Shree H.V.P. Mandal's

Degree College of Physical Education, Amravati.

(Multi-faculty Autonomous College)

FACULTY OF SCIENCE AND TECHNOLOGY (ENGINEERING GROUP)

MASTER OF COMPUTER APPLICATION

SYLLABUS

(Choice Based Credit System)

Program Code: MCA

Introduced from the session 2017-2018

Master in Computer Application (MCA)
Programme Outcomes (PO):

The following Programme Outcomes are attained after completion of this P.G. programme:

PO 1. Students become successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms.

PO 2. Able to contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise.

PO 3. Capable to achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, design and implementation skills.

PO 4. Successfully pursue lifelong learning to fulfill their goals.

Programme Specific Outcomes (PSO): MCA programme has been designed to prepare graduates for attaining the following Programme Specific Outcomes:

PSO 1. Able to select modern computing tools and techniques and use them with dexterity.

PSO 2. Able to identify, analyze, formulate and develop computer applications to meet desired needs within realistic constraints such as safety, security and applicability.

PSO 3. Able to devise and conduct experiments, interpret data and provide well informed conclusions.

PSO 4. Apply programming and software development knowledge to design and implement web application, mobile application, Data Analytics, AI and Expert Systems.

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SPECIAL NOTE FOR THE STUDENTS OF MASTER OF COMPUTER APPLICATION

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

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 MCA Programme (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)

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FACULTY OF SCIENCE AND TECHNOLOGY (ENGINEERING GROUP)

MASTER OF COMPUTER APPLICATION

SYLLABUS OF

FIRST YEAR

(Choice Based Credit System)

Program Code: MCA

Introduced from the session 2017-2018

MCA Semester – I

Course Code	**17MCA101**
Course Name	**Computer Organization and Architecture**
Course Short Name	**COA**
Total Lectures	**60**
Total Credits	**04**

Prerequisites :

- Awareness about Basic Digital Electronic components, internal architecture of 8086 Microprocessor.
- Knowledge of Operating system, Data Structure and Memory Organization.

Course Objectives:

- To understand the computer organizations and architecture related with contemporary design issue.
- To be familiar with embedded processor, peripheral devices, multi-core processor , performance assessment etc.
- It acquaints student with pipelining and multiple functional units in the design of high performance processor and superscalar processor.
- It provide detail about memory system including register, cache memory, main memory and I/O subsystem and interface.

Units	Contents	Total Lectures
1	Block diagram of computer system : Function of each block, I/O as a man M/C interface, memory as storage , processor; ALU , C.U. , registers , System BUS , Speed factor , Voltage profile.(pg.n.110,Tanenbaum) Internal Structure of processor Processor Architecture and organization Design of ALU , Register organization , instruction set , instruction format and types , addressing modes , types of operand ,Design principles of modern computers : RISC and CISC architecture.	12
2	Pipelining : Multistage pipeline , efficiency performance ,(pg.no.554,Tanenbaum), Hazard , types of Hazard ; Data dependency Hazard , solution ; forward path , I/O wait , Instruction Hazard ;Cache miss , conditional branch instruction , structural Hazard.	12
3	Parallel Processor and Superscalar Operation : Parallel processing , Flynn's classification ; SISD , SIMD, MISD, MIMD. Structure of multiprocessor , I/O modules , Network topologies : crossbar , Hypercube , Mesh , Tree , Multistage , Ring , single bus . Program Parallelism ; dividing in to subprogram , shared variable and critical sections , cache coherent , Superscalar operation , Array processor , Vector processor. Microcontroller ; Architecture (General)	12
4	Memory subsystem: Memory classification ; RAM , ROM , Cache , Characteristics and Hierarchy , classification of Cache , Levels of Cache , Direct mapped Cache , set and Fully associative Cache . Main memory DRAM refreshing , memory expansion ; word length , word capacity	12

	expansion. Virtual memory, Memory management.	
5	Input / Output Subsystem : I/O Organization ; Basic I/O structure ; Interfacing and communication technique , serial and parallel data transfer, memory mapped I/O, I/O mapped I/O, USART , programmed I/O , Interrupt driven I/O. DMA , I/O processor 8.	12
	Text Book : Computer Architecture and organization . By Subrata Ghoshal , Pearson.	
	Reference Books : Computer Architecture and Organization. By Nicholas P Carter Schaum's outlines	
	Course Outcomes: • On successfully completion of this subject, students would well aware about the basic architecture of the systemand system component. • Students would familiar with advance microprocessor architecture and supercomputer architecture. • Some new processes are introduces in market i.e. array processor, vector processor and students should aware about functions of this processes. • The network awareness is essential for the student are introduces in syllabus. • Memory subsystem and I/O subsystem are also the part of syllabus that increase awareness of students regarding interfacing.	

Course Code	**17MCA102**
Course Name	**Software Engineering**
Course Short Name	**SE**
Total Lectures	**55**
Total Credits	**04**

Prerequisites: **1.** Knowledge of SDLC and Approaches for System Analysis and Designing.
2. Knowledge of Objected Oriented Technology.
3. Knowledge of Testing.

Course Objectives:

1. To Study software engineering methods, models and Processes.
2. To learn the concepts of software products and software processes.
3. To understand the importance of process visibility.
4. To introduce the notion of professional responsibility

Units	Contents	Total Lectures
1	Introduction, Software Characteristics, Software Engineering, Processes, Software Process Models (water fall, incremental, spiral, WINWIN spiral, evolutionary, prototyping, object.oriented), RAD model, System Engineering-Conventional methods of software engineering, Analysis concepts and Principles	12
2	Analysis Modeling, Design concepts and principles, Architectural design, User interface design, Component level design, Software testing techniques, software testing strategies, Technical matrices for software.	12
3	Object oriented software engineering concepts and principles, Client & Server system, Distributed systems, Tiered architectures, protocols Technologies for ecommerce, design of Distributed system, security engineering, SE for C/S system .	11
4	Web Engineering :Attributes of Web based applications, The WebEProcess, formulation, analysis, design, testing and management issues of web based application.	10
5	Reengineering: Business Process reengineering, software reengineering, Reverse engineering, restructuring, forward engineering , Computer aided software engineering.	10
	Text Book : **1.**Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw-Hill International Edition, 5th edition. **Reference Books:** **1.** Ian Sommerville, Software engineering, Pearson education Asia, 6th edition, 2000. **2.** Pankaj Jalote- An Integrated Approach to Software Engineering, Springer Verlag, 1997. **3.** James F Peters and Witold Pedryez, "Software Engineering – An Engineering Approach", John Wiley and Sons, New Delhi, 2000. **4.** Ali Behforooz and Frederick J Hudson, "Software Engineering Fundamentals", Oxford University Press, New Delhi, 1996.	
	Course Outcomes : • Ability to compare and chose a process model for a software project development. • Analyze and model a software system. Test a software system.	

Course Code	**17MCA103**
Course Name	**Data structure & File Design**
Course Short Name	**DSFD**
Total Lectures	**57**
Total Credits	**04**

Prerequisites : 1.Knowledge of C or C++.

Course Objectives:

1. To understand the concept of Data Structure & File Design.
2. To uplift the students self driven programming in C or C++ on data structure.
3. Develop an ability to apply concepts in application building.

Units	Contents	Total Lectures
1	Introduction to DS, types, DS operations, algorithm, Complexity of algorithm, File structure, file types, records, attributes, applications.	08
2	Linear data structure, Non linear Data structure,their memory representation,DS operations on them, application of various data structure, Tree & graph traversals ,types, applications of tree & graph.	11
3	Searching & Sorting algorithms, bubble sort, selection sort, insertion sort, radix sort, quick sort, Merge sort, hashing, linear search, binary search tree, operations, complete binary tree ,binary search, heap sort.	11
4	Height balanced tree,weight balanced trees, trie structure,B tree indexing, binary tree indexing, garbage collection, buddy systems, fixed block storage allocation.Hierarchical, Network and linked approach to database.	14
5	File organization, sequential file, random file, hash file, indexed file, indexed sequential file, multikey access file, advantages and drawbacks.	13
	Text Book : 1.Data structure by Seymour Lipschutz. 2 Practical approach to Data structure and algorithm by Sanjay Pahuja.	
	Reference Books: 1.Introduction to data structure with applications. By Trambley & sorrenson. 2.Introduction to data structure by T.L Naps & Bhagatsing. 3.Data management & file structure by Merry E.S. Loomis	

Course Outcomes :

- Ability to evaluate algorithms and data structures in terms of time and complexity of basic operations.
- Ability to analyze algorithms and a algorithm corrections, to describe stack, queue and linked list.
- Knowledge of basic and dynamic data structures.
- Understands searching and sorting techniques.

Course Code	**17MCA104**
Course Name	**Programming Methodology**
Course Short Name	**PM**
Total Lectures	**55**
Total Credits	**04**

Prerequisites : Knowledge of mathematical concepts for basic programming.

Objectives: The objective of this course is to make the student understand the concept of programming, stepwise refinement in problem solving, decomposing complex problems into sub problems, programming language, decision making and looping, designing Functions, Handling complex data structures like arrays, structures unions, etc. The main emphasis of the course will be on problem solving aspect i.e. developing proper algorithms.

Units	Contents	Total Lectures
UNIT-I:	Introduction to Programming: How to develop a program, Algorithms, Flow-charts, Testing and Debugging a program, Documentation. C Basics: 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 and Branching: if, if..else, goto, conditional operator, switch statement.	**10**
UNIT-II:	**S**olving problems with iteration, divide and conquer methods, while, do-while and for loops, Jumps in loops, break and continue statements. Arrays: defining array, searching, sorting and binary search, finding Min, Mode, Median, Variance, Standard Deviation, defining matrix and using to solve problems, multi-dimensional arrays, Strings**:** defining strings, searching different types of characters in strings, searching for patterns, splitting strings into tokens separated by delimiters, identifying and counting different types of tokens in a string, table of strings.	12
UNIT III:	Functions: Top down approach of problem solving, call by value and call by reference, recursion, calling conventions. Storage Classes: Scope & life of variables, auto, extern, static, register storage classes, spanning code in multiple files, standard library functions, defining our own string handling and math functions, Structures: Defining & initialising structure, structure to represent entities and use in problem solving, structure and array, Unions: Definition and use, union vs. struct.	11
UNIT IV:	Pointers: pointer basics, pointer variables, initialisation, chain of pointers, pointer increment and scale factor, pointer and array: array of pointers, pointer to array, pointers and functions: pointers as arguments, functions returning pointers, pointers to functions, defining string handling functions using pointers, pointers and structures: pointer members, pointer to struct, passing structures to functions as value and as reference, returning structure as value and as pointer, Dynamic Memory Allocation: using malloc, calloc, realloc,free functions, creating linked list, insert and deleting elements.	12

UNIT V	File Processing: different modes of opening file, file pointer, text files, binary data files, input/output operations on files, copying one file to another, file I/O error handling, Command Line Arguments, Enumeration, bitwise operators and bit fields: arithmetic on bit fields, masking of bits. Graphics: basics, drawing line, circle, drawing solid figures, Creating simple animation. **(10 hours)**	10
	Text Books: 1. R.G. Dromey, "How to solve it by Computer", Pearson Education. 2. Byron S Gottfried "Programming with C", Tata McGrawhill. 3. Kanetkar Y, "Let us C", BPB Publications.	
	References: 1. Hanly J R & Koffman E.B, "Problem Solving and Programm design in C", Pearson Education, 2009. 2. B. W. Kernighan & D. M. Ritchie, "The C Programming Language", Pearson Education. 3. E. Balagurusamy, "Programming with ANSI-C", Tata McGraw Hill. 4. Venugopal K. R and Prasad S. R, "Mastering 'C'", Tata McGrawHill. 5. Kochen Stefan, "Programing in C",	

Course Outcomes:

- Students have the ability to illustrate flowchart and design algorithms for a given problem and to develop IC programs using operators.
- Ability to develop c programs using conditional and iterative statements, functions, pointers, arrays, structures, etc.
- Knowledge of using file concept.

