Semester I							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	Core	MCAC101 MCAC191	Programming for problem solving	4	0	4	6
2	Core	MCAC102 MCAC192	Computer Networks	4	0	4	6
3	Core	MCAC103	Discrete Structures	5	1	0	6
3	Skill-1	MCAS101	Soft Skills	2	0	0	2
4	Elective-1 (MOOC)	MCAD101	A. Introduction to Data Science B. Cryptography and Cyber Security C. Introduction to Artificial Intelligence D. Cloud Computing	4 / 5	0/ 1	4/ 0	6
				Total Credit			26

Name of the Course: MCA	
Subject: Programming for Problem Solving	
Course Code: MCAC101 + MCAC191	**Semester: 1st**
Duration: 36 Hours	**Maximum Marks: 100 + 100**
Teaching Scheme	**Examination Scheme**
Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 4 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1	In-depth understanding of various concepts of programming language.
2	Ability to read, understand and trace the execution of programs
3	Skill to debug a program.
4	Skill to write program code in C to solve real world problems.

Objective:

Sl. No.	
1	To introduce students to a powerful programming language
2	To understand the basic structure of a program
3	To gain knowledge of various programming errors.
4	To enable the students to make flowchart and design an algorithm for a given problem.
5	To enable the students to develop logics and programs

Pre-Requisite:

Sl. No.	
1	Understanding of basic mathematical logic.

Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	Introduction to Computers Computer Systems, Computing Environments, Computer Languages, Creating and Running Programs, Software Development, Flow charts. Number Systems: Binary, Octal, Decimal, Hexadecimal Introduction to C Language - Background, C Programs, Identifiers, Data Types, Variables, Constants, Input / Output Statements Arithmetic Operators and Expressions: Evaluating Expressions, Precedence and Associativity of Operators, Type Conversions.	6	10
02	Conditional Control Statements Bitwise Operators, Relational and Logical Operators, If, If- Else, Switch-Statement and Examples. Loop Control Statements: For, While, DoWhile and Examples. Continue, Break and Goto statements Functions: Function Basics, User-defined Functions, Inter Function Communication, Standard Functions, Methods of Parameter Passing. Recursion- Recursive Functions.. Storage Classes: Auto, Register, Static, Extern, Scope Rules, and Type Qualifiers.	8	10
03	Preprocessors and Arrays Preprocessor Commands Arrays - Concepts, Using Arrays in C, Inter-Function Communication, Array Applications, Two- Dimensional Arrays, Multidimensional Arrays, Linear and Binary Search, Selection and Bubble Sort.	8	10
04	Pointers Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, Lvalue and Rvalue, Arrays and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications, Pointers to void, Pointers to Functions, Command Line Arguments. Strings - Concepts, C Strings, String Input/Output Functions, Arrays of Strings, String Manipulation Functions.	**8**	**20**
05	Structures and File Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Self Referential Structures, Unions, Type Definition (typedef), Enumerated Types. Input and Output: Introduction to Files, Modes of Files, Streams, Standard Library Input/Output Functions, Character Input/Output Functions.	**6**	**20**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination		**30**
	Total:		**100**

Practical
Course Code: MCAC191
Credit: 2
Skills to be developed:
Intellectual skills:
   1. Ability to read, understand and write computer programs.

2. Ability to analyze problems and provide program based solutions.

List of Practical:
1. Write a c program to display the word "welcome".
2. Write a c program to take a variable int and input the value from the user and display it.
3. Write a c program to add 2 numbers entered by the user and display the result.
4. Write a c program to calculate the area and perimeter of a circle.
5. Write a C program to find maximum between two numbers.
6. Write a C program to check whether a number is divisible by 5 and 11 or not.
7. Write a C program to input angles of a triangle and check whether triangle is valid or not.
8. Write a C program to check whether a year is leap year or not.
9. Write a C program to input basic salary of an employee and calculate its Gross salary according to following:
   Basic Salary <= 10000 : HRA = 20%, DA = 80%
   Basic Salary <= 20000 : HRA = 25%, DA = 90%
   Basic Salary > 20000 : HRA = 30%, DA = 95%
10. Write a c program to print "welcome" 10 times.
11. Write a c program to print first n natural numbers using while loop.
12. Write a c program to print all the odd numbers in a given range.
13. Write a c program to add first n numbers using while loop.
14. Write a c program to print all numbers divisible by 3 or 5 in a given range.
15. Write a c program to add even numbers in a given range.
16. Write a c program to find the factorial of a given number.
17. Write a c program to find whether a number is prime or not.
18. Write a c program to print the reverse of a number.
19. Write a c program to add the digits of a number.
20. Write a c program to print the fibonacci series in a given range.
21. Write a c program to check whether a number is an Armstrong number or not.
22. Write a c program to find g.c.d. and l.c.m. of two numbers.

