** CASE building blocks, taxonomy of CASE tools, integrated CASE environment. **Mapping of COs:** CO5	13
	Text Books: 1. Ian Sommerville, Software Engineering, University of Lancaster, Pearson Education, Seventh edition, 2004. 2. Roger S. Pressman, Software Engineering : A practitioner's approach, McGraw Hill publication, Eighth edition, 2014	

	Reference Books: 1. K. K. Aggarwal and Yogesh Singh, Software Engineering, New age International Publishers, Second edition, 2005. 2. S.A. Kelkar, Software Project Management: A concise study, PHI, Third edition, 2012. 3. Walker Royce, Software Project Management : A unified frame work, Pearson Education, 1998	

Course Category	**Generic Interdisciplinary Theory**
Course Code	**22MSC203**
Course Name	**Elective-2**
Course Short Name	**Ele-2**
Total Lectures	**60**
Total Credits	**4**

Mapping of Programme Outcome: PO1, PO5	**Mapping of Programme Specific Outcome:** PSO5, PSO6

NOTE: This course can be selected from the list for Generic Interdisciplinary (Short Term) Theory course of 4 credits attached along with the syllabus.

Course Category	**Ability Enhancement Compulsory Course**
Course Code	**22MSC204**
Course Name	**Soft Skill Development**
Course Short Name	**SSD**
Total Lectures	**30**
Total Credits	**2**

Prerequisites :
- Basic knowledge of English.
- Basics knowledge of Soft Skills.

Course Objectives:
- To train and prepare the students to seek and find employment in various fields.
- To develop communicative competence in students.
- To expose the students to Various soft skills and human resources parameters

Mapping of Programme Outcome: PO1, PO2, PO5	**Mapping of Programme Specific Outcome:** PSO2, PSO5

Course Outcomes: The students will be :
CO1: Able to understand tenses, Voice, Helping Verbs and syllable stress.
CO2: Able to apply the Soft skills in his daily routine.
CO3: Able to communicate properly their ideas and concepts in English.

Units	Contents	Total Lectures (30)
I	Tenses, voice, Helping verbs, syllable Stress and pronunciation, writing skills (essay), Types of Sentences, Reported Speech, Essay (Current affairs, Pollution, Education).	04
	Mapping of COs: CO1	
II	Creativity improvement, Brainstorming, Communication Skills, Resume/CV writing, Business letter writing & Etiquettes, Business email writing & Etiquettes, Telephonic Conversations & Etiquettes, Video Conferencing, Listening Skills.	08
	Mapping of COs: CO1	
III	Assertiveness training, Goal Setting and Strategic planning, Neuro-linguistic Programming, Corporate Dressing, Body Language, Time Management, Negotiations Skills, Internal Motivation Generation.	08
	Mapping of COs: CO1, CO2, CO3	
IV	Leadership, Team Management, Group Dynamics, Group Discussion Techniques, Personal interview Techniques, Influencing Skills.	05
	Mapping of COs: CO1,CO2	
V	Presentation's and mock Interviews, Case. Report Writing: Structure, Parts & Drafting of Report Writing. Presentation: Preparation, Body, Appearance and Posture in Presentation. Mock Group Discussion.	05
	Mapping of COs: CO1,CO2,CO3	
	Text Books: 1. Dr. N.D.V. Prasada Rao, Wren And Martin -high School English Grammar	
	Reference Books: 1. Ian Tuhovsky, Communication skills training	

Course Category	**Core Course Practical**
Course Code	**22MSC205**
Course Name	**LAB4: DBMS**
Course Short Name	**Lab4**
Total Lectures	**30**
Total Credits	**2**
Practical List will be freshly prepared by subject teacher in every session. So the list is not mentioned.	

Course Category	**Generic Interdisciplinary Practical**
Course Code	**22MSC206**
Course Name	**LAB5: Practical from Generic Courses**
Course Short Name	**Lab5**
Total Lectures	**30**
Total Credits	**2**
NOTE: This course can be selected from the list for Generic Interdisciplinary Practical course of 2 credits attached along with the syllabus.	

Course Category	**Core Course Practical**
Course Code	**22MSC207**
Course Name	**Project -1**
Course Short Name	**Prj1**
Total Teaching Hours	**30**
Total Credits	**2**

Prerequisites

- Knowledge of Software engineering.
- Knowledge of Software Development Life Cycle.
- Knowledge of programming language and database.

Course Objectives

1. To understand SDLC, SE and software development processes.
2. To understand Software Testing.
3. To acquire live experience of how projects are developed in IT companies.

Mapping of Programme Outcome: PO1, PO2, PO3	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3, PSO4

Course Outcomes(CO):

CO1: Students will get hands-on experience of developing an application.

Synopsis format:

1. Abstract
2. Introduction
3. Objective of the Project
4. System Requirement Specification
    - Operating System
    - Frontend
    - Backend
5. Timeline of Project in week
6. Future scope
7. Conclusion
8. References

Project Report Format:

1. Title page
2. Certificate
3. Acknowledgement
4. Abstract
5. Index
6. Introduction
    i. Existing System
    ii. Background
    iii. Areas for Improvement
    iv. Proposed System
    v. Objectives
    vi. Applicability
7. System Analysis
    i. Identification of need
    ii. Requirement Gathering document (Review of Literature/ Interview/etc.)
    iii. Feasibility Study
    iv. Project Planning
    v. Project Scheduling (PERT / Gantt Chart)
    vi. User Requirement
    vii. Software Requirement
8. System Design
    i. System Flow
    ii. Module Flow
    iii. Navigation diagram/Data Flow Diagram
    iv. E-R Model
    v. Database Design, Procedural/Object Oriented Design
    vi. Menu Screens

vii. Input Design
viii. Output Design
ix. Test Cases (Unit Test Cases and System Test Cases)

9. Coding
   i. Complete Project Coding:
      a) Comments and Description of coding segments
      b) Code Efficiency
      c) Error Handling
      d) Parameters calling/passing
      e) Validation checks
10. Conclusion and Future Scope of the Project
11. Reference or Bibliography

Rules:

1. Topic should be a desktop or web based application.
2. Synopsis should be hand written.
3. Synopsis should be of 2-3 pages.
4. It will be the responsibility of guide and students to communicate about selection/ rejection/ preparation of the topic to each other.
5. Synopsis should be submitted within the time span specified by Project In-charge.
6. Student should submit the synopsis in the given format for approval by the department.
7. **Students should not bring any paid project otherwise it will be rejected. Students should do the project by themselves.**
8. Project Report should be in the given format only.
9. The Title page and Certificate format is given in following pages.
10. Student should bring two copies of project report for Examination. One hard bind copy for submission to Department Library. One spiral bind copy to retain by themselves.
11. In exam, the Project should execute flawless and students should be able to explain the working of project.