Course Code	**17MCA105**
Course Name	**Database Management Systems**
Course Short Name	**DBMS**
Total Lectures	**60**
Total Credits	**4**

Prerequisites : Basic knowledge about database, tables.

Course Objectives:

1. To be familiar with basic database storage structures and access techniques: file and page organizations, indexing methods and hashing.
2. To be able to write relational algebra expressions for queries and understand the use of Structured Query Language (SQL), DDL.
3. To understand the concept of a database transaction and related database facilities, including concurrency control.
4. To be able to apply normalization techniques to normalize the database.
5. To learn and practice data modeling using the entity-relationship and developing database designs.
6. To learn database security models and architectures.

Units	Contents	Total Lectures
I	**Introduction to Database Concepts:** Purpose of Database systems, Overview of physical storage media, File system. **File Organization:** Organization of records in a file, Data dictionary storage. **Indexing and Hashing:** Basic concepts, ordered Indices, B+ trees index Files, Static Hashing, Dynamic Hashing.	12
II	**Relational Algebra and Calculus:** Introduction, Selection and projection, Set operations, Renaming, joins, division, The tuple relational calculus, The domain relational calculus. **SQL:** Basic Structures, set operations, Aggregate functions, null values, nested sub-queries, derived relations.	12
III	Views, Modification of databases, Joined relations, Data Definition Language. **Transaction Management:** The ACID properties, Transactions and schedules, concurrent execution of transactions. **Integrity Constraints:** Domain constraints, Referential Integrity, Assertion.	12
IV	**Relational Database Design:** Decomposition, Normalization using functional Dependencies, Normalization using join dependencies, Domain key normal form, and alternate keys approaches to database design. ER Designs Diagrams, Entities Attributes and Entities Sets, Relationship and Relationship sets, Additional features of ER Model, Conceptual designs with ER Model.	12
V	**Introduction to Database Security:** Access Control, Discretionary Access Control, Mandatory Access Control. Introduction of Centralized System, Client-Server System, Parallel System, Distributed System, Architecture for Parallel Database and Architecture for distributed Database.	12
	Text Books : 1. Abraham Silberschatz, Henry F. Korth, S. Sudharsan, *Database System Concepts*, Fifth Edition, McGraw-Hill , 2006 2. Raghu Ramkrishnan, Johannes Gehrke, *Database Management Systems*, Third Edition, McGraw-Hill , 2003 3. C.J.Date, *An Introduction to Database Systems*, Third Edition, Vol. 1, Narosa Publishing House, 1998	
	References : 1. Jeffrey A. Hoffer, Mary B. Prescott, Fred R. McFadden, *Modern Database Management*, Pearson Publication, 6th Edition. 2. Thomas Connolly, Carolyn Begg, *Database Systems – A Practical Approach to Design, Implementation and Management*, Pearson Publication, 4th Edition.	

Course Outcomes :

- Ability to describe data models and schemas in DBMS
- Acquire knowledge about the features of database management systems and Relational database.
- Able to use SQL; the standard language of relational databases.
- Ability to understand the functional dependencies and design of the database.

Course Code	**17MCA106**
Course Name	**Practical- Data Structure & File Design**
Course Short Name	**PDSFD**
Total Teaching Hours	**30**
Total Credits	**2**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.	

Course Code	**17MCA107**
Course Name	**Practical-Programming Methodology**
Course Short Name	**PPMC**
Total Teaching Hours	**30**
Total Credits	**2**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.	

Course Code	**17MCA108**
Course Name	**Lab-DBMS Using Access**
Course Short Name	**Lab- I**
Total Teaching Hours	**30**
Total Credits	**2**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.	

Course Code	**17MCA109**
Course Name	**Self Study Module-1**
Course Short Name	**SSM1**
Total Teaching Hours	**30**
Total Credits	**2**

MCA Semester - II

Course Code	**17MCA110**
Course Name	**Data Communication & Networking**
Course Short Name	**DCN**
Total Lectures	**56**
Total Credits	**4**

Prerequisites: 1.Basic knowledge of computer network.

Course Objectives: 1. To understand the concepts of Data Communication & networking.
2. To learn various technologies In DCN.

Units	Contents	Total Lectures
I	Introduction, Basic concepts, line configuration, transmission mode, functions of the layer, TCP/IP protocol suit, Analog & Digital signals.Periodic and Aperiodic signal, composite signal, frequency spectrum, bandwidth, decomposition of digital signals.	8
II	Encoding & Modulating:Digital to Digital,Analog to digital, Digital to Analog,Analog to Analog conversion, digital data transmission, DTE-DCE interface. Interfaces and modem,cable modem, guided and unguided media.	11
III	Multiplexing:FDM, WDM, TDM, Error detection & ,types of errors, Detection, VRC, LRC,CRC, Checksum, error correction,Flow control, error control.	11
IV	Asynchronous Protocols, Synchronous Protocols, character oriented protocols, bit oriented protocols. Link access procedures, switching,,circuit, packet, message switching,Network control protocol.X.25.	14
V	Networking & internetworking devices:Bridges, gateways,routers,routing algorithm. Overview of TCP/IP, addressing, subnetting, other protocols in network layer, client server model, DHCP,FTP, DNS,SMTP,SNMP,WWW.	12
	Text Book : **1.**Data Communication & Networking 2nd ed,Behrouz A. Forouzan.	
	Reference Books:	

Course Outcomes:

- After learning this subject the student understands the computer network technology.
- Students have Ability to identify the different types of network topologies and protocols.
- Students understands the OSI model and threats to network and Countermeasures.

Course Code	**17MCA111**
Course Name	**Operating System Design**
Course Short Name	**OSD**
Total Lectures	**54**
Total Credits	**4**

Prerequisites : Knowledge of architecture of computer system including memory, registers, interrupts, interrupt processing, BUS structure, I/O channels, instruction processor, Assembly language programming, IO Programming.

Course Objectives:

1. Understand the role of operating systems.
2. Understand the fundamental principles of operating system design and kernel implementation.
3. Understand key features of operating systems of practical importance, including Linux and Windows.
4. Understand principles of and gain hands-on experience with memory and virtual memory management
5. Understand file systems design principles.

Units	Contents	Total Lectures
I	Introduction to Operating system: Importance of Operating system, Operating system terminology, operating system resource manager, operating system resource viewpoint, operating system hierarchical and extended machine view, System software: Assembler, macros and design of macro processor, Linkers, Loaders.	10
II	**Memory management:** Single contiguous allocation, Introduction to multiprogramming, partitioned allocation, relocatable partitioned memory management, paged memory management, demand paged memory management, segmented memory management, segmented and demand paged memory management, other memory management scheme.	10
III	**Processor management:** state model, job scheduling, process scheduling, multiprocessor system, process synchronization, combined job and process scheduling. **Device management:** Techniques for device management, device characteristics hardware considerations, channels and control units, device allocation consideration, I/O traffic controller, I/O scheduler, I/O device handler, virtual devices.	14
IV	**Information management**: A simple file system, general model of file system, symbolic file system, basic file system, Access control verification, logical file system, physical file system, allocation strategy module, device strategy module.	10
V	**Case study LINUX:** Overview of LINUX, processes in LINUX, Memory management in LINUX, I/O in LINUX, The LINUX file system.	10
	Text Books: 1. D.M. Dhamdhere, "System programming and Operating systems", TMH 2. Stuart E. Madnick, John J Donovan, "Operating systems", TMH 3. Andrew S Tanenbaum, "Modern Operating systems", Pearson education	
	Reference Books: 1. Maurice J Bach, "The Design of the UNIX Operating system", PHI 2. Milan Milenkovic, "Operating systems concept and design", TMH 3. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Principles" 4. Achyut Godbole, "Operating systems with case studies in UNIX NetWare Windows NT", TMH 5. William Stallings, "Operating systems", PHI	

Course Outcomes:

- Student will able to understand the operating system hierarchy, Assembler, macros and design of macro processor, Linkers, Loadersetc..
- Understand the system behavior and system architecture. Also how to deal with the error condition.
- Ability to understand how to deal with input output devices properly.
- Students are able to understand physical file system architecture.
- Knowledge of open source operating system i.e. Linux

Course Code	**17MCA112**
Course Name	**Mathematical Foundation**
Course Short Name	**MF**
Total Lectures	**55**
Total Credits	**4**

Prerequisites : Basic concept of Mathematical Logic, connectives, knowledge of derivative, integration, matrix, basic knowledge of data structure like tree, stack, array, queue etc.

Course Objectives:

1. To understand and be able to use fundamental concepts of mathematics in computational science
2. To learn understand the basic concepts 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 Computations.

Units	Contents	Total Lectures
I	Introduction to Discrete mathematics, Normal Forms: Disjunctive and Conjunctive Normal forms, Relation : Types of relation, operations on relation, Permutations and combinations, Function : Representation of function, types of function, classification of function, Lattice, Boolean Algebra	11
II	Graph Theory : Introduction to Graph, Matrix representation of a graph, Transport network, Minimal cost flow, Errors Analysis, Floating-point representation of numbers, Iterative Methods: Bisection, False position, Newton-Raphson methods, Secant method.	10
III	Metrices and linear system of equation: Matrix operations, transpose of matrix, inverse ofmatrix, rank of a matrix, consistency of a linear system of equation, Solution of linear system: Matrix Inversion method, Gaussian elimination Method, Method of Factorization, Ill-conditioned linear system, The Gauss Seidel iterative method.	10
IV	Interpolation: Introduction, Lagrange Interpolation, Difference Tables, Truncation Error in Interpolation, Spline Interpolation, Least squares approximation of function: Linear Regression, Polynomial Regression, Fitting exponential and trigonometric functions, Taylor series representation, Chebyshev series.	12
V	Numerical Differentiation: The Cubic Spline Method, Numerical Integration: Trapezoidal rule,Simpson's 1/3 Rule, Simpson's 3/8 Rule, Euler's Method, Runge-Kutta method, Predictor-corrector methods, Laplace's equation: Jacobi's method, Gauss Seidal Method.	12
	Text Books: 1. T Veerarajan, "Discrete mathematics with graph theory and combinatorics." 2. Narsingh Deo ,"Graph theory with applications to engineering and computer science" 3. V. Rajaraman, "Computer Oriented Numerical Methods", PHI 4. S. S. Sastry, "Introductory Methods of Numerical Analysis", PHI	
	Reference Books: 1. C. L. Liu, "Elements of Discrete mathematics" 2. Bernard Kolman, Robert C. Busby, sharan cutler Ross,Nadeem-Ur-Raheman, "Discrete mathematical structures". 3. Steven C. Chapra, Raymond P. Canale, "Numerical Methods for Engineers", Tata McGraw Hill. 4. M.Goyal, "Computer Based Numerical & Statistical Techniques", ISP	

Course Outcomes :

- Ability to apply mathematical and statistical techniques to solve some real life problems.
- Students are able to apply mathematical techniques for data analysis.
- Understand the basic principles of sets and operations in sets.
- Model problems in Computer Science using graphs and trees.