Assignments:
   Based on the curriculum as covered by subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
E. Balaguruswamy	Programming in ANSI C		Tata McGraw-Hill
Gary J. Bronson	A First Book of ANSI C	4th Edition	ACM
Reference Books:			
Byron Gottfried	Schaum's Outline of Programming with C		McGraw-Hill
Kenneth A. Reek	Pointers on C		Pearson
Brian W. Kernighan and Dennis M. Ritchie	The C Programming Language		Prentice Hall of India

List of equipment/apparatus for laboratory experiments:			
Sl. No.			
1.	Computer with moderate configuration		
2.	A programming language compiler		

End Semester Examination Scheme.　　**Maximum Marks-70.**　　**Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1 to 5	10	10				
B	1 to 5			5	3	5	70
C	1 to 5			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)	**5*2=10**	
On Spot Experiment(one for each group consisting 5 students)	**10**	
Viva voce	**5**	

Name of the Course: MCA
Subject: Computer Networking

Course Code: MCAC102 + MCAC192	Semester: 1st
Duration: 36 Hours	Maximum Marks: 100 + 100
Teaching Scheme	Examination Scheme
Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 4 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1	To gain Knowledge of uses and services of Computer Network
2	To enhance Ability to identify types and topologies of network.
3	To gain Understanding of analog and digital transmission of data.
4	

Objective:

Sl. No.	
1	To deliver comprehensive view of Computer Network.
2	To enable the students to understand the Network Architecture,Network type and topologies
3	To understand the design issues and working of each layer of OSI model.
4	To familiarize with the benefits and issues regarding Network Security.

Pre-Requisite:

Sl. No.	
1.	None

Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	Introduction Introduction to communication systems, Data, signal and Transmission: Analog and Digital, Transmission modes, components, Transmission Impairments, Performance criteria of a communication system. Goals of computer Network, Networks: Classification, Components and Topology, categories of network [LAN, MAN,WAN];Internet: brief history, internet today; Protocols and standards; OSI and TCP/IP model.	3	10
02	Data link layer: Types of errors, framing [character and bit stuffing], error detection & correction methods; Flow control; Protocols: Stop & wait ARQ	6	10
03	Medium access sub layer: Point to point protocol, FDDI, token bus, token ring; Reservation, polling, concentration; Multiple access protocols:ALOHA, CSMA,FDMA, TDMA, CDMA; Ethernet	4	10
04	Network layer: Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : Internet address, classful	6	10

	address,Routing : techniques,static vs. dynamic routing ,Protocols: IP, IPV6			
05	Transport layer: Process to process delivery; UDP; TCP; Congestion control algorithm: Leaky bucket algorithm, Token buc ket algorithm, Quality of services [Qos]		**6**	**10**
06	Application Layer DNS, SMTP, FTP, HTTP & WWW; Security: Cryptography [Public, Private Key based], Digital Signature, Firewalls [technology & applications]		**6**	**10**
07	Physical Layer: Overview of data[analog & digital], signal[analog &digital], transmission [analog & digital] & transmission media [guided & unguided]; Circuit switching: time division & space division switch, TDM bus; Telephone Network		**5**	**10**
	Sub Total:		**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination			**30**
	Total:			**100**

Practical
Course Code: MCAC192
Credit: 2

List of Practical:
 Implementation of practicals are adhered to the theoretical curriculum.

 Assignments:
  Based on the curriculum as covered by subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
B. A. Forouzan	Data Communications and Networking		TMH
A. S. Tanenbaum	Computer Networks		Pearson Education/PHI
W. Stallings	Data and Computer Communications		PHI/ Pearson Education

Reference Books:			

List of equipment/apparatus for laboratory experiments:	
Sl. No.	
1	Computer with moderate configuration

2	Network simulator package		

End Semester Examination Scheme. Maximum Marks-70. Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1 to 7	10	10				
B	1 to 7			5	3	5	70
C	1 to 7			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)	5*2=10	
On Spot Experiment(one for each group consisting 5 students)	10	
Viva voce	5	