Project Title page:

Project Report
On
Project Topic Name

A Project Submitted in Partial Fulfillment of the Requirement for

Master of Science (Computer Science),

during the academic year [20___- 20___]

Guided By

Prof . _____

Submitted By

Mr./Ms. _____
(FYMSC- Sem II)

Shree H.V.P. MANDAL'S
P. G. Department of Computer Science & Technology
Degree College of Physical Education,
(A Multi Faculty Autonomous College),
Affiliated To S.G.B. Amravati University, Amravati.
Session 20___ - 20___

Project Certificate:

Shree H. V. P. MANDAL'S

P. G. Department of Computer Science & Technology,

Degree College of Physical Education,

(A Multi Faculty Autonomous College),

Affiliated To S. G. B. Amravati University, Amravati.

C E R T I F I C A T E

This is to certify that this project entitled

Project Topic Name

is submitted by

Mr./Ms._____

(FYMSC- Sem II)

A Project report Submitted
In Partial Fulfillment of the requirement for
Master of Science (Computer Science),
Degree College of Physical Education,
Affiliated To S.G.B. Amravati University, Amravati
during the academic year
[20___- 20___]

Project Guide	**Principal**
(Prof./Dr.)	(Prof./Dr.)
Project Incharge	**Course Coordinator**
(Prof./Dr.)	(Prof./Dr.)
Internal Examiner	**External Examiner**
(Prof./Dr.)	(Prof./Dr.)

Semester III

Course Category	**Core Course Theory**
Course Code	**22MSC301**
Course Name	**Data Science**
Course Short Name	**DS**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:

- Basic Knowledge about Data Science.
- Types of Data and databases.
- Basic knowledge of Statistics.

Course Objectives:

- Introductions to different types of data and introduction to science behind data
- Understand the Process of Data sciences
- Understand the classification method
- Understand the cluster methods
- Evaluate the method

Mapping of Programme Outcome: PO1, PO2, PO3, PO4	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3, PSO4

Course Outcomes: The students will be able to

CO1. Basic Knowledge about Data Science
CO2. Know about Data Science process and Data Exploration.
CO3. Data Classification, Regression Methods and Association Analysis
CO4. Data Clustering and evaluation method
CO5. Perform Case studies with Machine Learning and Deep Learning method.

Units	Contents	Total Lectures
I	**Introduction to Data Science:** What is data Science, Case for data science, Data sciences Diagram, Terminology, Data Sciences Classification, Introduction to Data Sciences algorithms **Data :** Structure and unstructured, Quantitative and Qualitative Data , Level of Data , Explore of Data **Mapping of COs:CO1**	12
II	**The data science process:** Prior Knowledge, Data Preparation, Model Design, Application, Knowledge. **Data Exploration:** Objective of Data Exploration, Data Sets, Descriptive Statistics, Data Visualization **Mapping of COs: CO2**	12
III	**Classification**: Introduction, Working and Implementation of Classification methods: Decision Tree, Rule Induction, k-Nearest Neighbors, Naïve Bayesian, Artificial Neural Network, Support Vector Machines, **Mapping of COs: CO3**	12
IV	**Regression Methods:** Introduction, Working and Implementation of Methods: Linear Regression, Logistic Regression **Association Analysis:** Introduction, Mining Association Rules, Apriori Algorithm, Frequent Pattern-Growth Algorithm **Mapping of COs: CO4**	12
V	**Clustering**: Introduction, Clustering to Describe the Data, Clustering for processing, Types of Clustering Techniques:- K-Means, DBscan clustering **Model Evaluation:** Introduction, Confusion Matrix, ROC and AUC, Lift Cures , Case studies using technologies, Deep Learning, Machine Learning **Mapping of COs: CO5, CO6**	12
	Text Books: 1. Vijay Kotu Bala Deshpande, Data Science Concepts and Practice, Second Edition, Morgan Kaufmann Publication. 2. Dr. B, Dwarkanath, R. M. Rani, Dr. D. Usha, Fundamental of data science, 1st Edition, Notion press Media Pvt. Ltd.	

	3. Data Science Fundamentals and Practical Approaches, Dr Gypsy Anand, Dr Rupam Sharma, BPB Publications.	
	Reference Books: 1. Saikt Dutt, Subramanian Chandramouli, Amit Kumar Da, Machine Learning, Pearson Pvt. Ltd. 2. https://www.kaggle.com (Web Reference)	

Course Category	**Core Course Theory**
Course Code	**22MSC302**
Course Name	**Python**
Course ShortName	**PYT**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:

- Basic Computer Skills.
- Understand the difference between front-end and back-end coding languages.
- Probability and Statistics.
- Installation of Python

Course Objectives:

- To be familiar with basic and advanced concepts of Python.
- To build basic programs using fundamental programming constructs
- To work with user input to create fun and interactive programs.
- To be familiar with python modules and libraries.
- Foster analytical and critical thinking abilities.

Mapping of Programme Outcome: PO1, PO2, PO3, PO4	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3, PSO4

Course Outcomes: After completing this course, The students will be able to:

CO1. Understand the structure, syntax, and semantics of the Python language.
CO2. Understand conditional and control structures, operators and functions in python
CO3. Know in-depth about core libraries in python
CO4. Handle different files using python & operations on them.
CO5. Develop your own applications using the Python programming language.

Units	Contents	Total Lectures
I	**Introduction to Python:** Python Overview: Python History, Python Features, Python applications, Python environment setup, Python installation. Python Basics: Running Python: Different ways to start python, Python IDE. Python Basic syntax, keywords, operators, comments in python, types of comments, write Python program, Data types, statements and expressions in python , Boolean expressions.	12
	Mapping of COs:CO1	
II	**Decision and Control Flow Instructions:** Decision Instructions**:** Python if statement, if else, Elif Statements Control Statements **:** For Loop , Range( ) Function , While Loop , Break Statement ,Pass Statement, Python strings, Numbers, arrays, strings in python, string Operations and functions, List, Tuple, List Vs. Tuple, List and Tuple operations and related methods, python sets, dictionaries, Console input /Output, Built-in functions, date and time functions, Built-in Math functions, User defined functions, function arguments, Recursion. Introduction to modules and packages.	12
	Mapping of COs: CO2	
III	**Core Libraries in Python:** NumPy library for array, Pandas Library for data processing, Matplotlib library for visualization, SciPy for statistics, algorithm libraries like scikit-learn and statsmodels, Seaborn library, NLTK library, OpenCV library, PyTorch framework, understanding the basics of data analytics: Importing and Exporting Data sets, Data Wrangling, dealing with missing values, categorical variables, statistical summary, using GroupBy.	12
	Mapping of COs: CO3	
IV	**File Handling in Python:** Opening a file, Reading and Writing a file, closing a file, File related methods, Renaming a file, Directory, File object attributes, file positions, Read CSV file, Write CSV file, Read excel file, write excel file **Illustrative Programs.**	12
	Mapping of COs: CO4	

V	**Python and Databases:** Python MySQL: Introduction to Python MySQL, connector, Connect MySQL database using python connector, Python MySQL: create database, create table, insert into table. Select query, use of where clause, order by clause, update query, commit and rollback operations in Python, drop table.	12
	Mapping of COs CO5	
	Text Books: 1. Let us Python by by Yashavant Kanetkar (Author), Aditya Kanetkar (Author) 5th Edition, BPB Publication. 2. Python for Beginners by A Kathiresan, K.Lakshamanan Yes Dee Publisher. 3. Data Analytics using Python by Bharti Motwani (Author) Wiley Publication	
	Reference Books: 1. Python: The Complete Reference by Martin. C Brown 4th edition , Publisher: McGraw Hill Education	

Course Category	**Discipline Specific Theory**
Course Code	**22MSC303**
Course Name	**Elective -3 : Advanced Database Systems (ADS)**
Course ShortName	**Ele-3**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:

- Basic knowledge of Database management system.
- Should have knowledge of one Programming Language (Java preferably).
- Practice of SQL queries and sub queries.
- Exposure to Linux Environment.