Course Code	**17MCA113**
Course Name	**Object Oriented Programming**
Course Short Name	**OOP**
Total Lectures	**55**
Total Credits	**4**

Prerequisites :

1.Knowledge of C language.
2.Basic Programming Skill

Course Objectives

1.To learn the concepts of object oriented programming.

Units	**Contents**	**Total Lectures**
I	What is object oriented programming ? Characteristic of object oriented programming, Encapsulation, Abstraction , C++ programming basics , CVs, Classes, creating objects, constructors and destructors, references. Functions as members of classes, Inline functions, Default arguments, Reference arguments Overloaded function, Returning by reference.	12
II	Object as function arguments, returning object from function. Structures and classes, Classes, objects and memory, this pointer, static data and functions, const and classes, Arrays, string array, Arrays as class Members, Arrays of object, The standard C++ String class.	10
III	Operator overloading , Overloading unary operations, Overloading binary operators, data conversion, pitfalls of operators overloading and conversion keywords, Explicit and Mutable. Inheritance : Concept of inheritance. Derived class and based class. Derived class constructors, member function, inheritance in the English distance class, class hierarchies, inheritance and graphics shapes, public and private inheritance, aggregation : Classes within classes, inheritance and program development	13
IV	Addresses and pointers. The addressof operator, pointer and arrays, Pointer and Functions, Memory management : New and Delete, pointers to objects, debugging pointers, Virtual Function : Virtual Function, friend function, , dynamic type information, Plolymorphism.	10
V	Streams and Files : Streams classes, Stream Errors, Disk File I/O with streams, file pointers, overloading the extraction and insertion operators, memory as a stream object, command line arguments, keyboard and printer as stream, Templates: Function templates, Class templates, Exceptions Handling, The Standard Template Library, sequence containers, iteators, specialized iteratetors, associative containers, strong user-defined object, function objects.	10
	References: 1. Object Oriented Programming in C++ by Robert Lafore Techmedia Publication. 2. The complete reference C – by Herbert shieldt Tata McGraw Hill Publication. 3. Object Oriented Programming in C++ Saurav Sahay Oxford University Press. 4. Object Oriented Programming in C++ R Rajaram New Age International Publishers 2nd . 5. OOPS C++ Big C++ Cay Horstmann Wiley Publication.	

Course Outcomes:

- After learning this subject students will understand the all the OOPs concepts.
- Students are able to do CPP programming by using classes and objects.
- Ability to develop application using Addresses and pointers as well as Streams and Files.

Course Code	**17MCA114**
Course Name	**Web Design**
Course Short Name	**WP**
Total Lectures	**56**
Total Credits	**4**

Prerequisites :

1. Knowledge of Internet, Web Browsers and Websites.
2. Designning Skills
3. Simple Programming Skills
4. Knowledge of Internet Protocols.

Course Objectives

1. To understand Fundamentals of Web Site Designing and Development.
2. To be familiar with web Technologies like XHTML,CSS,VB SCRIPT,JavaScript,XML and ASP.
3. To make students able to design and developed simple websites

Units	Contents	Total Lectures
I	Introduction to XHTML: Editing, Headers, Linking, Images, Lists : Unordered, Ordered, Nested. Basic XHTML tables & their formatting. XHTML forms : Simple & Complex. Cascaded Style Sheets : Inline, embedded & external, Linking, element positioning & dimensioning.	10
II	Introduction to XML : Basic concepts, structuring data and namespaces. Document Type Definitions & Schemas. XML vocabularies. Document Object Model (DOM). Introduction to scripting : Java Script operators, data types, logical operators, control structures : if. If-else. Switch - case.	10
III	Java Script Looping structures: for, do-while, while. Break /Continue statements. Java Script functions: Declaration, Definition, and Referencing. Identifiers scope rules, Recursion. Arrays; declaration, allocation and accessing. JavaScript objects: Math, String, Date, Number and Boolean.	13
IV	VBScript : Basics, operators, data types, control structures, looping structures, function declaration and definitions, Arrays; declaration, allocation and accessing. String manipulation functions, mathematical functions, classes and objects.	13
V	Introduction to Active Server Pages (ASP): Working of ASP, setup, ASP objects, FileSystemObject, session tracking and cookies, accessing databases using ASP.	10
	Text Books: **1.** Deitel & Deitel "WWW:How to Program" (Pearson Education) **2.** ASP Unleashed (Techmedia) **3.** HTML, XHTML, CSS & XML by Example	
	Reference Books: **1.** Techmedia : The Complete Java Script **2.** Xml Unleashed **3.** VBScript Superbible **4.** Pure JavaScript (Techmedia) **5.** Professional ASP 3.0 (Wrox)	

Course Outcomes:

- After learning this subject students will understand the web designing concepts.
- Students are able to do web programming by using XHTML, javascript, vbscript.
- Ability to web based application .

Course Code	**17MCA115**
Course Name	**Practical- Object Oriented Programming in CPP**
Course Short Name	**POOP**
Total Teaching Hours	**30**
Total Credits	**2**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.	

Course Code	**17MCA116**
Course Name	**Practical- Web Design**
Course Short Name	**PWD**
Total Teaching Hours	**30**
Total Credits	**2**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.	

Course Code	**17MCA117**
Course Name	**Linux**
Course Short Name	**Lab-2**
Total Teaching Hours	**30**
Total Credits	**2**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.	

Course Code	**17MCA118**
Course Name	**Project**
Course Short Name	**PROJ-1**
Total Teaching Hours	**30**
Total Credits	**2**

Prerequisites

- Preliminary knowledge of research methodology.
- Knowledge about technology and application domain in which project will be developed.
- Good knowledge of subject domain and Software Engineering.

Objectives

- To give the students hands on experience of real life system development life cycle involving deadlines and team work.
- To make the students apply the technologies learnt during the programme.
- To provide the experience in analyzing, designing, implementation and evaluating information systems by following proper documentation process.
- To learn research methodology & tools used in research.

Rules for Project Work :

A student will be examined in the course "Project Work" as given below:

1. Project work may be done individually or in groups. However if project is done in groups, each student must be given a responsibility for a distinct task and care should be taken to see the progress of individual.
2. Students should take guidance from a guide and prepare a Project Report on "Project Work" in 2 copies to be submitted to the Head of the Department. A soft copy of project report along with source-code and data should also be submitted.
3. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, File designs, experimental setup and methodology.
4. The project report will be duly accessed by the guide of the project and marks will be communicated by the Head of the Department to the Examination Department.
5. The project report should be prepared in a format prescribed by the College, which also specifies the contents and methods of presentation.

General Instruction Regarding Preparation of Project Report :

TYPING :

(a) The typing shall be standard 12 pts in double spacing using only
(b) Margins must be Left 1.5 inches Right 1 inches Top 1 inches Bottom 1 inches
(c) Paper A4 size Paper

COPIES :

Two hard-bind copies (As per format displayed herewith) One original and one clean Xerox Copy.

FORMAT FOR TITLE PAGE AND FOR COVER PAGE :

PROJECT REPORT
ON
NAME OF THE PROJECT
BY
NAME OF STUDENT

GUIDED BY
NAME OF THE GUIDE

P.G. Department of Computer Science & Technology
Degree College of Physical Eucation
Shree H. V. P. Mandal, Amravati.

ACADEMIC SESSION

Report format for Application Development Projects:	**Report format for Research Projects:**
1 Blank Page at beginning	1 Blank Page at beginning
Title Page	Title Page
Certificate from Guide	Certificate from Guide
Acknowledgement	Acknowledgement
Index with printed Page Numbers	Index with printed Page Numbers
CHAPTER 1 : INTRODUCTION	CHAPTER 1 : INTRODUCTION
1.1 Company Profile (optional)	1.1 Problem Domain
1.2 Existing System and Need for System	1.2 Problem Statement
1.3 Proposed System	1.3 Experimental Setup
1.4 Scope of Work	

1.5 Operating Environment – Hardware and Software CHAPTER 3 : ANALYSIS & DESIGN 3.1 User Requirements 3.2 Software Requirements 3.3 System Flow 3.4 Module Flow 3.5 Module Document 3.6 Input Document 3.7 Computational Method Document (If methods are used) 3.8 Output Document 3.9 Data Flow Diagram (DFD) 3.10 Functional Decomposition Diagram (FDD) 3.11 Entity Relationship Diagram (ERD) 3.12 Data Dictionary 3.13 Table Design 3.14 Menu Tree 3.15 Menu Screens 3.16 Input Screens 3.17 Report Formats 3.18 Pseudocodes (optional) 3.19 Test Procedures (optional) CHAPTER 4: IMPLEMENTATION & RESULTS 4.1 Input Forms with Data 4.2 Output Reports with Data 4.3 Sample Code CHAPTER 5 : USER MANUAL 5.1 User Manual 5.2 Operations Manual / Menu Explanation 5.3 Forms and Report Specifications CHAPTER 6: CONCLUSION AND FUTURE SCOPE 6.1 Drawbacks and Limitations 6.2 Conclusion 6.3 Proposed Enhancements REFERENCES 1 Blank Page at the end.	CHAPTER 2 : PROBLEM DEFINITION 1.1 Review of Related Work 1.2 Problem Definition CHAPTER 3 : EXPERIMENT DESIGN & METHODOLOGY 1.1 Experiment Design 1.2 Methodology CHAPTER 4: RESULT ANALYSIS 1.1 Data Sheets 1.2 Graphs & Tables 1.3 Sample Code CHAPTER 5: CONCLUSION AND FUTURE SCOPE 5.1 Issues and Limitations 5.2 Conclusion 5.3 Future Scope REFERENCES 1 Blank Page at the end.

Course Outcomes

- Learn proper project documentation.
- Ability to implement the commercial or research project.
- Ability to commissioning of the developed software.
- Presentation and marketing skills for the developed application.