Name of the Course: MCA	
Subject: Discrete Structures	
Course Code: MCAC103	Semester: 1st
Duration: 36 Hrs	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 5	End Semester Exam: 70
Tutorial:1	Attendance: 5
Practical: 0	Continuous Assessment: 25
Credit:6	Practical Sessional internal continuous evaluation: NA
	Practical Sessional external examination: NA
Aim:	

Sl. No.	
1.	The aim of this course is to introduce you with a new branch of mathematics which is discrete mathematics, the backbone of Computer Science.
2.	In order to be able to formulate what a computer system is supposed to do, or to prove that it does meet its specification, or to reason about its efficiency, one needs the precision of mathematical notation and techniques. The Discrete Mathematics course aims to provide this mathematical background.

Objective: Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following

Sl. No.	
1.	Use mathematically correct terminology and notation.
2.	Construct correct direct and indirect proofs.
3.	Use division into cases in a proof.
4.	Use counterexamples.
5.	Apply logical reasoning to solve a variety of problems.

Pre-Requisite:

Sl. No.	
1.	**Knowledge of basic algebra**
2.	**Ability to follow logical arguments.**

Contents		4 Hrs./week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Set Theory** Definition of Sets, Venn Diagrams, complements, Cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets), proofs of some general identities on sets, pigeonhole principle. Relation: Definition, types of relation, composition of relations, domain and range of a relation, pictorial representation of relation, properties of relation, partial ordering relation. Function: Definition and types of function, composition of functions, recursively defined functions.	7	14
02	**Propositional logic** Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradictions, normal forms (conjunctive and disjunctive), modus ponens and modus tollens, validity, predicate logic, universal and existential quantification. Notion of proof: proof by implication, converse, inverse, contrapositive, negation, and contradiction, direct proof, proof by using truth table, proof by counter example.	8	14

03	**Combinatorics** Mathematical induction, recursive mathematical definitions, basics of counting, permutations, combinations, inclusion-exclusion, recurrence relations (nth order recurrence relation with constant coefficients, Homogeneous recurrence relations, Inhomogeneous recurrence relation), generating function (closed form expression, properties of G.F., solution of recurrence relation using G.F, solution of combinatorial problem using G.F.)	**7**	**14**
04	**Algebraic Structure** Binary composition and its properties definition of algebraic structure, Groyas Semi group, Monoid Groups, Abelian Group, properties of groups, Permutation Groups, Sub Group, Cyclic Group, Rings and Fields (definition and standard results).	**6**	**10**
05	**Graphs** Graph terminology, types of graph connected graphs, components of graph, Euler graph, Hamiltonian path and circuits, Graph coloring, Chromatic number. Tree: Definition, types of tree(rooted, binary), properties of trees, binary search tree, tree traversing (preorder, inorder, post order). Finite Automata: Basic concepts of Automation theory, Deterministic finite Automation (DFA), transition function, transition table, Non Deterministic Finite Automata (NDFA), Mealy and Moore Machine, Minimization of finite Automation.	**8**	**18**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Assignments:
Based on the curriculum as covered by subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Kenneth H. Rosen	Discrete Mathematics and its Applications		Tata Mc.Graw Hill
seymour Lipschutz, M.Lipson	Discrete Mathematics		Tata Mc.Graw Hill

Reference Books:

V. Krishnamurthy	Combinatorics:Theory		East-West Press

		and Applications				
Kolman, Busby Ross		Discrete Mathematical Structures			Prentice Hall International	

End Semester Examination Scheme.   Maximum Marks-70.   Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1 to 5	10	10				
B	1 to 5			5	3	5	60
C	1 to 5			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Name of the Course: MCA **Subject: Soft Skills**	
Course Code: MCAS101	**Semester: 1st**
Duration: 36 Hours	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 2	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 0	Continuous Assessment: 25
Credit: 2	Practical Sessional internal continuous evaluation: 0
	Practical Sessional external examination: 0
Aim:	
Sl. No.	
1.	Ability to read English with ability to read English with understanding and decipher paragraph patterns, writer techniques and conclusions

2.	Skill to develop the ability to write English correctly and master the mechanics of writing the use of correct punctuation marks and capital letter	
3.	Ability to understand English when it is spoken in various contexts.	

Objective:

Sl. No.		
1.	To enable the learner to communicate effectively and appropriately in real life situation	
2.	To use English effectively for study purpose across the curriculum	
3.	To use R,W,L,S and integrate the use of four language skills, Reading, writing , listening and speaking.	
4.	To revise and reinforce structures already learnt.	