Course Objectives:

- To gain knowledge of distributed database.
- To get an overview of the data warehouse and data mining concepts.
- To know about unstructured database like NoSQL and provide hands on MongoDB.
- To get knowledge about Big Data and provide hands on Hadoop Eco System.
- To gain knowledge about various other advance databases.

Mapping of Programme Outcome: PO1, PO2, PO3, PO4	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3, PSO4

Course Outcomes: The students will be able to

CO1. Understand distributed database concepts.
CO2. Understand the details of data warehouse and data mining.
CO3. Understands NoSQL database concepts and use MongoDB.
CO4. Develop Big Data Solutions using Hadoop Eco System.
CO5. Understand the other advance databases.

Units	Contents	Total Lectures
I	**Distributed Database Concepts:** Introduction, Advantages, Fragmentation, Replication and Allocation techniques for Distributed Database Design, Overview of Concurrency Control and Recovery, Overview of Transaction Management, Stages in distributed Query Processing, Types of Distributed Database Systems, General Architecture for Pure Distributed Databases, Issues with distributed database systems. **Mapping of COs:CO1**	12
II	**Introduction to Data Warehouse:** Characteristics, Types of Data Warehouse Architecture, Data Marts, Data Warehousing Lifecycle, Data Warehouse Development. **Data Mining Overview:** Data Mining as part of Knowledge Discovery process, Goals, Types of Knowledge discovered during Data Mining. Short Introduction to Association, Classification and Clustering. Approaches to other Data mining Problems, Data Mining Applications, Commercial Data Mining Tools. **Mapping of COs: CO2**	12
III	**NoSQL database concepts:** Introduction to NOSQL systems, Benefits of NoSQL, comparison between SQL and NoSQL database systems. **NoSQL using MongoDB:** Introduction to MongoDB Shell, Running the MongoDB shell, MongoDB client, Basic operations with MongoDB shell, Basic Data Types, Arrays, Embedded Documents **Querying with MongoDB:** find() function, specifying which keys to return, query criteria, OR queries, Types specific querying **Mapping of COs: CO3**	12
IV	**Big Data Technologies based on MapReduce and Hadoop:** Introduction, Hadoop distributed file system, MapReduce runtime, Advantages of Hadoop/Mapreduce Technologies. **Apache Hive:** Hive Shell, Services, Metastore, Comparison with traditional Databases, HiveQL, Tables, Querying Data and User defined functions. **Mapping of COs: CO4**	12

V	**Hbase:** Introduction, Architecture, Shell Commands, Insert and retrieve data in Hbase, Applications. **Pig:** Introduction, Feature, Architecture, User defined functions, Data processing operators **Introduction other Databases:** Blockchain Database, Temporal Database, Spatial Database, Mobile Databases.	12
	Mapping of COs: CO4, CO5	
	Text Books: 1. Ramez Elmasri, Shamkant B. Navathe, Fundamentals of database systems, Pearson Education, Seventh Edition, 2017 2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concept, McGraw-Hill, Sixth edition, 2011 3. Kogent Learning Solutions Inc., Database Management Systems A fication, Dreamtech Press, 2014 4. Tom White, Hadoop: The Definitive Guide, O'reily Media, Third Editon, 2012.	
	Reference Books: 1. Seema Acharya, Subhasini Chellappan, Big Data Analytics, 2nd Edition, Wiley, 2015. 2. Raghu Ramkrishnan, Johannes Gehrke, Database Management System, McGraw-Hill, Third Edition, 2003 3. Jeffrey A. Hoffer, Marry B. Presscott, Fred R. McFadden, Modern Database Management, 6th edition, Pearson publication. 4. Tom White, Hadoop: The Definitive Guide, O'reily Media, Third Edition, 2012. 5. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007. 6. Jay Liebowitz, Big Data and Business Analytics, Auerbach Publications, CRC press, 2013.	

Course Category	**Discipline Specific Theory**
Course Code	**22MSC303**
Course Name	**Elective -3 : Image Processing (IP)**
Course ShortName	**Ele-3**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:
- Fundamental knowledge of mathematics, and computer graphics.

Course Objectives:
- To learn the fundamental concepts of Digital Image Processing.
- To study basic image processing operations.
- To understand image analysis algorithms.
- To expose students to current applications in the field of digital image processing.

Mapping of Programme Outcome: PO1, PO2, PO3, PO4	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3, PSO4

Course Outcomes: The students will be able to

CO1. Understand various steps involved in image processing.
CO2. Understand how to Enhance image
CO3. Understand basic of image compression.
CO4. Understand the concept of segmentation and restoration.
CO5. Apply image processing algorithms for practical object recognition applications.

Units	Contents	Total Lectures
I	**Fundamentals of Image Processing** Steps in image processing, Human visual system, Sampling & quantization, Representing digital images, Spatial & gray-level resolution, Image file formats, Basic relationships between pixels, Basic operations on images-image addition, subtraction, logical operations, scaling, translation, rotation. Image Histogram. Color fundamentals & models – RGB, HSI YIQ. **Mapping of COs:CO1**	12
II	**Image Enhancement** Spatial domain enhancement: Point Operations-Log transformation, Power-law transformation, Piecewise linear transformations, Histogram equalization. Filtering operations- Image smoothing, Image sharpening. Frequency domain enhancement: 2D DFT, Smoothing and Sharpening in frequency domain. Homomorphic filtering. **Mapping of COs: CO2**	12
III	**Image Compression** Types of redundancy, Fidelity criteria, Lossless compression – Runlength coding, Huffman coding, Bit-plane coding, Arithmetic coding. Introduction to DCT, Wavelet transform. Lossy compression – DCT based compression, Wavelet based compression. Image and Video Compression Standards – JPEG, MPEG. **Mapping of COs: CO3**	12
IV	**Image Restoration** Introduction, Degradation model, algebraic approach to restoration, Unconstrained restoration, Constrained restoration Segmentation: Introduction to image segmentation: point, line edge detection, Thresholding, Regions Based segmentation, Edge linking and boundary detection **Mapping of COs: CO4**	12
V	**Representation and Description** Representation – Chain codes, Polygonal approximation, Signatures. Boundary Descriptors – Shape numbers, Fourier Descriptors, Statistical moments. Regional Descriptors – Topological, Texture. Principal Components for Description. Object Recognition – Feature extraction, Patterns and Pattern Classes, Representation of Pattern classes, Types of classification algorithms. **Mapping of COs: CO5**	12

	Text Books: 1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, Third Edition, Pearson Education 2. S. Sridhar, Digital Image Processing, Oxford University Press.	
	Reference Books: 1. Rafael C. Gonzalez, Richard E. Woods, and Steven L. Eddins, Digital Image Processing Using MATLAB, Second Edition, Tata McGraw Hill Publication 2. S Jayaraman, S Esakkirajan, T Veerakumar, Digital Image Processing, Tata McGraw Hill Publication	

Course Category	**Discipline Specific Theory**
Course Code	**22MSC303**
Course Name	**Elective -3 : Mobile Computing (MC)**
Course ShortName	**Ele-3**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:

- Basic knowledge of Networking, Wireless networking, Network communication protocols.