Shree H.V.P. Mandal's

Degree College of Physical Education, Amravati.

(Multi-faculty Autonomous College)

FACULTY OF SCIENCE AND TECHNOLOGY
(ENGINEERING GROUP)

MASTER IN COMPUTER APPLICATION

SYLLABUS OF

SECOND YEAR

(Choice Based Credit System)

Program Code: MCA

Introduced from the session 2017-2018

MCA Semester - III

Course Code	**17MCA201**
Course Name	**Management Information System**
Course Short Name	**MIS**
Total Lectures	**60**
Total Credits	**04**

Prerequisite

1. Basic Knowledge of data, information and information system.
2. Basics of Management functions and processes

Course Objective :

1. To study organization structures and information systems.
2. To understand the basics and Application of MIS
3. To study different system architectures to support MIS.

Unit I	**Strategic View of MIS :** MIS in a digital firm, E-Business Enterprise ,Strategic Management of Business Performance , Information Security Challenges, Information Technology impact on society.	12
Unit II	**Basic of Management Information System:** Decision making, Information, Knowledge Intelligence, Analysis and Design, Development Process of MIS, Strategic Design of MIS, Business Process Re-Engineering.	12
Unit III	**Application of Management Information System in E-Business :**Application in manufacturing sector and Service sector , Decision support system and knowledge management	12
Unit IV	**Information Technology Infrastructure :**Technology and information System, Unified Communication System, Security Information System	12
Unit V	Database and Client Server Architecture, Data warehouse : Architecture and Implementation, E-business Technology	12

Text Books

1	Management Information System 4th edition by Waman S. Jawadekar Publication by TMH
2	Management Information System managing the digital firm by Kenneth C. Laudon and Jane P., Laudon publication by Pearson Education

Course Outcomes:

- Knowledge of information system which supports decision making, and management of activities.
- Information System in E-Business.
- Data warehouse implementation, for E-business.

Course Code	**17MCA202**
Course Name	**JAVA Programming**
Course Short Name	**JAVA**
Total Lectures	**60**
Total Credits	**04**

Prerequisites: 1. Knowledge of OOPS and C++.

Course Objective:

1. To understand the programming structure of Java language.
2. To implement OOPS concept in Java Programming.
3. To implement the concepts like inheritance, interface, exception handling, multithreaded programming, applet programming, Graphics programming in actual programming.
4. To understand Generic Programming.

Units	Contents	Total Lectures
1	**Introduction to Java Programming:** Java features, Byte code, Java Virtual Machine, JDK, Constants, variables and Data types, Operators and expressions, Control structures, Arrays, String Buffer classes and their methods.	10
2	**OOPS Using Java:** Objects and Classes, methods, constructors, method overloading, Overloading constructors, abstract methods and abstract classes, **Inheritance**: Introduction, Inheritance hierarchies, the use of super method **, Interface:** Defining and implementing Interface, Interface and their use, Using super, final and this keyword, the concept of static and dynamic polymorphism.	12
3	**Exception Handling**:- Fundamentals, Exception types, Uncaught exceptions, Multiple catch clauses, Nested try statements, throws clause, Exception subclasses. **Multithreaded programming**:- Thread basics, Creating and running a thread, The thread life cycle, Thread priorities. **Reflection:** Reflection class, Reflection methods	13
4	**Applets** :- The Applet class, Applet architecture, Applet display methods, Repainting, Handling Events, HTML Applet tag, Passing parameters to applets, **AWT:** AWT Classes, working with frame window, Creating a Frame window in an Applet **,** Telephony API.	12
5	**Graphics Programming** :- Frame windows, Reacting a frame window in applet, Displaying information within a Window, Graphics drawing lines, Rectangles, Polygon, Ellipses and circles, Arcs, Working with color, Layout Manager. **Java Imaging:** Image Fundamentals, ImageObserver, ImageProducer, ImageFilter. **Generic Programming**: Generic class, Generic methods, Bounds for Type variables, translating generic expressions and methods. Collection Classes, Wrapper Classes.	13
	Text Book : 1. Horstmann & Cornell, "Core Java Vol-1", Sun Microsystems 2. Herbert Schildt, " The Complete Reference Java 2 (s/e)", (TMH)	
	Reference Books: 1. Liang "A Text Book of Java Programming" 2/e (PHI). 2. Dietel & Dietel "Java How to Program "Pearson Education. 3. S. Chavan "Programming in Java" Shroff Pub. 4. E. Balagurusamy, "Programing with Java- A primer", McGrawHill	
	Course Outcomes: 1. Ability to identify and implement Object Oriented concepts in programming. 2. Skill to write java application programs using OOP principles, applet programming. 3. Understanding of the concepts of polymorphism and inheritance principles of Interface, Exception Handling, Applets, Graphics Programming , Java Imaging and Generic Programming	

Course Code	**17MCA203**
Course Name	**Computer Graphics**
Course Short Name	**CG**
Total Lectures	**60**
Total Credits	**4**

Prerequisites :

- Basic Knowledge of computer system, it's components and function.
- Knowledge of basic mathematics, matrices, set theory and coordinate geometry.

Course Objective:

- To acquire the knowledge of digital image, its components and properties.
- To learn various algorithms used for Computer Graphics.
- To study 2-D and 3-D graphics, its representation and processing.

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. **Video Display Devices:** CRT, Raster scan display, Random scan display, Color CRT Monitors, Virtual Reality System.	11
II	**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.	13
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,	13
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,	11
V	**GUI and interactive Input Method**:-User Dialogue, Logical Classification of Input Devices, Interactive Picture Construction Techniques. **Three Dimensional Concepts**: 3Dimensional Display Methods, Polygon Table, Blobby Object , Bezier Curve, B-Spline Curve.	12
	Text Book :- 1)Donald Hearn & M.P.Baker: Computer Graphics 2/e(PHI)	
	Reference books:- 1) S. Harrington : Computer Graphics : A programming Approach (McGraw Hills) 2) Roger : Procedural Elements for Computer Graphics(McGraw Hills)	

Course Outcomes:

- Ability to draw graphics using line, curves, and polygon.
- Ability to perform operations on computer graphics.

Course Code	**17MCA204**
Course Name	**PHP**
Course Short Name	**PHP**
Total Lectures	**60**
Total Credits	**4**

Prerequisites :

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

Course Objective:

1. Web Site Designing and Development using Open Source Technologies.
2. To learn the scripting languages.
3. To learn the creation of dynamic websites using Open source databases.

Units	Contents	Total Lectures
1	Introduction, PHP Basics: Escaping to PHP, Comments, Output: print(), echo(), printf(), sprint(), Data types, type casting, Type-Related Functions, Type Identifier Functions, Identifiers, Variables, scope of variables, Superglobal Variables, Constants, operators, Expressions, String Interpolation, Control Structures. File Inclusion Statements	12
2	Functions: Invoking a Function, Creating a Function: Passing Arguments by Value, Passing Arguments by Reference, Default Argument Values, Optional Arguments, Returning Values from a Function, Nesting Functions, Recursive Functions, Variable Functions, Function Libraries, Arrays: Creating an Array, Adding and Removing Array Elements, Outputting Arrays, Traversing Arrays	12
3	Sorting Arrays, Merging, Slicing, Splicing, and Dissecting Arrays, Other Array Functions: array_rand(), shuffle(), array_sum(), array_chunk(), String-Specific Functions : Determining the Length of a String, Comparing Two Strings, Manipulating String Case, Converting Strings to and from HTML, Padding and Stripping a String, Counting Characters and Words, Regular Expressions, Alternatives for Regular Expression Functions	12
4	Connecting to MySql Database, selecting a database, building and sending query, retrieving data, displaying data in HTML table from database, Inserting/Update/Delete data to/from the database, Other PHP Mysql functions.	12
5	Error and Exception Handling: Error Logging, Exception Handling, PHP and Web Forms, Handling Uploads with PHP, Session Handling: Cookies, URL Rewriting, PHP Session: Starting a Session, Destroying a Session, Retrieving and Setting the Session ID, Creating and Deleting Session Variables	12
	Text Book : 1. Begining PHP5 and MySQL5 from novice to professional, 2nd edition, by W. Jason Gilmore.	
	Reference Books: 1. PHP5 and Mysql Bible By Tim Converse, Joyce Park, Wiley Publication 2. Beginning PHP5, Apache, and MySQL Web Development by Elizabeth Naramore, Jason Gerner, Yann Le Scouarnec, Jeremy Stolz, Michael K. Glass, WROX Publication. 3. PHP Cookbook, Second Edition by David Sklar and Adam Trachtenberg,O'Reilly **Course Outcomes:** • Be able to configure text, color, and page layout with Cascading Style Sheets. • Able to use of images & multimedia on web pages. • Skill of developing the server and client side programs. • Skill & knowledge of Web page design using HTML5 and PHP.	

Course Code	**17MCA205**
Course Name	**Artificial Intelligence and Expert system**
Course Short Name	**AI**
Total Lectures	**58**
Total Credits	**04**

Prerequisites: Basic Knowledge of search techniques, logic & reasoning.

Course Objective:

- To learn the Lisp Programming for implementation of AI.
- To learn the knowledge representation and dealing with inconsistency and uncertainty.
- To understand Expert system architecture and searching techniques.

Units	Contents	Total Lectures
1	**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	12
2	**LISP:-** Introduction, Syntax and Numeric Function, Basic List Manipulation function, Additional List Manipulations Functions, Functions, predicates, Conditionals, Logical Function, Input Output and Local Variables, Property List and Arrays	11
3	**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.	12
4	**Dealing with Inconsistencies and Uncertainties:** TMS, default reasoning, modal & temporal logics, no monotonic reasoning system, circumscription. **Expert system Architecture:** Rule based system architecture, non production system architecture & validation, Expert System Architecture, Expert System Shells.	12
5	**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.	11
	Text Books: **"**Introduction to AI and Expert Systems": Dan W. Patterson. **"**Foundations of AI Expert Systems":V.S. Jankiraman **Reference Books:** AI & Intelligent systems: N.P. Padhy AI a Practical Approach: Rajiv Chopra Principles of AI: Nils J. Nilsson	
	Course Outcomes: • Knowledge of AI and expert system. • Know the concept List Processing, Knowledge representation. • Applications of AI for designing the expert system.	

Course Code	**17MCA206**	
Course Name	**Practical- JAVA Programming**	
Course Short Name	**PJAVA**	
Total Teaching Hours	**90**	
Total Credits	**6**	
Units	**Contents**	**HRS**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.		

Course Code	**17MCA207**	
Course Name	**Practical- PHP**	
Course Short Name	**PPHP**	
Total Teaching Hours	**90**	
Total Credits	**6**	
Units	**Contents**	**HRS**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.		

Course Code	**17MCA208**	
Course Name	**Lab- Computer Graphics**	
Course Short Name	**Lab-1**	
Total Teaching Hours	**90**	
Total Credits	**6**	
Units	**Contents**	**HRS**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.		