Aim:

Pre-Requisite:

Sl. No.		
1.	Basic knowledge of English Language.	

Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
02	**Grammar** Correction of sentence, Vocabulary / word formation, Single word for a group of words, Fill in the blank, transformation of sentences, Structure of sentences – Active / Passive Voice – Direct / Indirect Narration.	6	10
03	**Essay Writing** Descriptive – Comparative – Argumentative – Thesis statement- Structure of opening / concluding paragraphs – Body of the essay.	5	10
04	**Reading Comprehension** Global – Contextual – Inferential – Select passages from recommended text .	5	10
05	**Business Correspondence** Letter Writing – Formal.Drafting.Biodata- Resume'- Curriculum Vitae.	5	10
06	**Report Writing** Structure , Types of report – Practice Writing.	5	10
07	**Communication skills** Public Speaking skills , Features of effective speech, verbal-nonverbal.	5	10
08	**Group discussion** Group discussion – principle – practice .	5	10
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination		30
	Total:		100
Practical			

Course Code: MCAC192
Credit : 2
Skills to be developed:
Intellectual skills:
1. Skill to read, write and speak english efficiently.

List of Practical:

1. Honing 'Listening Skill' and its sub skills through Language Lab Audio device.
2. Honing 'Speaking Skill' and its sub skills.
3. Helping them master Linguistic/Paralinguistic features (Pronunciation/Phonetics/Voice modulation/ Stress/ Intonation/ Pitch & Accent) of connected speech.
4. Honing 'Conversation Skill' using Language Lab Audio –Visual input, Conversational Practice Sessions (Face to Face / via Telephone , Mobile phone & Role Play Mode).
5. Introducing 'Group Discussion' through audio –Visual input and acquainting them with key strategies for success.
6. GD Practice Sessions for helping them internalize basic Principles (turn- taking, creative intervention, by using correct body language, courtesies & other soft skills) of GD.
7. Honing 'Reading Skills' and its sub skills using Visual / Graphics/Diagrams /Chart Display/Technical/Non Technical Passages, Learning Global / Contextual / Inferential Comprehension.
8. Honing 'Writing Skill' and its sub skills by using Language Lab Audio –Visual input, Practice Sessions.

Assignments:
Based on the curriculum as covered by the subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Mark MaCormack	Communication		
John Metchell	How to write reports		
S R Inthira & V Saraswathi	Enrich your English – a) Communication skills b) Academic skills		CIEFL & OUP

Reference Books:

R.C. Sharma and K.Mohan	Business Correspondence and Report Writing		Tata McGraw Hill
L.Gartside	Model Business Letters		Pitman

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1	Computer with moderate configuration
2	Audio visual Setup.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
End Semester Examination Scheme.		Maximum Marks-70.			Time allotted-3hrs.		
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1 to 8	10	10				
B	1 to 8			5	3	5	70
C	1 to 8			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)	**5*2=10**	
On Spot Experiment(one for each group consisting 5 students)	**10**	
Viva voce	**5**	

			Semester II				
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
1	Core-1	MCAC201 MCAC291	Object Oriented Programming	4	0	4	6
3	Core-2	MCAC202 MCAC292	Operating Systems	4	0	4	6
	Core-3	MCAC203 MCAC293	Database Management System	4	0	4	6
4	Elective-2 (MOOC)	MCAD201	A. Computer Graphics B. Digital Image processing C. Mobile application development D. Introduction to IoT	4 / 5	0 / 1	4 / 0	**6**
Practical							

5	Skill-2	MCAS281	Web Design and Development	0	0	4	**2**
				Total Credit			26

Name of the Course: MCA	
Subject: Object Oriented Programming	
Course Code: MCAC201 + MCAC291	**Semester: 2nd**
Duration: 36 Hours	**Maximum Marks: 100 + 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 3 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1	In-depth understanding of various concepts of object oriented programming language.
2	Ability to read, understand and trace the execution of programs
3	Skill to debug a program.
4	Skill to write program code in java to solve real world problems.

Objective:

Sl. No.	
1	To introduce students to a powerful programming language
2	To understand the basic structure of object oriented program
3	To gain knowledge of various programming errors.
4	To enable the students to make flowchart and design an algorithm for a given problem.
5	To enable the students to develop logics and programs

Pre-Requisite:

Sl. No.	