Course Objectives:

- To understand the basic concepts of mobile computing, Architecture, Mobile Communication.
- To learn the basics of MAC protocol and Mobile IP Network Layer.
- To be familiar with the Mobile Transport Layer and Ad-Hoc networks.
- To know the basis of Wireless Sensor Network.
- To gain knowledge about different mobile operating system, mobile platforms and application development.

Mapping of Programme Outcome: PO1, PO2, PO3, PO4	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3, PSO4

Course Outcomes: The students will be able to

CO1. Understand the Architecture of Mobile computing and Mobile communication concepts.
CO2. Describe the functionality of Mobile IP and MAC Protocols.
CO3. Demonstrate the Ad-hoc networks and Transport Layer concepts and its routing protocols.
CO4. Would be knowledgeable about the principles of wireless sensor networks.
CO5. Make use of mobile operating systems in developing mobile applications and Mobile commerce.

Units	Contents	Total Lectures
I	**Introduction:** Mobile Computing, Mobile Computing Architecture, Mobile Computing vs Wireless Networking, Mobile Computing Applications, Characteristics of Mobile Computing, Structure of Mobile Computing Application, Mobile System Network. **Introduction of Mobile Communication:** Cellular Mobile Communication, GSM, GPRS, UMTS.	10
	Mapping of COs: CO1	
II	**MAC Protocol:** Wireless MAC Protocols, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Cognitive Radio ad-hoc Network, Architecture of CRN. **Mobile IP Network Layer:** IP and Mobile IP Network Layer, Packet Delivery and Handover Management, Location Management, Route Optimization.	12
	Mapping of COs: CO2	
III	**Mobile Transport Layer:** Terminology of TCP/IP, Architecture of TCP/IP, Application Layer protocol of TCP. **Mobile Ad-hoc Network:** Basic Concept, Characteristic of Mobile Ad-hoc Network, Application of MANET, MANET Routing Protocol, Vehicular Ad-hoc Network	12
	Mapping of COs: CO3	
IV	**Wireless Sensor Network**: Architecture of Sensor Node, Challenges in Design of an WSN, Characteristics of WSN, **WSN Routing Protocol**: Directed Diffusion, Sequential Assignment Routing, Lower Energy Adaptive Clustering Hierarchy, Power efficient Gathering in Sensor Information system, Geographic and Energy aware Routing, Geographic Adaptive Fidelity, Clustered wireless sensor Network.	14
	Mapping of COs: CO4	
V	**Operating System and Application Development platform for Mobile:** Basic Concepts iOS, Android OS **Application development with Android**: Introduction, Versions, Features, Architecture, Android Studio **ios application development:** Languages (Objective C & Swift) Evolution of Swift, Introduction to Xcode for application development, Functional Programming overview with respect to OOPs.	12

	Mapping of COs: CO5	
	Text Books: 1. Prashant Kumar Pattnaik, Rajib Mall, Fundamentals of Mobile Computing, 2nd Edition, PHI 2. Raj Kamal, Mobile Computing, Oxford Higher Education 3. Wei-Meng Lee," Beginning Android 4 Application development", Wrox publication.	
	Reference Books: 1. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, Mobile Computing Technology, Application and Service Creation, 2nd Edition, MG Graw Hill. 2. David Taniar, Mobile Computing: Concepts, Methodologies, Tools, and Applications, InformatIon Science reference, Hershey, New York 3. Raksha Shende, Mobile Computing for Beginners, Shroff Publishers and Distributors 4. https://www.apple.com/za/education/docs/xcode-guide.pdf (Web Reference)	

Course Category	**Skill Enhancement Course**
Course Code	**22MSC304**
Course Name	**Research Methodology and Report Writing**
Course ShortName	**RMRW**
Total Lectures	**30**
Total Credits	**2**

Prerequisites:
Fundamental knowledge of research, and data analysis.

Course Objectives:
1. To understand the meaning of research, distinguish between different kinds of researches, understand the importance, need and significance of the research.
2. To understand the meaning of sampling, sampling design, characteristics of Sampling.
3. To understand the editing of data, convert raw data into useful one.
4. To understand Meanings and Objective of Research Report.
5. To understand types and steps involved in writing report

Mapping of Programme Outcome:	**Mapping of Programme Specific Outcome:**

Course Outcomes: The students will be able to
CO1. Meaning of research, various kind of researches, need and significance of research.
CO2. Meaning of sampling and its characteristics.
CO3. Perform data analysis.
CO4. Learn meanings and objective of research report.
CO5. Write research papers and reports and making presentation.

Units	Contents	Total Lectures
I	RESEARCH: MEANING, TYPES, SCOPE AND SIGNIFICANCE : Introduction Objectives Meaning of Research Definition of Research Characteristics of Research, Types of Research, Methodology of Research, Formulation of Research Problem, Research Design, Meaning of Research Design , Characteristics of Research Design, Steps in Research Design, Concept of Hypotheses. **Mapping of COs:** CO1	6
II	SAMPLING DESIGN AND DATA COLLECTION Meaning of sampling, Sampling Design, Characteristics of Sampling Design, Types of sample design, Data in research, Importance of accuracy in Data Collection, Types of data, Methods of collecting primary data, Sources of secondary data. **Mapping of COs:** CO2	6
III	PROCESSING AND ANALYSING DATA Defining data processing and analysis, Editing, Coding, Classification and tabulation, Presentation of Data, Interpretation of Data meaning, Methods of data analysis Introduction of different types of Software for Statistical analysis: SPSS, Matlab and R. **Mapping of COs:** CO3	8
IV	REPORT WRITING Research Report :Meanings and Objective of Research Report, Concepts Of Case Study, Characteristics of Good Research Report Writing, Objective of Research Report. **Mapping of COs:** CO4	5
V	**TYPES OF RESEARCH REPORT AND PRESENTATION** Types of Research Report, Concepts of Appendices, Review of Literature, Bibliography and References, Recommendation, Hypothesis Testing. Making presentation, use of visual aids, importance of effective communications. **Mapping of COs** :CO5	5
	Text Books: 1. Kumar Ranjit, Research Methodology: A Step by Step Guide for Beginners, Sage Publication, 2014. 2. Kothari C.R., Research Methodology, New Age International, 2011. 3. Kothari, C.R., Research Methodology-Methods and Techniques, New Delhi, Wiley Eastern Limited. 1985	

	Reference Books: 1. Best and Kahn, Research Methodology, PHI Limited. 2. Kothari, C.R. Research Methodology (Methods and Techniques), New Age Publisher. 3. Kerlinger, Foundation of Research. 4. Fundamentals of modern statistical methods by Rand R.wilcox. 5. Design of Experience: Statistical Principles of Research Design and Analysis, by Robert O. Kuehl Brooks/cole.	