Course Code	**17MCA209**	
Course Name	**Swayam / Free Elective**	
Course Short Name	**SSM2**	
Total Teaching Hours	**30**	
Total Credits	**2**	
Units	**Contents**	**HRS**
	Guidelines for Online Courses **(SWAYAM, MOOC, NPTEL)** 1. College recognizes online courses provided by SWAYAM, MOOC and NPTEL. 2. College notifies the schedule for subscription of online courses well in advance during the start of session. 3. A facilitator/counselor shall be assign to a group of students. 4. Students can subscribe the course in a group. 5. A course should be of minimum 30 days/Hrs duration fixed pace/self pace. 6. The facilitator/counselor guide students throughout the process of selection, learning and examination. 7. Students shall submit the certificate/online certificate issued by the respective agency. 8. The credit will be treating completed only on submission of certificate. 9. In case a student who registered and sincerely attended and completed the online course but fail to clear the online examination, he/she shall submit the failure certificate duly recommended by the facilitator for satisfactory completion of the course to complete the credits.	

MCA Semester - IV

Course Code	**17MCA210**
Course Name	**Assembly Language Programming**
Course Short Name	**ALP**
Total Lectures	**58**
Total Credits	**04**

Prerequisites:
Knowledge of Digital Electronics, logic gates, including combination & sequential logic, decoders, memories, Boolean algebra and operation on binary numbers.

Course Objective:

- To study the architecture and function of microprocessor chip.
- To learn different assembly language programming techniques.
- To study the interrupts and interfacing with HLL

Units	Contents	Total Lectures
1	**Pentium Architecture:** Evolution of microprocessor, Introduction to Pentium microprocessor, Block diagram of execution unit & Functional description of Pentium. Hardware details of the pentium: RISC and CISC architecture, Superscalar, pipelining, Branch prediction, Instruction and data caches, Fp unit, Software model or programming model of Pentium, processors flag. Real mode and protected mode. Data types, addressing modes.	12
2	**Pentium instructions and programming:** Data transfer instruction, string manipulation instruction, Arithmetic instruction, Logical instruction, Bit manipulation instruction, Program transfer instructions, and processor control instruction. ALP programs based on above instructions; searching, sorting application program.	11
3	**Interrupt processing:** Hardware and software interrupt, priority concept, Interrupt vector table, Interrupt processing sequence, Multiple interrupt, Special interrupts, Interrupt service routine program.Interrupt hook. number conversion.(ASCII, BCD and Binary mutual conversion). DOS and BIOS function calls programming: Introduction to DOS and BIOS function calls related to keyboard, display, Printer.	12
4	Command line Interface. Advance programming application: EXTRN and PUBLIC directives, subroutines or procedures. MACRO design and expansion, Memory management, TSR program, interfacing C with ALP. ALP programs based on above features.	12
5	**Protected mode operation of Pentium:** Detection of protected mode, protected mode operation ; segmentation , Paging, protection, multitasking, Microcontroller: 8051 Architecture, memory map, Applications.	11
	Text Book : 1. The Pentium microprocessor by James Antonakos.	
	Reference Books: **1.** Programming the microprocessor by Berry Brey. **2.** The Intel microprocessor Architecture. By Ray and Bhurchundi **3.** IBM PC And Assembly Language Programming by Peter Abel.	
	Course Outcomes: • Knowledge of advance computer & microprocessor Architecture. • Understanding intelligent behavior of m/c by studying ALP. • Design and implementation of software at the assembly level.	

Course Code	**17MCA211**
Course Name	**Cloud Computing**
Course Short Name	**CC**
Total Lectures	**60**
Total Credits	**4**

Prerequisites :

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

Course Objective:

- To study cloud computing concepts and models.
- To study the technologies required for Cloud Computing.
- To study the applications that uses cloud computing.

Units	Contents	Total Lectures
I	**Basic Concepts:** Introduction cloud computing, History, Working, Benefits, Characteristics, Application, and Deployment Models: public, private, hybrid, Service Model: SAAS, PAAS, LAAS, Cloud Computing Architecture, Cloud infrastructure.	11
II	**Cloud Computing Technologies:** Parallel vs. distributed computing, Elements of parallel computing: Hardware architectures for parallel processing, Approaches to parallel programming, Laws of caution, and Elements of distributed computing: definition, component, Grid Computing, Utility Computing.	13
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.	10
IV	**Concurrent Computing:** Anatomy of the Aneka container, Introducing parallelism for single-machine computation , Programming applications with threads: introduction Thread API's ,Domain decomposition, Functional Decomposition, Multithreading with aneka: Model, Interface Compellability, life Cycle ,Programming applications with aneka threads.	12
V	**Storage in Cloud:** Storage system architecture, Big data, Virtualized data centre(VDC) architecture, VDC Environment, server, storage, networking, desktop and application virtualization techniques and benefits, **Clouds file systems:** GFS and HDFS, BigTable, HBase and Dynamo. Features and comparisons among GFS,HDFS.	12
	Text Books: 1. Rajkumar Buyya, "Mastering Cloud computing", McGraw Hill 2. Rajkumar Buyya, "Cloud computing principles and paradigms", Wiley	
	References : 1. Gautam Shroff, Enterprise Cloud Computing, Cambridge 2. Dr. Kumar Saurabh,"Cloud Computing", Wiley Publication 3. Pranab kumar Das Gupta, Manojranjan Nayak, Sabyasachi Pattnaik "Cloud Computing- Based Projects using Distributed Architecture", PHI. 4. Greg Schulr,"Cloud and virtual data storage networking",CRC Press 5. Barrie Sosinsky,"Cloud Computing", Wiley India	

Course Outcomes:

- Ability to deal with cloud computing environment.
- Understanding of modern computing technologies and storage technologies in distributed environment.

Course Code	**17MCA212**
Course Name	**Advanced Java Programming**
Course Short Name	**AJP**
Total Lectures	**60**
Total Credits	**04**

Prerequisites:
Knowledge of Core Java i.e. Java Basic, JDK, AWT, Object Oriented Concepts etc.
Basic knowledge of Programming, program modeling and Knowledge Of DBMS.
It is desirable to have basic knowledge of Software Development Techniques, Web Technology and Networking Protocols.

Course Objectives:

- To learn the concept of Swing and develop applications using swing.
- To understand JDBC Connectivity and programming using SQL statements.
- To understand client server programming using TCP and UDP socket.
- To learn how to develop web applications using different technologies like Servlet, JSP, etc.
- To understand RMI Programming.

Units	Contents	Total Lectures
1	**Introduction to Swing** Compression between AWT and swing, Japplet,icon,the container, panel, windows and frame classes, combo box,tabbed,panes,Scroll Panes,Trees,Custom Rendering of Jlist Cells.	11
2	**JDBC :-** JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL statements, Working with Result Set Object & Result Set Meta Data. **Network_programming** : Basic of Networking, Network Classes and Interfaces, Inetaddress, TCP / IP client sockets, Server socket, Client / Server Programming using TCP sockets, URL and URL connection Classes, Datagram, Packets and Sockets, Client / Server Programming using UDP	13
3	**Servlets :-** Introduction to Servlets (Life cycle of servlets, Java Servlets Development Kit, creating, Compiling and running servlet), The servlet API : javax.servlet package, Reading the servlet Parameters, Handling HTTP Request and Response (GET / POST Request) , Using Cookies, Session Tracking. **JSP :** JSP Architecture, JSP Access Model, JSP Syntax Basic (Directions, Declarations, Expression, Scriplets, Comments), Request Dispatching, the include Directivity, Session Management, Developing web application using Structs.	13
4	**JSP AND XML**:XML Overview, XML Processing Model, Parsing XML,XSL Transformation With XSLT,XML Syntax for JSP. **JAVA BEAN:** What is Java Bean? Advantages of Java Bean, Application Builder Tools, Using the Bean Development Kit, Using Bound Properties, Using the BeanInfo Interface, Constrained Properties, JAVA mail API	11
5	**Distributed Object Development Using RMI** Remote Method Calls, Stubs and Parameter Marshalling, RMI Programming Model, Transferring remote and Non-Remote Objects, Dynamic class loading, Using Multiple interfaces, Remote object Activation, Class Loaders, Byte code verification, Serialization.	12
	Text Book : 1. Core Java Vol-II- Advanced Features, VII Ed., Cay S Horbmann & Gary Cornell, Person Education. 2. Java Complet Reference, Herbert Schildt, TMH, VIII Ed. **3.** JSP 2,Q: The complet Reference, Second Ed. Phil Hanna, TMH.	
	Reference Books: 1. Using Java 2, Weber, QUE. 2. Dustin R Callaway: Inside Servlets Pearson Education (LPE) 3. XML Related Technologies and Programming in Java by IBM EEE (PHI). 4. Larne Pekowasky: Java Server Pages, Pearson Education (LPE) 5. Dietel & Dietel: WWW: How To Program, Pearson Education (LPE)	
	Course Outcomes: **1.** Ability to develop applications using Client/Server technology. 2. Knowledge of designing Server Side Application Using JSP and Servlets. 3. Knowledge of developing Component Based Development Using Java Bean. 4. Knowledge of networking Programming Based on TCP/ UDP Protocols and GUI Application, Enterprise Application Development Based On JDBC.	

Course Code	**17MCA213**
Course Name	**Data warehouse & Data Mining**
Course Short Name	**DWDM**
Total Lectures	**60**
Total Credits	**04**

Prerequisites :
Basic knowledge about databases, data storage and information retrieval.

Course Objectives:

- To understand the basics of Data Warehouse & Data Mining.
- To study various techniques / schemes of storing large datasets and issues there in.
- To learn the Data Visualization and pattern identification.
- To study the Classification, Clustering, and Association analysis.
- Study of advanced data mining techniques.

Units	Contents	Total Lecture
1	**Introduction to Data warehouse:** DSS, Definition of DW, basic characteristics, need, differences between database & DW, goals, advantages & disadvantages, Components, Types, Architectures, Data Mart, Types of DM, metadata for DM, types of metadata, Process of building DW, OLAP, OLTP , Comparison between OLTP & OLAP; MOLAP Architecture; ROLAP Architecture; Hybrid/MQE architecture. Building a data warehouse: Considerations, data extraction, cleanup and transformation tools, applications and DW security.	12
2	**Introduction to Data Mining :**Definition, need, evolution, KDD process, KDD Vs.DM, basic DM task, process, issues, matrices, introduction to operations in DM, applications, architecture of DM system, Data mining techniques, related field relations. Types of data sets Data Processing Approaches: Aggregation; Sampling; Dimensionality reduction; Feature subset selection; Feature creation; Discretization and binirazation; Variable transformation.	12
3	**Classification:** Introduction in context with DM, issues in classification, statistical-based algorithms, distance based algorithms, decision tree based algorithms, Neural network based algorithms, rule based algorithms,; SVM classifier, examples .	12
4	**Clustering:** Introduction, difference between Classification & Clustering, requirement of clustering in DM,types of data for cluster analysis, types of clustering methods, outliers, similarity and distance measures, agglomerative algorithm, MST, K-means clustering, PAM algorithm, clustering using GA ,Using NN, clustering large databases: DBSCAN	12
5	**Association Rules:** Introduction, Support, confidence, Market basket analysis, large Item sets, Criteria for classification of frequent pattern mining, , Apriority algorithm Partition Algorithm, FP growth algorithm, Advanced Association rule techniques , large item set generation, Sequential pattern; sub graph patterns; Infrequent patterns.	12
	Text Book : "Data Mining" by Margaret H.Dunham, LPE Pearson Education "Data Warehousing and Data Mining" by ITL education solutions ltd, Express Learning series	
	Reference Books: "Data Mining Techniques" by Arun K. Pujari, 2nd edition "Data Warehousing" C.S.R Prabhu, 3rd edition "Data Mining & Data Warehousing" by B.B.Agrawal & S.P.Tayal "Data Mining Methods" by Rajam Chattamvelli. Narosa Publishing.	
	Course Outcomes: • Able to perform Data Preprocessing. • Ability to perform Descriptive and predictive analysis of data. • Problem solving and applications of Data Mining.	