1	Understanding of basic programming logic.		

Contents			
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Object oriented design** Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.	5	10
02	**Object oriented concepts** Difference between OOP and other conventional programming – advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism	4	10
03	**Basic concepts of object oriented programming using Java** Implementation of Object oriented concepts using Java. Language features to be covered:	5	10
04	**Class & Object properties** Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String [discuss charAt[] , compareTo[], equals[], indexOf[], length[] equalsIgnoreCase[], substring[], toCharArray[] , toLowerCase[], toString[], toUpperCase[] , trim[] , valueOf[] methods] & StringBuffer classes [discuss append[], capacity[], charAt[], delete[], deleteCharAt[], ensureCapacity[], getChars[], indexOf[], insert[], length[], setCharAt[], setLength[], substring[],	**8**	**10**

	toString[] methods], concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.		
05	**Reusability properties** Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super[ ] method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.	**6**	**10**
06	**Exception handling & Multithreading [6L]**Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, interthread communication, deadlocks for threads, suspending & resuming threads.	**6**	**10**
07	**Applet Programming [using swing]** Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint[], getDocumentBase[], getCodeBase[] methods, layout manager [basic concept], creation of buttons [JButton class only] & text fields.	**4**	**10**
	Sub Total:	**38**	**70**
	Internal Assessment Examination & Preparation of Semester Examination		**30**
	Total:		**100**

Practical
Course Code: MCAC291
Credit: 2
Skills to be developed:
Intellectual skills:
1. Ability to read, understand and write object oriented programs.
2. Ability to analyze problems and provide program based solutions.
List of Practical:
1. As compatible to theory syllabus.

Assignments:
   Based on the curriculum as covered by subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
E. Balaguruswamy	Object Oriented Modelling and Design		Tata McGraw-Hill
Ali Bahrami	Object Oriented System Development		Mc Graw Hill

Reference Books:

Patrick Naughton, Herbert Schildt	The complete reference-Java2		TMH
Kenneth A. Reek	Pointers on C		Pearson
R.K Das	Core Java For Beginners		VIKAS PUBLISHING

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer with moderate configuration
2.	A programming language compiler

End Semester Examination Scheme.   **Maximum Marks-70.**   **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the	Subjective Questions

		correct answer)					
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1 to 5	10	10				
B	1 to 5			5	3	5	70
C	1 to 5			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)	5*2=10	
On Spot Experiment(one for each group consisting 5 students)	10	
Viva voce	5	

Name of the Course: MCA
Subject: Operating Systems

Course Code: MCAC202 + MCAC292	Semester: 2nd

Duration: 48 Hours	Maximum Marks: 100 + 100
Teaching Scheme	**Examination Scheme**
Theory: 4	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 4 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1	To understand the principles and tasks of operating systems.
2	Ability to apply CPU scheduling algorithms to manage tasks.
3	Initiation into the process of applying memory management methods and allocation policies.
4	Knowledge of methods of prevention and recovery from a system deadlock.

Objective:

Sl. No.	
1	To deliver a detailed knowledge of integral software in a computer system –Operating System.
2	To understand the working of operating system as a resource manager.
3	To familiarize the students with Process and Memory management.
4	To describe the problem of process synchronization and its solution.
5	

Pre-Requisite:

Sl. No.	None

Contents			
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction	**3**	**10**

	Importance of OS,Basic concepts and terminology,Types of OS,Different views,Journey of a command execution,Design and implementation of OS			
02	Process Concept and views, OS view of processes, OS services for process management, Scheduling algorithms,Performance evaluation; Inter-process communication and synchronisation, Mutual exclusion, Semaphores, Hardware support for mutual exclusion, Queuing implementation of semaphores, Classical problem of concurrent programming, Critical region and conditional critical region, Monitors, Messages, Deadlocks	10	20	
03	Resource Manager Memory management,File management,Processor management,Device management	8	20	
04	Security and related Issues Security and protection,Authentication,Protection and access control,Formal models of protection ,Worms and viruses	5	5	
05	**Multiprocessor System** Multiprocessor system,Classification and types,OS functions and Requirements, Introduction to parallel computing,Multiprocessor interconnection synchronization	6	10	
06	Distributed OS Introduction to distributed processing	4	5	
	Sub Total:	36	70	
	Internal Assessment Examination & Preparation of Semester Examination		30	
	Total:		100	