Course Category	**Core Course Practical**
Course Code	**22MSC305**
Course Name	**LAB6: DS**
Course Short Name	**Lab6**
Total Lectures	**30**
Total Credits	**2**
Practical List will be freshly prepared by subject teacher in every session. So the list is not mentioned.	

Course Category	**Core Course Practical**
Course Code	**22MSC306**
Course Name	**LAB7: Python**
Course Short Name	**Lab7**
Total Lectures	**30**
Total Credits	**2**
Practical List will be freshly prepared by subject teacher in every session. So the list is not mentioned.	

Course Category	**Discipline Specific Practical**
Course Code	**22MSC307**
Course Name	**LAB8: Practical based on Elective 3**
Course Short Name	**Lab8**
Total Lectures	**30**
Total Credits	**2**
Practical List will be freshly prepared by subject teacher in every session. So the list is not mentioned.	

Course Category	**Discipline Specific Practical**
Course Code	**22MSC308**
Course Name	**Seminar-2 (Based on Research Topic)**
Course Short Name	**SEM2**
Total Teaching Hours	**15**
Total Credits	**1**

Prerequisites

Knowledge of recent research trends in Computer Science.
Knowledge of Word, Power Point or other presentation tools.

Course Objectives:

- To develop interest in research topics by self-learning.
- To study and review the research papers, magazines, etc.
- To be able to formulate research topic on which research project will be carried out in Semester IV.
- To develop communication, interpersonal and presenting skills.

Mapping of Programme Outcome: PO1, PO2, PO4	**Mapping of Programme Specific Outcome:** PSO2, PSO4, PSO5, PSO6

Course Outcomes (CO): Students will be

CO1. Able to learn new technologies by themselves.
CO2. Attain knowledge about various cutting edge technologies and ongoing work of various researchers.
CO3. Able to do research, formulate problem definition and propose research methodology.
CO4. Able to do presentation skill to showcase their research work.

Synopsis format:

1. Abstract
2. Introduction
3. Literature survey
4. Problem Definition
5. Conclusion
6. References

Seminar Report Format:

1. Title page
2. Certificate
3. Acknowledgement
4. Index
5. Abstract
6. Introduction
7. Literature survey
8. Research issues
9. Motivation
10. Problem statement
11. Aims
12. Objectives
13. Scope
14. Existing methodologies and analysis
15. Proposed approach of methodology
16. Research plan
17. Conclusion
18. References

Rules:

1. Topic should be research oriented.
2. The topic may be out of the scope of syllabus.
3. Synopsis should be handwritten.
4. Synopsis should be minimum of 3-4 pages, it should cover the summary of whole topic in brief.
5. It will be responsibility of guide and students to communicate about selection/ rejection/ preparation of the topic to each other.
6. Synopsis should be submitted within the time span specified by Seminar In-charge.
7. Student should submit the synopsis in the given format for approval by the department.
8. The Title page and certificate format is given in next page.

9. Seminar report should be minimum of 20 pages.
10. Seminar report should be duly signed by seminar guide.
11. Student should bring two copies of seminar report for Examination. One hard binded copy should be submitted to Department's Library. One spiral binded copy should be kept near the student.
12. Minimum10-12 slides presentation should be prepared for seminar.
13. The Research project (22MSC407: Project-2) of Semester IV will be based on this seminar topic.
14. The Internal Evaluation of Seminar will be done as below:
    i. If student publishes research paper in any national/international journal, 100% internal marks will be awarded.
    ii. If student presents paper in Conference then 80% internal marks will be awarded and remaining 20% will be based on report and presentation.
    iii. If student doesn't publish paper or present paper then the internal evaluation will be done on the basis of report and presentation.

Seminar Title page:

Seminar Report
On
Seminar Topic Name

A Seminar Submitted in Partial Fulfillment of the Requirement for

Master of Science (Computer Science),

during the academic year [20___- 20___]

Guided By

Prof . _____

Submitted By

Mr./Ms. _____
(SYMSC- Sem III)

Shree H.V.P. MANDAL'S
P. G. Department of Computer Science & Technology
Degree College of Physical Education,
(A Multi Faculty Autonomous College),
Affiliated To S.G.B. Amravati University, Amravati.
Session 20___ - 20___

Seminar Certificate:

Shree H. V. P. MANDAL'S

P. G. Department of Computer Science & Technology,

Degree College of Physical Education,

(A Multi Faculty Autonomous College),

Affiliated To S. G. B. Amravati University, Amravati.

CERTIFICATE

This is to certify that this seminar entitled

Seminar Topic Name

Is submitted by

Mr./Ms._____

(SYMSC- Sem III)

A Seminar Report Submitted
In Partial Fulfillment of the requirement for
Master of Science (Computer Science),
Degree College of Physical Education,
Affiliated To S.G.B. Amravati University, Amravati
during the academic year
[20___-20___]

Seminar Guide	**Seminar Incharge**
(Prof./Dr.)	(Prof./Dr.)
Internal Examiner	**External Examiner**
(Prof./Dr.)	(Prof./Dr.)
Course Coordinator	
(Prof./Dr.)	

Semester IV

Course Category	**Core Course Theory**
Course Code	**22MSC401**
Course Name	**Artificial Intelligence and Machine Learning**
Course Short Name	**AIML**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:

- Students should aware about programming concept.
- Basic knowledge about probability theory and linear Algebra.
- Basic Knowledge of system design and Architecture
- Basic Knowledge about algorithm

Course Objectives:

- To aware learner the concept of Artificial Intelligence.
- To be able to differentiate between Human Intelligence and Artificial Intelligence.
- Understand the Knowledge and Knowledge representation and storage.
- Able to understand Machine Learning Concept and Algorithm.

Mapping of Programme Outcome: PO1, PO2, PO3, PO4	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3, PSO4

Course Outcomes: The students will be able to

CO7. Should understand the concept of Artificial Intelligence.
CO8. Should understand the concept of Machine Learning.
CO9. Should understand the concept Machine Learning.
CO10. Should understand the concept of Machine Learning Algorithms.
CO5. Understand the Applications of Artificial Intelligence in of Society.
CO6. Apply the Knowledge of ML and Neural Network in Research and Technology.