Course Code	**17MCA214**
Course Name	**Elective- 1 Cyber Security & Ethical Hacking**
Course Short Name	**CSEH**
Total Lectures	**60**
Total Credits	**04**

Prerequisites :

- Basics information of Viruses and Firewall.
- Basic knowledge of Networking Protocols.

Course Objective:

- To learn about the importance of information security.
- To understand various hacking techniques and attacks.

Units	Contents	Total Lectures
1	Information system components, information security: introduction, threats, cyber security and security risk analysis, application security: introduction, data security considerations, disposal of data, security technology, access control	12
2	Security threats, network and service attacks, security threats in e-commerce.	12
3	Development of secure information system, introduction, key elements of information security policy, application security, security architecture and design, security issues in hardware	12
4	Hacking: introduction, types of hackers, types of hacking, phases of hacking,, hacking into system, advantages, disadvantages, ethical hacking tools, process of ethical hacking.	12
5	Introduction to kali Linux, footprinting, scanning, sniffing, packet analysis and session hijacking, vulnerability assessment. email-Hacking ,Google Hacking Websites, and databases Hacking, Windows Passwords Cracking in seconds, Wireless Cracking , Mobile Hacking	12
	Text Book : 1. Fundamentals of Cyber security(Principles, theory and Practices) By Mayank Bhushan, Rajkumar Singh Rathore, Aatif Jamshed BPB Publication 2. Ethical Hacking for begineers by Deepanshu Rai, CreateSpaceIndependent publishing platform. 3. Hacking for begineers by Cooper Alvin	
	Reference Books: 1. Cryptography and information security by V.K..Pachghare PHI pub 2. Cyber Security by Nina Godbole and Sunit Belapure, Wiley pub 3. Hacking-Be a hacker with ethics by Harsh Bothara 4. The unrevealed secrets of hacking and cracking-Hack before you get cracked by Prateek Shukla 5. Hacking secrets –A practical guide to learn Hacking by Sai Satish	
	Course Outcomes: • Understanding of system security and cyber security. • Knowledge of different attacks. • Use of different tools for hacking, hijacking and web vulnerability.	

Course Code	**17MCA214**
Course Name	**Elective- 1 Image Processing**
Course Short Name	**IP**
Total Lectures	**60**
Total Credits	**04**

Prerequisites:

- Basic knowledge in Computer Graphics.
- Knowledge of digital Image and related terms.
- Knowledge of representation formats of digital images.

Course Objective:

- To study the image enhancement techniques.
- To study image restoration procedures.
- To study the image compression procedures.
- To study the image segmentation and representation techniques.

Units	Contents	Total Lectures
1	**Introduction:** Digital Image Representation, Fundamental steps in digital image processing, Elements of Digital Image Processing system. A simple image model, basic relationships between pixels. **Basic Transformations:** Translation, Scaling, Rotation, Perspective transformation, Camera Model, Stereo Imaging, Film Characteristics.	12
2	**Image Transforms:** Introduction of Fourier Transform, Forward and Reverse transformation Kernel, Walsh transform, Hadamard transform, Haar transform, Slant transform, Hotelling transform. **Image Enhancement:** Spatial Domain Method, Frequency Domain Methods, Point processing: Intensity Transformation, Histogram processing, Image Subtraction and Image Averaging.	12
3	**Spatial Filtering:** Smoothing Filters, Sharpening Filters, Lowpass and Highpass Filters, Homomorphic Filters. **Color Image Processing:** RGB Color Model, CMY Color Model, YIQ Color Model, HSI Color Model. Intensity Slicing, Gray level to color transformation.	12
4	**Image Restoration:** Image Degradation Model, Algebraic approach to restoration, interactive restoration. **Image Compression:** Image compression models, error-free compression, lossy compression, Image Compression standards.	12
5	**Image Segmentation:** Detection of discontinuous, Edge Detection, Edge linking and boundary detection, threshold. **Representation and Description:** Representation Schemes, Boundary Descriptors, Regional Descriptors, Morphology.	12
	Text Book : 1. Digital Image Processing, Rafeal C.Gonzalez, Richard E.Woods, Second Edition, Addison-Wesley Publishing Company.	
	Reference Books: 1. Fundamentals of Image Processing, Anil K. Jain, Eighth Edition, Prentice Hall of India Pvt. Ltd., New Delhi. 2. Digital Image Processing and Analysis, B. Chanda, D. Datta Mujumder, PHI Learning Pvt. Ltd., New Delhi. 3. Image Processing In C, Dwayne Phillips, First Edition, B.P.B. Publications, Delhi.	
	Course Outcomes: • Knowledge of the Image enhancement techniques, Image restoration procedures and compression procedures. • Knowledge of image segmentation and compression techniques.	

Course Code	**17MCA214**
Course Name	**Elective-1: Soft Computing-Fuzzy Logic and Neural Network**
Course Short Name	**ELE**
Total Lectures	**60**
Total Credits	**04**

Prerequisites :
Knowledge of AI, Linear Algebra and Calculus, Probability theory.

Course Objective:
- To solve complex real-world problems using soft computing techniques.
- To recognize the feasibility of applying a soft computing methodology for a particular problem.
- To design, analyze and perform experiments using soft computing techniques.

Units	Contents	Total Lectures
1	**Soft Computing:** Introduction, Hard Computing and Soft Computing, Constituents of Soft Computing: Conventional AI to Computational Intelligence, Neural networks, Fuzzy set theory, Evolutionary Computation. Introduction to Hybrid systems, Neuro-Fuzzy and soft computing characteristics.	10
2	**Neural Network**: Introduction, Advantages, Applications, Fundamental Concept, Basic model of artificial neural network, McCulloch-Pitts Neuron, Linear separability, Hebb Network.	12
3	**Supervised Learning Networks:** Introduction, Architectures of: Percepteron Networks, Adaptive Linear Neuron (Adaline), Multiple Adaptive Linear Neurons, Back propogation Network. **Unsupervised Learning Networks:** Introduction, Architectures of: Fixed weight competitive nets (Maxnet, Mexican Hat, Hamming), Kohonen self-organizing feature maps, Learning Vector Quantization, Counter propagation networks (Full & Forward only).	14
4	**Fuzzy Logic:** Introduction, Fuzzy sets, Fuzzy relations, Fuzzy arithmetic and Fuzzy measures, Fuzzy Rule base and approximate reasoning: Introduction, Truth values & Tables in Fuzzy logic, Fuzzy propositions, Formation of rules, Decomposition of Rules, Aggregation of Fuzzy Rules, Fuzzy Reasoning. Fuzzy decision making.	12
5	**Genetic Algorithm:** Introduction, Traditional Optimization and Search Techniques, GA and search space, Difference of Genetic Algorithm and Traditional methods, Simple genetic algorithm, General GA, Operators in Genetic Algorithm: Encoding, Selection, Crossover and Mutation. Problem solving using genetic algorithm, Advantages & Limitations of GA, Applications of GA.	12
	Text Book : 1. Dr. S. N. Sivanandam, Dr. S. N. Deepa, "Principles of Soft Computing", 2nd Edition, Wiley India Pvt. Ltd. 2. Samir Roy, Udit Chakraborty, "Introduction to soft computing Neuro-Fuzzy and Genetic Algorithms", Pearson. 3. S. R. Jang, T. Sun, E. Mizutani, "Neuro-Fuzzy and Soft Computing A Computational Approach to Learning and Machine Intelligence", PHI Learning Private Ltd.	
	Reference Books: 1. Satish Kumar, "Neural Networks A Classroom Approach", Tata McGraw-Hill Education Pvt. Ltd. 2. Simon Haykin, "Neural Networks and Learning Machines", Third Edition, PHI Learning Private Ltd. 3. M. Ganesh, "Introduction to Fuzzy Sets and Fuzzy Logic", PHI Learning Private Ltd. 4. John Yen, Reza Langari, "Fuzzy Logic Intelligence, Control and Information", Pearson Education. 5. David E. Goldberg, "Genetic Algorithms in Search, Optimization & Machine Learning", Pearson Education.	
	Course Outcomes: • Recognize the feasibility of applying a soft computing methodology for a particular problem. • Ability to solve complex real-world problems using soft computing techniques. • Conceptualize fuzzy logic & its implementation for various real world applications. • Derive the mathematical background to carry out optimization using genetic algorithms.	

Course Code	**17MCA214**
Course Name	**Elective- 1 Bioinformatics**
Course Short Name	**Bio**
Total Lectures	**60**
Total Credits	**04**

Prerequisites :
Knowledge about Biology, mathematics, database system and file system.

Course Objective:

- To study the basics of Bioinformatics.
- To study various databases used in Bioinformatics and how to search the information in those databases.
- To study the popular tools FASTA and BLAST.
- To study Genome maps, Gene identification and prediction methods and tools.
- To study Protein Structure visualization and prediction.
- To study the application in drug discovery and drug discovery.