Assignments:
          Based on the curriculum as covered by subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
A Silberschatz, P.B. Galvin, G. Gagne	Operating Systems Concepts	8th Edition	John Wiley

			Publications
A.S. Tanenbaum	Modern Operating Systems	3rd Edition	Pearson Education

Reference Books:

G. Nutt	Operating Systems: A Modern Perspective	2nd Edition	Pearson Education

End Semester Examination Scheme.   **Maximum Marks-70.**   **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	**1 to 6**	**10**	**10**				
	1 to 6						
B				**5**	**3**	**5**	**70**
	1 to 6						
C				**5**	**3**	**15**	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	**All**	**1**	**10**	**10**
B	**All**	**5**	**5**	**3**
C	**All**	**15**	**5**	**3**

Name of the Course: MCA
Subject: Database Management System

Course Code: MCAC203 + MCAC293	**Semester: 2nd**

Duration: 36 Hours	Maximum Marks: 100 + 100
Teaching Scheme	**Examination Scheme**
Theory: 3	End Semester Exam: 70
Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 3 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1	Familiarization with Database Management System.
2	Comprehensive knowledge of database models.
3	Ability to code database transactions using SQL.

Objective:	
Sl. No.	
1	To introduce the students to the database system.
2	To learn how to design a database by using different models.
3	To enable the students to understand the database handling during execution of the transactions.
4	To understand the handling of database by concurrent users.
5	To gain complete knowledge of SQL and PL/SQL.

Pre-Requisite:	
Sl. No.	
	None

Contents

Chapter	Name of the Topic	Hours	Marks
01	Introduction Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Data Abstraction, Three Schema architecture of DBMS.	4	5
02	E-R Model Need for E-R Model, Various steps of database design, Mapping Constraints, E-R diagram, Subclass, Generalization, Specialization, Aggregation, Strong Entity-Weak Entity,	6	10
03	SQL Concept of DDL, DML, DCL. Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Subqueries, Stored procedures,cursors and triggers.	6	10
04	Relational Model and Relational Database Design Concept of Relational Model, Design Issues, Keys, Closure set, Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multivalued dependencies, 4NF,5NF, Centralized and distributed database.	8	20
05	File Organization and Query Optimization Concepts of File and Records, Fixed Length-Variable length Record, Query optimization.	2	10
06	Indexing Primary, secondary, clustering, Multilevel Indexes.	4	5
07	Transaction Management Transaction definition, properties, transaction state diagram, commit and rollback, Concurrency control,lock based protocols,two phase locking, Recovery management.	6	10
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination		30
	Total:		100

Practical
Course Code: MCAC293
Credit: 2
Skills to be developed:

List of Practical:

1. As compatible with theory syllabus.

Assignments:
Based on the curriculum as covered by subject teacher.

List of Books
Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Henry F. Korth and Silberschatz Abraham	Database System Concepts		Mc.Graw Hill
Ramez Elmasri, Shamkant B.Navathe	Fundamentals of Database Systems		Addison Wesley

Reference Books:			

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	
2.	

End Semester Examination Scheme.　　　　**Maximum Marks-70.**　　　　**Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	1 to 7	10	10				
B	1 to 7			5	3	5	70
C	1 to 7			5	3	15	

- Only multiple choice type question (MCQ) with one correct answer are to be set in the objective part.
- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Five No of Experiments			

External Examination: Examiner-

Signed Lab Note Book(for five experiments)	5*2=10	
On Spot Experiment(one for each group consisting 5 students)	10	
Viva voce	5	

Name of the Course: MCA
Subject: Web Design and Development

Course Code: MCAS294	Semester: 3rd
Duration: 48 Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 0	End Semester Exam:
Tutorial: 0	Attendance:
Practical: 4	Continuous Assessment:
Credit: 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Practical:

Skills to be developed:

Intellectual skills:

1. Skill to analyze algorithms and to determine algorithm correctness and their time efficiency.
2. Knowledge of advanced abstract data type (ADT) and data structures and their implementations.

List of Practical:

1. Design basic HTML pages with HTML tags.
2. Enhancing design with CSS
3. Include dynamic contents using javascript.
4. Understanding and working with JQuery.
5. Understanding serverside programming.
6. Develop website with frontend, backend and database connectivity.
7. Mini project.

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer with moderate configuration
2.	Javascript enabled browser.
3.	Database package and web service

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			40

External Examination: Examiner-

Signed Lab Note Book	10	
On Spot Experiment	40	
Viva voce	10	60