Units	Contents	Total Lectures
I	**Overview of AI**: Importance of AI, AI and related fields, Application of AI. **Knowledge:** Introduction, Definition and importance of knowledge, representation of knowledge, Knowledge organization, knowledge manipulation, Acquisition of knowledge. **Dealing with Inconsistencies and Uncertainties**: TMS, default reasoning, model & temporal logics, non monotonic reasoning system, circumscription. **Expert system** Architecture: Rule based system architecture, non production system architecture & validation, Expert System Architecture, Expert System Shells.	12
	Mapping of COs: CO1	
II	**Knowledge Representation:** Logic, Prepositional, predicate, syntax & semantics, inference rule, principle of resolution, representation using rules, procedural Vs declarative representation, semantic network, frames, scripts, conceptual dependency. **Heuristic Search Technique:** Hill Climbing, Branch and Bound Technique, Best First Search and A* algorithm. Learning: Definitions, types of learning, general learning model, Classification of learning strategies.	12
	Mapping of COs: CO2	
III	**Machine learning :** Introduction to ML, Types of ML, Statistical Decision Theory, Regression, Principal Components regression, Linear discriminant Analysis, Support vector machine, Evaluation and Measures, Learning Theory, Introduction to Reinforcement Learning, RL framework and TD Learning, Solution Methods and Applications.	12
	Mapping of COs: CO3	
IV	**Machine Learning:** Most common ML algorithms, pre-processing data, techniques for data pre-processing, labeling data, building classifier in python, logistic regression, decision tree classifier, clustering, algorithms for clustering the data, finding nearest neighbors, k nearest neighbors classifier, NLTK, tokenization, stemming, Lemmatization.	12
	Mapping of COs: CO4, CO5	
V	**Neural Networks :** Introduction, Perception Learning, Training and Validation, **Estimation :** MLE, MAP, Bayesian Estimation. Decision Tree, Regression Tree,	12

	Bootstapping and Cross Validation, ROS curve, Random Forest, Multiclass Classification, Naïve Bayes, Bayesian Network, Partial Clustering, Hierarchical Clustering, Birch and CURE algorithm, Density Based Clustering, Gaussian Mixture Model, Expectation Maximization. **Mapping of COs:** CO5, CO6	
	Text Books: 1. Artificial Intelligence Basic By Tom Taulli Apress Publication 2. Pattern Recognition and Machine Learning By Christopher Bishop	
	Reference Books: 1. Artificial Intelligence For Dummies By John Paul Mueller A Wiley Brand. 2. The Elements of Statistical Learning By Trevor Hastie, Robert Tibshirani, Jerom H. Friedman.	

Course Category	**Core Course Theory**
Course Code	**22MSC402**
Course Name	**Web Technology**
Course Short Name	**WT**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:
- Knowledge of HTML.
- Fundamentals of designing & hosting the websites.

Course Objectives:
- Web Site Designing and Development using Open Source Technologies.
- To learn the scripting languages.
- To learn the creation of dynamic websites using Open source databases

Mapping of Programme Outcome: PO1, PO2, PO3	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3

Course Outcomes: The students will be able to

CO1. Ability to configure text, color, and page layout with Cascading Style Sheets.

CO2. Able to use of images & multimedia on web pages.

CO3. Skill of developing the server and client side programs.

CO4. Skill & knowledge of Web page design using HTML5 and PHP.

Units	Contents	Total Lectures
I	**Web basics**, Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting, World Wide Web Consortium (W3C). **HTML5:** Features, Editing, HTML5 structure, Headings, Linking, Images, Lists, Tables, Forms. HTML5 New Elements: Form input type element: colors, date, time, e-mail addresses, numbers, range, search, telephone numbers, URLs, Data list Elements. Page-Structure Elements: header, nav, figure, fig caption, article, summary, details, section, aside, meter, footer. Audio & Video elements.	12
	Mapping of COs: CO1	
II	**CSS:** Introduction, basic properties: text, list, border font, Selectors: universal, type, id, class. CSS types: Inline, Internal and External Style Sheets. **Introduction to PHP**: PHP and open source. Overview of PHP: Features, PHP HTML embedding tags and syntax, simple script examples, PHP variables, operators, data types.	12
	Mapping of COs: CO1, CO2	
III	**Control Statement in PHP:** If Else, Switch Statements. **Looping Statements:** For, While, Do-While, Break statements. **PHP Array:** Array Types: Indexed Array, Associative Array, Multidimensional Array. **PHP Functions:** Introduction to functions, declaring functions, function scope, passing arguments to function, using include files and require statements, mail functions.	12
	Mapping of COs: CO3, CO4	
IV	**Object oriented concepts:** Introduction, basic class definition, visibility, constructors and destructors, static keywords, class constants, inheritance. **File handling in PHP:** Open, Append, Write, Read, Delete. PHP: String and String functions, PHP Maths Functions.	12
	Mapping of COs: CO3, CO4	
V	**Processing of HTML and PHP:** Adding PHP to HTML or processing HTML form using GET, POST, SESSION, COOKIE variables. PHP File uploads and PHP Downloads File, Exception and Error handling. **Database operations:** Operations with PHP, connecting to Mysql with PHP, selecting a database, building and sending query, SELECT, INSERT, DELETE, UPDATE. PHP Mysql functions: mysqli_affected_rows(), mysqli connect(), mysqli close(), mysqli_query(), mysqli_select_db(), mysqli_num_rows() , mysqli_num_fields()	12
	Mapping of COs: CO3, CO4	
	Text Books: 1. Beginning PHP6, Apache and MySql Web Development, By Timothy Boronczyk, Elizabeth Naramore, Jason Gerner, Wrox Publication.	

Reference Books:

1. PHP6 & MySql Bible, By Steve Suehring, Tim Converse & Joyce Park, Wiley India Publication
2. Professional PHP5, By Ed Lecky-Thompson, Deow Eide-Goodman, Steven D. Nowicki, Wrox Publication.
3. Mastering PHP, WebTech Solutions Inc.
4. LAMP Linux, Apache, MySql and PHP Web Development, By Jason Gerner, Elizabeth Naramore, Morgan L. Owens, Wrox Publication

Course Category	**Discipline Specific Theory**
Course Code	**22MSC403**
Course Name	**Elective-4 : Cloud Computing (CC)**
Course Short Name	**Ele-4**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:

- Knowledge of Operating Systems and Database.
- Knowledge of Virtualization and Networking.

Course Objectives:

- To study cloud computing concepts and models.
- To study the technologies required for Cloud Computing.
- To Study virtualization and its significance in cloud computing.
- To study cloud computing Architecture and models.
- To study the applications that uses cloud computing.