Units	Contents	Total Lectures
1	**Bioinformatics Introduction:** Introduction**,** Bioinformatics Applications, Major Databases in Bioinformatics, Data Management and Analysis, Molecular Biology and Bioinformatics, Central dogma of Molecular Biology. **Biological Databases:** Introduction, Types of Databases, Biological Databases Considerations**.** **Information Search and Data Retrieval:** Introduction, Electronic Libraries, Tools for Web search, Data Retrieval Tools, Data Mining of Biological Databases.	12
2	**Alignment of Pairs of Sequences:** Introduction, Biological Motivation of Alignment Problems, Methods of Sequence Alignments, Using score matrices. **Alignment of Multiple Sequences:** Introduction, Methods of multiple sequence alignment, Applications of Multiple Alignments. **Tools for Similarity search & Sequence Alignment:** Introduction, Working with FASTA & BLAST, Fasta & Blast Algorithms comparison, Other programs.	12
3	**Genome Mapping:** Introduction, Genome Mapping, Sequence Assembly Problem, Genetic mapping & Linkage Analysis, Physical Maps, Application of Genetic Maps, Sequence Assembly Tools, Human Genome Project (HGP)**.** **Gene Identification and Prediction:** Introduction, Pattern Recognition, Gene Prediction Methods, Other Gene Prediction tools. **Gene Expression and Microarrays:** Introduction, Working with DNA Microarrays, Clustering Gene Expression Profiles, Data Sources & Tools for Microarray Analysis, Applications of Microarray Technology.	12
4	**Protein Structure visualization:** Introduction, Protein structure databases, Protein structure visualization and database tools, Protein structure alignment, Domain Architecture Databases, Tools for plotting Protein-Ligand interaction. **Protein Structure Prediction:** Introduction, Protein Identification and Characterization, Primary and Secondary Structure analysis & Prediction, Motifs, Profiles, Patterns and Fingerprints Search.	12
5	**Drug Discovery:** Introduction, Areas influencing drug discovery, Pharmacogenetics and Pharmacogenomics Applications, Important parameters in drug discovery, drug discovery technologies. **Computer aided drug design:** Introduction, Drug design approaches, Computer aided drug designing methods.	12
	Text Book : 1. S.C. Rastogi, N. Mendiratta, P. Rastogi, "BIOINFORMATICS Methods and Applications Genomics, Proteomics and Drug Discovery", Fourth Edition, PHI Learning Private Limited. 2. David W. Mount, "Bioinformatics Sequence & Genome Analysis", CSHL Press 3. Jin Xiong, "Essential Bioinformatics", Cambridge University Press.	
	Reference Books: 6. Arthur Lesk, "Introduction to Bioinformatics", Second Edition, Oxford University Press 7. T. K. Attwood, D. J. Parry-Smith, Samiron Phukan, "Introduction to bioinformatics", First Edition, Pearson Education Ltd. 8. Zhumur Ghosh, Bibekanand Mallick, "BIOINFORMATICS Principles and Applications", First Edition, Oxford University Press	
	Course Outcomes: Understanding of the Bioinformatics databases, techniques and tools. Knowledge of application areas of bioinformatics.	

Course Code	**17MCA215**
Course Name	**Practical- Assembly Language Programming**
Course Short Name	**PALP**
Total Teaching Hours	**30**
Total Credits	**6**

Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.

Course Code	**17MCA216**
Course Name	**Practical- Advanced Java Programming**
Course Short Name	**PJAVA**
Total Teaching Hours	**30**
Total Credits	**2**

Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.

Course Code	**17MCA217**
Course Name	**Lab – Dot Net**
Course Short Name	**Lab - 2**
Total Teaching Hours	**30**
Total Credits	**2**

Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.

Course Code	**17MCA218**
Course Name	**Vacational Internship**
Course Short Name	**INT**
Total Teaching Hours	**30**
Total Credits	**2**

Vacational Internship of 30 days / Online Courses through Swayam /MOOC / NPTEL/ Conduction of Workshop on New Technology of 10 Hrs: Students are required to complete a "Vacation Internship of 30 days during Winter and /or summer vacation.

OR

Complete one online course offered by Swayam, MOOC, NPTEL in related Subject.

OR

Conduct a workshop of not less than 10 hrs duration on new tools/technology for students of same class / Junior class.

Shree H.V.P. Mandal's

Degree College of Physical Education, Amravati.

(Multi-faculty Autonomous College)

FACULTY OF SCIENCE AND TECHNOLOGY (ENGINEERING GROUP)

MASTER IN COMPUTER APPLICATION

SYLLABUS OF

THIRD YEAR

(Choice Based Credit System)

Program Code: MCA

Introduced from the session 2017-2018

MCA Semester - V

Course Code	**17MCA301**
Course Name	**Optimization Techniques**
Course Short Name	**OT**
Total Lectures	**60**
Total Credits	**04**

Prerequisite

Awareness about Numerical method, Statistical method, Array Algebra.
The student should familiar with Discrete Mathematical Structure.

Course Objectives

1. To introduce the concept of Project Management.
2. To learn Critical Path Approach, System Integration, Cost Benefit Analysis and improve productivity in multinational Business.

Unit I	Introduction to Operation Research (O.R.), classification of models, Advantages of models. Linear programming : Examples, Applications of L.P. Model, Formulation, Graphical solution method, Simplex method, Duality in L.P.	12
Unit II	Integer Linear Programming: Transportation model, Definition, Formulation, Solution. Assignment Problem: Model, Definition, Formulation, Solution. Operation research techniques, Decision Theory: Steps, Decision making environment under certainty, uncertainty and risk. Decision trees , Game Theory: Pure strategies, Game with saddle points, Mixed strategies, Rules of Dominance.	12
Unit III	Inventory control model: meaning, advantages, features, deterministic inventory control model with storage, constraint, Probabilistic inventory control model with setup cost and without setup cost. Sequencing problem: Notation terminology, Processing in Jobs through two m/c, three m/c, two jobs through three m/c, n jobs through m m/c.	12
Unit IV	Project Management: PERT Introduction, CPM Introduction, Difference between PERT and CPM, Phases of Project Management, PERT/CPM Network, Cost analysis, Project Scheduling, Resource Allocation.	12
Unit V	Queuing theory: Structure, Components, Calling Population, Queuing Discipline, Service Process, Types of waiting line situation , random arrival and random servicing , Some general relation ship for waiting line model, Simulation: Introduction, Steps of Simulation process, Advantages and Dis advantages, simulation of inventory problems.	12

Text Books

1. "Operation Research" by Hira and Gupta.
2. "Operation Research Theory and Application" by J.K.Sharma.
3. "Operation Research" by Anand Sharma Taha Publication.

Reference Book

1. "Operation Research" by Shridhar Bhat
2. "Operation Research" by Natrajan Taha Publication.
3. "Operation Research" by Gillete.

Course Outcomes:

- Ability to investigate, study, develops, organize and promote innovative solutions for various applications.
- Ability to apply optimization techniques.

Course Code	**17MCA302**
Course Name	**Business system Administration**
Course Short Name	**BSA**
Total Lectures	**60**
Total Credits	**04**

Prerequisite

1. Basic information about business organization.
2. Information about financial transactions and book keeping.

Course Objectives

3. To study the processes in the business system.
4. To learn the business system optimization.
5. To study implementation of business processes.
6. To Impart the knowledge of basic cost concepts, elements of cost, methods of costing.

Unit I	**Introduction to business system:** Introduction of management Accounting, financial Accounting, cost Accounting, comparison, Fundamental principles of cost accounting, Basic cost concept.	12
Unit II	**Materials Cost :** Basic concepts of material cost, purchase control, store control and Issue control. **Labors cost :** Labors types, Need assessment and Requirement, Labor cost control parameter, time keeping methods and practices, wages methods.	12
Unit III	**Overhead Cost:** Definition, classification accounting , Appointment of services department cost, Absorption of factory overhead, Methods of Absorption of factory overhead , Administration of overhead , Under of over Absorption of overhead , Treatment of special Item of overhead **Output Cost:** Cost sheet,Method and preparing cost sheet, Tender and cost sheet	12
Unit IV	**Process Costing:** Introduction to job costing procedure, contract costing and Procedures, processes costing and Procedures , Operating costing (variable)Procedures.	12
Unit V	Budgets and budgetary controls , analysis and interpretation of financial statement Ratio analysis, fund flow and cash flow, statements, Recent development.	12

Text Books

1	Cost and management Accounting Theory problems and solution ------M.N. Arrora
2	Basic of cost Accounting Theory problems and solution ------M.N. Arrora

Reference Book

1	cost Accounting ---By V.V Probhudev
2	cost Accounting -----By R.S. Pillai, V. Buguvathi

Course Outcomes

- Knowledge of business systems.
- Knowledge of the functions of different units of a business system.
- Understanding of costing methods and ability to evaluate the cost of the process.

Course Code	**17MCA303**
Course Name	**Mobile Application Development**
Course Short Name	**MAD**
Total Lectures	**60**
Total Credits	**04**

Prerequisites: 1. Knowledge of Object oriented concept, Java and XML.

Course Objectives:

1. To learn the characteristics of mobile applications.
2. To understand the intricacies of UI required by mobile applications.
3. To study about the design aspects of mobile application.
4. To learn Mobile application development and working of mobile applications.

Units	Contents	Total Lectures
1	**Introduction**: Mobile Application, Mobile Application development, Types of Mobile Application: Native, Hybrid and Web application, Mobile Applications – Characteristics and Benefits, Tools for Mobile apps development.	10
2	**Application development with Android:** Introduction, Versions, Features, Architecture, Difference of android with other mobile application development platform. **Android Required Tools introduction**: Android Studio, Android SDK, Android SDK manager, Android Development tools (ADT), Android virtual device (AVD), Android NDK.	12
3	**Android Studio Project Structure**: Introduction, User Interface, Tools Window, Version Control Basics, Gradle Build System, Creating First Android Application, Introduction Kotlin on Android. **Activities and Intent**: Introduction, Life cycle of Activity, Applying style and themes to an activity, displaying a Dialog window, linking activities using intent, Passing data using an intent object, Displaying Notification.	12
4	**User Interface**: Components of a Screen: Linear Layout, Relative Layout, Table Layout, Screen orientation, Detecting and controlling the orientation of Activity, Listening for UI notification. **User interface with Views**: Text View, Button, Image Button, Edit Text, Checkbox, List View, Spinner view, Date and Time Picker view, Image view, Menus with types.	13
5	**Data Persistence**: Persisting data to files, saving internal and external storage, Creating and using Database, Content provider. Introduction about Sqlite database. **Messaging:** sending and receiving SMS messages, sending E-mail, **Location based services:** Displaying the map, displaying the zoom control.	13
	Text Book : 1. Wei-Meng Lee," Beginning Android 4 Application development", Wrox publication. 2 Reto Meier "Professional Android 4 Application Development", Wrox Publication.	
	Reference Books: 1. Mastering Android WebTech Solution Inc. Khanna Book Publication. 2. https://developer.android.com/guide/	
	Course Outcomes: 1. Knowledge to use Android studio for developing mobile applications. 2. Students are able to design and develop android application.	

Course Code	**17MCA304**
Course Name	**INTERNET OF THINGS**
Course Short Name	**IOT**
Total Lectures	**60**
Total Credits	**4**

Prerequisites :

- Information of Internet and Internet of Things.
- Knowledge of sensors and sensor network.

Course Objectives:

- To study the RFID Technology, Sensor Technology and Satellite Technology.
- To study the resource management and security issues in Internet of Things.
- To study the application areas of Internet of things.