Mapping of Programme Outcome: PO1, PO2, PO3, PO4	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3, PO4

Course Outcomes: The students will be able to

CO1. Students will get introduce concepts of Cloud Computing.
CO2. Students would be familiar with technologies required for Cloud Computing.
CO3. Students would be familiar with Virtualization and Cloud Computing.
CO4. Students can understand Services Model and Types of cloud.
CO5. Understanding significance of the Cloud Computing in today's Market and its applications
CO6. Get introduced with Modern concept in cloud computing

Units	Contents	Total Lectures
I	**Introduction :**The vision of cloud computing ,Defining a cloud, The cloud computing reference model, Characteristics and benefits, Historical developments: Distributed systems, Virtualization, Web 2.0, Service-oriented computing, Utility-oriented computing	12
	Mapping of Cos: CO1	
II	**Cloud Computing Technologies:** Parallel vs. distributed computing, Elements of parallel computing: Hardware architectures for parallel processing, Approaches to parallel programming, **Distributed computing:** General concepts and definitions, Components of a distributed system,	12
	Mapping of COs: CO2	
III	Virtualization: Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology example: VMware: full virtualization.	12
	Mapping of COs: CO3	
IV	**Cloud Computing Architecture:** The cloud reference model, Architecture, Infrastructure- and hardware-as-a-service, Platform as a service, Software as a service. **Types of clouds:** Public clouds, Private clouds, Hybrid clouds, Community clouds, **Economics of the cloud , Open challenges**	12
	Mapping of COs: CO4	
V	**Cloud Platforms in Industry:** Amazon web services, Google App Engine, Microsoft Azure **Cloud Applications:** Scientific applications, Business and consumer applications, Social networking, Media applications. **Advanced Topics in Cloud Computing:** Energy efficiency in clouds, Market-based management of clouds, Federated clouds/Inter Cloud, Third-party cloud services	12
	Mapping of COs: CO5, CO6	
	Text Books: 1. Rajkumar Buyya, Mastering Cloud computing, MK publications 2. Rajkumar Buyya, Cloud computing principles and paradigms, John Wiley & Sons, Inc., Hoboken, New Jersey	
	Reference Books: 1. Gautam Shroff, Enterprise Cloud Computing, Cambridge 2. Greg Schulz, Cloud and Virtual Data Storage Networking	

Course Category	**Discipline Specific Theory**
Course Code	**22MSC403**
Course Name	**Elective-4 : Computer Vision (CV)**
Course Short Name	**Ele-4**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:

- Basic Understanding of Image Processing
- Basic Understanding of Programming

Course Objectives:

- To understand the Basics of Computer Vision and Image Formation
- To understand the concept of image processing, Feature detection and matching
- Perform shape analysis and extract features form Images and do analysis of Images
- Get an exposure to advanced concepts, including state of the art deep learning architectures, in all aspects of computer vision.
- Acquiring skills to develop computer vision based applications.

Mapping of Programme Outcome: PO1, PO2, PO3, PO4	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3, PO4

Course Outcomes: The students will be able to

CO1. Know the Fundamentals of Image Formation
CO2. Know about Image processing
CO3. Know about Segmentation of Images
CO4. Understand the Dense motion estimation, Image stitching and Computational photography
CO5. Know about Image-based rendering and recognition

Units	Contents	Total Lectures
I	**Introduction to computer Vision**: History, Applications of computer vision. Image Formation: Geometric primitives, 2D transformations, 3D transformations, 3D rotations. 3D to 2D projections, photo metric image formation: Lighting Reflectance and shading, Optics. The digital camera: Sampling and aliasing, Color, Compression	12
	Mapping of Cos: CO1	
II	**Image Processing:** Point operators, Linear filtering, More neighborhood operators, Fourier transforms, Pyramids and wavelets, Geometric transformations, Global optimization, **Feature detection and matching**: Points and patches, Edges, Lines.	12
	Mapping of Cos: CO2	
III	**Segmentation:** Active contours, Split and merge, Mean shift and mode finding, Normalized cuts, Graph cuts and energy-based methods. **Feature-based alignment**: 2D and 3D feature-based alignment, Pose estimation, Geometric intrinsic calibration. **Structure from motion :**Triangulation, Two-frame structure from motion, Factorization, Bundle adjustment, Constrained structure and motion	12
	Mapping of Cos: CO3	
IV	**Dense motion estimation:** Transnational alignment, Parametric motion, Spline-based motion, Optical flow, Layered motion. **Image stitching:** Motion models, Global alignment, Compositing. **Computational photography:** Photometric calibration, High dynamic range imaging, Super-resolution and blur removal, Image matting and compositing.	12
	Mapping of Cos: CO4	
V	**Stereo correspondence, 3D reconstruction, Image-based rendering, Recognition:** Object detection • Face recognition • Instance recognition • Category recognition • Context and scene understanding • Recognition databases and test sets	12
	Mapping of Cos: CO5	
	Text Books: 1. Richard Szeliski, Computer Vision: Algorithms and Applications (CVAA), Springer, 2010 2. D. Forsyth and J. Ponce, Computer Vision - A modern approach, Prentice Hall	

Reference Books:

1. E. R. Davies, Computer & Machine Vision, Academic Press, 2012
2. Dana H. Ballard, Christopher M. Brown, Computer Vision, 1st Edition, Prentice Hall, 1982 (ISBN-978-0131653160)

Course Category	**Discipline Specific Theory**
Course Code	**22MSC403**
Course Name	**Elective–4 : Cyber & Information Security (CIS)**
Course Short Name	**Ele-4**
Total Lectures	**60**
Total Credits	**4**

Prerequisites:

- Students should be familiar with Security aspects of Computing.
- Basic knowledge of system Architecture, Networking is required

Course Objectives:

- To make the student understand the concept of Security, Vulnerabilities, virus, Malware, & Hacking.
- To be able to protect their system from any security treats..
- To learn about Cryptography.
- To generate and handle the Public and Private Key.

Mapping of Programme Outcome: PO2, PO3	**Mapping of Programme Specific Outcome:** PSO2, PSO3

Course Outcomes (CO):

CO1. Today Society is facing the security problem in computing, so user should familiar with it.
CO2. Should be familiar with web attack and tool to safeguard.
CO3. User should able to take preventive measures against the security treats.
CO4. Should able to identify Network security attack and safeguard the system from it.
CO5. Should able to know the all types of threats in information security, cryptography.
CO6. Should able to generate public & Private key and communicate key among the user.
CO7. Should familiar with Hacking system and prevent them.

Units	Contents	Total Lectures
I	**Introduction to Computer Security:** Computer Security, Threats, Harm, Vulnerabilities, Control, Authentication, Access Control, and Cryptography. **Web attack :** Browser attack, targeting User, E-mail Attack, Scanning for Web vulnerability tool Nikto, W3af, HTTP utilities Curl, Open SSL and stunnel, Application Inspection tools; Zed attack, proxy SQL map, DVWA, webgoat. **Password cracking** & Brute-force tool, John the Ripper, LohtCrack, Pwdump, HTC hydra**.**	12
	Mapping of Course Outcomes: CO1, CO2	
II	**Network Vulnerabilities:** Overview of vulnerability Scanning**,** Open port/service identification, Version check, Traffic prob, Vulnerability prob, openVAS, metasploit. Network Sniffer & injection tools. **Firewall and Packet Filers,** Keylogger and spyware, virus and Worms, Trojan and Backdoor, stegnopgraphy, DOS and DDOS attack, SQL injection, Buffer overflow. **Wireless Network Security:** security issues in wireless network, Securing Wireless network. Bole device security.	12
	Mapping of Course Outcomes: CO2, CO3, CO4	
III	**Information Security :** **Cryptography:** basic concepts, encryption, decryption and types. **Codes and Ciphers** – Some Classical systems Stream ciphers, Block ciphers. Design considerations for stream ciphers, Cryptanalysis of stream ciphers, and **Conventional Cryptographic Techniques:** Combined encryption and encoding. **Block Ciphers** – DES and variant, modes of use of DES	12
	Mapping of CO: CO5	
IV	**Public key Cryptosystem and Asymmetric Cryptographic Techniques:** Public key cryptography, characteristics, Applications, and schemes RSA: Use, working, Key generation, and distribution Key distribution in asymmetric encryption, Diffie Hellman Key Exchange, set up , examples **Message Authentication:** Digital Signatures: Properties requirements, standards, verification process **Public Key distribution:** Digital Certificates, Certificate Authority, X.509 Authentication service, certificate format, certificate renewal, revocation, delta	12

	revocation	
	Mapping of CO : CO5	
V	**Hacking techniques:** Overview of Hacking, Footprint and Reconnaissance, System Hacking, Sniffers, Trozans, Backdoor, Viruses and Worms, Session Hijacking, Social Engineering, Denial of Service, Web application Hacking, SQL injection Hacking, Wireless network IDS, Firewall and Honeypots.	12
	Mapping of CO: CO6, CO7	
	Books: 1. W. Stallings, Network Security Essentials (Applications and Standards), 7th ed., Pearson Education.	
	References: 1. W. Stallings, Cryptography and network Security, 5rd ed., Pearson Education. 2. R. Bragg, M. Rhodes, Network Security: The complete reference, 3rd ed., TMH 3. Buchmann, Introduction to Cryptography, Springer.	

Course Category	**Skill Enhancement Course**
Course Code	**22MSC404**
Course Name	**Online Course**
Course Short Name	**OC**
Total Lectures	**30**
Total Credits	**2**
Note: 1. Online Course can be opted from online learning platforms like Swayam/ MOOC/ NPTEL/ COURSERA. **2. These courses should be based on Computer Science and student can complete it in Semester III or Semester IV. But the credits will be considered in Semester IV on producing the examination certificate.** **3. If any student is unable to give the exam then he/she shall have to present the seminar report and undergo a seminar examination in which he/she will have to present the knowledge gained from the online course attended.**	

Course Category	**Core Course Practical**
Course Code	**22MSC405**
Course Name	**LAB9: AIML and WT**
Course Short Name	**Lab9**
Total Lectures	**30**
Total Credits	**2**
Practical List will be freshly prepared by subject teacher in every session. So the list is not mentioned.	

Course Category	**Discipline Specific Practical**
Course Code	**22MSC406**
Course Name	**LAB10: Practical based on Elective-4**
Course Short Name	**Lab10**
Total Lectures	**30**
Total Credits	**2**
Practical List will be freshly prepared by subject teacher in every session. So the list is not mentioned.	

Course Category	**Core Course Practical**
Course Code	**22MSC407**
Course Name	**Project -2 (Research Project)**
Course Short Name	**Prj2**
Total Teaching Hours	**30**
Total Credits	**2**

Prerequisites

- Knowledge of Software engineering.
- Knowledge of programming language and database.
- Knowledge of Research Methodology.
- Knowledge of Research Tools.

Course Objectives

1. To understand research project development process.
2. To motivate students to undertake research projects and pursue innovations.
3. To create research aptitude in students so that they can think of new research ideas and participate in innovative startup or project competitions.

Mapping of Programme Outcome: PO1, PO2, PO3, PO4	**Mapping of Programme Specific Outcome:** PSO1, PSO2, PSO3, PSO4

Course Outcomes(CO): Students will be able to

CO1: Develop new ideas and innovations.
CO2: Develop new solutions for the innovative problems.
CO3: Use the Research tools effectively.

Synopsis format:

1. Abstract
2. Introduction
3. Literature Review
4. Problem Definition
5. Objective of the Research
6. Existing and Proposed Methodology
7. Timeline of Project in week
8. Conclusion
9. References

Project Report Format:

1. Title page
2. Certificate
3. Acknowledgement
4. Abstract
5. Index
6. Introduction
7. Literature Review
8. Methodology
9. Implementation
10. Result and Discussion
11. Implications
12. Conclusion and Future Scope
13. Reference or Bibliography

Rules:

1. Project-2 will be a research project which shall be developed on topic identified in (22MSC308) Seminar-2.
2. It will be the responsibility of guide and students to report the progress of the research to the In-charge.
3. Synopsis should be submitted within the time span specified by Project In-charge.
4. Student should submit the synopsis in the given format for approval by the departmental research committee.
5. **Students should not bring any paid project also avoid plagiarism otherwise it will be rejected. Students should do the project by themselves.**
6. Project Report should be in the given format only.
7. The Title page and Certificate format is given in following pages.

8. Student should bring two copies of project report for Examination. One hard bind copy for submission to Department Library. One spiral bind copy to retain by themselves.
9. The Internal Evaluation will be done as below:
   i.) If student publishes 2 research papers (Survey paper and Result oriented paper) in any national/international journal, 100% internal marks will be awarded.
   ii) If student presents 2 research papers (Survey paper and Result oriented paper) in Conference then 80% internal marks will be awarded and remaining 20% will be based on report and presentation.
   iii) If student doesn't publish paper or present paper then the internal evaluation will be done on the basis of report and presentation.

Project Title page:

Project Report
On
Project Topic Name

A Project Submitted in Partial Fulfillment of the Requirement for

Master of Science (Computer Science),

during the academic year [20___- 20___]

Guided By

Prof . _____

Submitted By

Mr./Ms. _____
(SYMSC- Sem IV)

Shree H.V.P. MANDAL'S
P. G. Department of Computer Science & Technology
Degree College of Physical Education,
(A Multi Faculty Autonomous College),
Affiliated To S.G.B. Amravati University, Amravati.
Session 20___ - 20___

Project Certificate:

Shree H. V. P. MANDAL'S

P. G. Department of Computer Science & Technology,

Degree College of Physical Education,

(A Multi Faculty Autonomous College),

Affiliated To S.G.B. Amravati University, Amravati.

CERTIFICATE

This is to certify that this project entitled

Project Topic Name

Is submitted by

Mr./Ms._____

(SYMSC- Sem IV)

A Project Report Submitted
In Partial Fulfillment of the requirement for
Master of Science (Computer Science),
Degree College of Physical Education,
Affiliated To S.G.B. Amravati University, Amravati
during the academic year
[20___-20___]

Project Guide
(Prof./Dr.)

Project Incharge
(Prof./Dr.)

Internal Examiner
(Prof./Dr.)

External Examiner
(Prof./Dr.)

Course Coordinator
(Prof./Dr.)