Units	Contents	Total Lectures
I	**Introduction:** What is Internet of Things : History of IoT, About IoT, Overview, Applications. Definitions and Frameworks : IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities	12
II	**Fundamentals of IOT mechanism & key technologies:** Identification of IoT, Objects and Services, Structural aspects of IoT, Environment Characteristics, Traffic Characteristics, Scalability, Interoperability, Security and Privacy, Open Architecture, Key IoT Technologies, Device Intelligence, Communication Capabilities, Mobility Support, Device Power, Sensor Technology, RFID Technology, Satellite Technology.	12
III	**Evolving IOT standard :** Overview and Approaches, MQTT Protocol, Representational State Transfer (REST), ETSI M2M, IP in Smart Objects (IPSO). **Signal Conditioning Units:** Sensors(Temperature Sensor, Pressure Sensor, Motion Control Sensor, Soil Moisture Sensor, Ultrasonic Range Sensor), Gateway (Raspberry PI, Arduino, Its Difference), Actuators.	12
IV	**Wireless Technologies for IOT : WPAN Technologies for IoT/M2M**: Zigbee/IEEE 802.15.4, Radio Frequency for Consumer Electronics (RF4CE), Bluetooth and its Low-Energy Profile, Comparison of WPAN Technology. **Cellular and Mobile Network Technologies for IoT/M2M:** Overview and Motivations, Universal Mobile Telecommunications System, LTE	12
V	**IOT Privacy, Security & Governance :**Vulnerabilities of IoT, Security requirements, Threat analysis, Use cases and misuse cases, IoT security tomography and layered attacker model, Identity establishment, Access control, Message integrity, Non-repudiation and availability, Security model for IoT.	12
	Text Books: **1. Daniel Minoli**, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", Willy Publications **2. Bernd Scholz-Reiter**, Florian Michahelles, "Architecting the Internet of Things",	
	References : **1. Hakima Chaouchi**, " The Internet of Things Connecting Objects to the Web" Willy Publications **2. Olivier Hersent**, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, , 2nd Edition, Willy Publications **3. Daniel Kellmereit**, Daniel Obodovski, "The Silent Intelligence: The Internet of Things",. Publisher: Lightning Source Inc; 1 edition (15 April 2014).	
	Course Outcomes: • Understanding of Internet of Things. • Knowledge of Key technologies and standards used in IoT. • Security and governance in IoT.	

Course Code	**17MCA305**
Course Name	**Software Testing and Quality Assurance**
Course Short Name	**STQC**
Total Teaching Hrs.	**58**
Total Credits	**4**

Prerequisites :

- Knowledge of Software Life cycle, Models etc.

Course Objectives:

- To understand the role of Software Testing in enterprise performance management.
- To study the applications of Software Testing.
- To study Various Type of Testing, Organization Structure for software testing.
- Ability to learn the various tools, technologies and standards for Software Testing and Quality Control.

Units	Contents	Total Hrs.
1.	**Introduction to Software Testing:** Why Testing? Need of s/w Testing Principle,Goals of Software Testing, Effective Software Testing vs. Exhaustive Software Testing, ,**Software Testing life cycle, Debugging Life Cycle.**	11
2.	**Testing Techniques:**, UnitTesting, Integration Testing, , System Testing, Acceptance Testing, Regression Testing. Quality Assurance and Quality Control, Quality Management, QM &Project Management, Quality Factor, Methods Of Quality Management, Software Quality Metrics.	12
3.	**Verification & Validation , V-Model,Software Testing Methodology,** Black Box Testing:-Boundary Value Analysis, Equivalence Partioning, Finite State Testing. **White Box Testing**:-Statement Coverage, Decision Coverage, Cyclomatic Complexity	12
4.	Static Testing and their Techniques Dynamic Testing, Functional Testing:-Volume Testing, Stress Testing, Compatibility Testing, Load Testing, Configuration Testing, Performance Testing, Usability testing, Interoperability Testing, Security Testing, Retesting	11
5.	Test Case Writing:- How to Write Test Cases, Test Design&Specification, Debugging Life Cycle, **Software Metrics:** Need of Software Measurement, Definition of Software Metrics, Classification of Software Metrics, Entities to be Measured, Size Metrics, Testing Metrics for Monitoring & Controlling the Testing Process, Efficient Test Suit Management.	12
	Text Books: 1. NareshChauhan, 'Software Testing Principals and Practices, Oxford Higher Education	
	References : 1. SrinivasanDesikan And Gopalswamy Ramesh, 'Software Testing Principals and Practices, Pearson 2. Daniel Galin 'Software Quality Assurance from Theory to Implementation' Pearson/Addison Wesley, 2004	
	Course Outcomes: • Understanding about the software testing terminology. • Knowledge about software testing technologies, models and software metrics.	

Course Code	**17MCA306**
Course Name	**Practical- Mobile Application Development**
Course Short Name	**PMAD**
Total Teaching Hours	**30**
Total Credits	**2**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.	

Course Code	**17MCA307**
Course Name	**Practical- Software Testing and Quality Assurance**
Course Short Name	**PSTQA**
Total Teachning Hours	**30**
Total Credits	**2**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.	

Course Code	**17MCA308**
Course Name	**Lab – Data Analytics**
Course Short Name	**Lab – 1**
Total Teaching Hours	**30**
Total Credits	**2**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.	

Course Code	**17MCA309**
Course Name	**Lab – Elective**
Course Short Name	**Lab – II**
Total Teaching Hours	**30**
Total Credits	**2**
Practical list will be prepared by subject teacher in every session and duly approved by Head of the department. So the list is not mentioned.	

MCA Semester - VI

Course Code	**17MCA310**
Course Name	**Seminar**
Course Short Name	**Sem**
Total Teaching Hours	**90**
Total Credits	**6**

Prerequisites

-

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.

Synopsis format:

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

Seminar Report Format:

1. Abstract
2. Introduction
3. Technology Focus
4. Applications
5. Future Scope
6. Conclusion
7. 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.
4. Synopsis should submit the synopsis in the given format for approval by the department.
5. Synopsis should not exceed more than 2 pages, it should cover the summery of whole topic in brief.
6. Minimum 10-12 slides presentation should be prepared for seminar.
7. Seminar report should be duly signed by seminar guide.
8. It will be responsibility of guide and students to communicate about selection/rejection/preparation of the topic to each other.
9. Synopsis should be submitted within tipe span specified by Seminar In-charge.
10. Synopsis should be hand written.

Formatting Rules:

a. Paper size A4.
b. Margins all side 1 inch.
c. Line Spacing for final report 1.5
d. Font : Times New Roman
e. Size :
   i. 12 for Normal body of text in the seminar report
   ii. 14 for title and headings in the seminar report
   iii. 9 for footnote and style italic

Course Outcome:

- Ability to learn a new technology and formulate the contents for self learning.
- Able to present the new topic and defend the questions raised.
- Gain self confidence and stage daring.

Course Code	**17MCA311**
Course Name	**Industrial Project**
Course Short Name	**Proj**
Total Teaching Hours	**-**
Total Credits	**22**

Prerequisites

- Preliminary knowledge of research methodology.
- Knowledge about technology and application domain in which project will be developed.
- Good knowledge of subject domain and Software Engineering.

Objectives

- To give the students hands on experience of real life system development life cycle involving deadlines and team work.
- To make the students apply the technologies learnt during the programme.
- To provide the experience in analyzing, designing, implementation and evaluating information systems by following proper documentation process.
- To learn research methodology & tools used in research.

Rules for Project Work :

A student will be examined in the course "Project Work" as given below:

1. Project work may be done individually or in groups. However if project is done in groups, each student must be given a responsibility for a distinct task and care should be taken to see the progress of individual.
2. Students should take guidance from a guide and prepare a Project Report on "Project Work" in 2 copies to be submitted to the Head of the Department. A soft copy of project report along with source-code and data should also be submitted.
3. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, File designs, experimental setup and methodology.
4. The project report will be duly accessed by the guide of the project and marks will be communicated by the Head of the Department to the Examination Department.
5. The project report should be prepared in a format prescribed by the College, which also specifies the contents and methods of presentation.

General Instruction Regarding Preparation of Project Report :

TYPING :

(a) The typing shall be standard 12 pts in double spacing using only
(b) Margins must be Left 1.5 inches Right 1 inches Top 1 inches Bottom 1 inches
(c) Paper A4 size Paper

COPIES :

Two hard-bind copies (As per format displayed herewith) One original and one clean Xerox Copy.

FORMAT FOR TITLE PAGE AND FOR COVER PAGE :

PROJECT REPORT
ON
NAME OF THE PROJECT
BY
NAME OF STUDENT

GUIDED BY
NAME OF THE GUIDE

P.G. Department of Computer Science & Technology
Degree College of Physical Eucation
Shree H. V. P. Mandal, Amravati.

ACADEMIC SESSION

Report format for Application Development Projects:

1 Blank Page at beginning
Title Page
Certificate from Guide
Acknowledgement
Index with printed Page Numbers

CHAPTER 1 : INTRODUCTION
1.1 Company Profile (optional)
1.2 Existing System and Need for System
1.3 Proposed System
1.4 Scope of Work
1.5 Operating Environment – Hardware and Software

Report format for Research Projects:

1 Blank Page at beginning

Title Page
Certificate from Guide
Acknowledgement
Index with printed Page Numbers

CHAPTER 1 : INTRODUCTION
1.1 Problem Domain
1.2 Problem Statement
1.3 Experimental Setup

CHAPTER 2 : PROBLEM DEFINITION

CHAPTER 3 : ANALYSIS & DESIGN 3.1 User Requirements 3.2 Software Requirements 3.3 System Flow 3.4 Module Flow 3.5 Module Document 3.6 Input Document 3.7 Computational Method Document (If methods are used) 3.8 Output Document 3.9 Data Flow Diagram (DFD) 3.10 Functional Decomposition Diagram (FDD) 3.11 Entity Relationship Diagram (ERD) 3.12 Data Dictionary 3.13 Table Design 3.14 Menu Tree 3.15 Menu Screens 3.16 Input Screens 3.17 Report Formats 3.18 Pseudocodes (optional) 3.19 Test Procedures (optional) CHAPTER 4: IMPLEMENTATION & RESULTS 4.1 Input Forms with Data 4.2 Output Reports with Data 4.3 Sample Code CHAPTER 5 : USER MANUAL 5.1 User Manual 5.2 Operations Manual / Menu Explanation 5.3 Forms and Report Specifications CHAPTER 6: CONCLUSION AND FUTURE SCOPE 6.1 Drawbacks and Limitations 6.2 Conclusion 6.3 Proposed Enhancements REFERENCES 1 Blank Page at the end.	1.1 Review of Related Work 1.2 Problem Definition CHAPTER 3 : EXPERIMENT DESIGN & METHODOLOGY 1.1 Experiment Design 1.2 Methodology CHAPTER 4: RESULT ANALYSIS a. Data Sheets b. Graphs & Tables c. Sample Code CHAPTER 5: CONCLUSION AND FUTURE SCOPE 5.1 Issues and Limitations 5.2 Conclusion 5.3 Future Scope REFERENCES 1 Blank Page at the end.

Course Outcomes

- Learn proper project documentation.
- Ability to implement the commercial or research project.
- Ability to commissioning of the developed software.
- Presentation and marketing skills for the developed application.