Semester III								
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits	
Theory + Practical								
1	Core-4	MCAC301	Analysis of algorithm	4	0	4	**6**	
2	Core-5	MCAC302	Management Information System	5	1	0	**6**	
3	Core-6	MCAC303 MCAC393	Software Engineering	4	0	4	**6**	
4	Elective-3 (MOOC)	MCAD301	A. Machine Learning Basics B. Pattern Recognition C. Natural Language processing D. Digital Marketing E. Compiler Design	4 / 5	0 / 1	4 / 0	6	
Practical								
5	Skill-3	MCAS391	Project and Entrepreneurship-I	0	0	4	2	
				Total Credit			26	

Semester IV							
Sl. No.	Category	Course Code	Course Name	L	T	P	Credits
Theory + Practical							
2	Core-7	MCAC401	Research Methodology and IPR	4	0	4	6
Practical							
	Skill-4	MCAS481	Grand Viva	0	0	2	2
5	Skill-5	MCAS482	Project and Entrepreneurship-II	0	0	4	6
				Total Credit			14

**Elective papers will be offered from MOOCs Only.

Name of the Course: MCA	
Subject: Analysis of algorithm	
Course Code: MCAC301 + MCAC391	**Semester: 3rd**
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	**8**	**20**

	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.			
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: MCAC391

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. As compatible with theory curriculum.

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
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: Management Information System	
Course Code: MCAC302	**Semester: 3rd**
Duration: 36 Hours	**Maximum Marks: 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:
	Practical Sessional external examination:

Aim:

Sl. No.	
1	To provide students with an understanding at how to use and manage information system in order to revitalize business processes.
2	improve business decision making.
3	gain competitive advantage
4	

Objective:

Sl. No.	
1	Define the key terms.
2	Describe the use and function of information systems.
3	Describe and evaluate information systems development processes and techniques
4	Identify and evaluate hardware and software requirements for information systems.
5	Explain the security risks associated with management information systems.

Pre-Requisite:

Sl. No.	
1	NA

Contents		Hrs./week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	System concepts, system control, types of systems, handling system complexity, Classes of systems, Generalmodel of MIS, Need for system analysis, System analysis for existing system & new requirement, system development model, MIS & system analysis	3	7
02	Information concepts, classification of information, methods of data and information collection, value of information, information: A quality product, General model of a human as information processor, Knowledge,	3	7
03	MIS: Concept, Definition, Role of the MIS, Impact of MIS, MIS and the user, Management as a control system,MIS support to the management, Management effectiveness and MIS, Organization as system. MIS:organization effectiveness	3	7
04	Concept of corporate planning, Essentiality of strategic planning, Development of the business strategies, Typeof strategies, short-range planning, tools of planning, MIS: strategic business planning	3	7
05	Development of long range plans of the MIS, Ascertaining the class of information, Determining the information requirement, Development and implementation of the MIS, Management of information quality in the MIS, Organization for development of MIS, MIS development process model	3	7
06	Planning fundamentals (real world cases), Organizational planning, planning for competitive advantage,(SWOTAnalysis), Business models and planning. Business/IT planning, identifying business/IT	3	7

	strategies,Implementation Challenges, Change management., Developing business systems, (real world case), SDLC,prototyping, System development process, implementing business system		
07	Introduction to Business process, process model of the organization, value stream model of the organization, what delay the business process, relevance of information technology, MIS and BPR	4	7
08	Data processing, Transaction processing, Application processing, information system processing,TQM of information systems, Human factors & user interface, Strategic nature of IT decision, MIS choice of information technology	4	7
09	Decision making concepts; decision making process, decision-making by analytical modeling, Behavioral Concepts in decision making, organizational decision-making, Decision structure, DSS components,Management reporting alternatives	4	7
10	Client server architecture, implementation strategies, Introduction to E-business, model of E-business, internet and World Wide Web, Intranet/Extranet, Electronic, Impact of Web on Strategic management, Web enabledbusiness management, MIS in Web environment.	6	7
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination		30
	Total:		100

Practical

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
A O'Brien	Management Information Systems		

Reference Books:

W S Jawadekar	Management Information Systems		

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	Total Marks	No of question to	To answer	Marks per question	Total Marks

		be set		be set				
A	1 to 10	10	10					
B	1 to 10			5	3	5	70	
C	1 to 10			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: Software Engineering**	
Course Code: MCAC303 + MCAC393	**Semester: 3rd**
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	Familiarization with the concept of software engineering and its relevance.
2	Understanding of various methods or models for developing a software product.
3	Ability to analyze existing system to gather requirements for proposed system.
4	Gain skill to design and develop softwares.

Objective:	
Sl. No.	
1	To introduce the students to a branch of study associated with the development of a

	software product.		
2	To gain basic knowledge about the prerequisites for planning a software project.		
3	To learn how to design of software		
4	To enable the students to perform testing of a software.		

Pre-Requisite:

Sl. No.			
1.	None		

Contents

Chapter	Name of the Topic	Hours	Marks
01	Overview of Computer Based Information System- TPS, OAS, MIS, DSS, KBS Development Life Cycles- SDLC and its phases Models- Waterfall, Prototype, Spiral, Evolutionary Requirement Analysis and Specification, SRS System analysis- DFD, Data Modeling with ERD	12	20
02	Feasibility Analysis System design tools- data dictionary, structure chart, decision table, decision tree. Concept of User Interface, Essence of UML. CASE tool.	7	15
03	Testing- Test case, Test suit, Types of testing- unit testing, system testing, integration testing, acceptance testing Design methodologies: top down and bottom up approach, stub, driver, black box and white box testing.	7	20
04	ERP, MRP, CRM, Software maintenance SCM, concept of standards [ISO and CMM]	10	15
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination		
	Total:		

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
Igor Hawryszkiewycz	System analysis and design		PEARSON
V Rajaraman	Analysis and design of Information System		PHI
Ian Sommerville	Software Engineering		Addison-Wesley

Reference Books:			

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1	Computer with moderate configuration
2	MS-Project or similar software.

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 4**	**10**	**10**				
B	**1 to 4**			5	3	5	70
C	**1 to 4**			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: 60

Practical Internal Sessional Continuous Evaluation 40

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 IV								
Sl. No.	**Category**	**Course Code**	**Course Name**		**L**	**T**	**P**	**Credits**

Theory + Practical							
1	Core-7	MCAC401	Research Methodology and IPR	4	0	4	6
Sessional							
2	Skill-4	MCAS481	Grand Viva	0	0	2	2
3	Skill-5	MCAS482	Project and Entrepreneurship-II	0	0	8	4
4		MCAS483	Seminar	0	0	4	2
				Total Credit			14

Name of the Course: MCA
Subject: Research Methodology and IPR

Course Code: MCAC401	Semester: 4th
Duration: 36 Hours	Maximum Marks: 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	Familiarization with the concept of software engineering and its relevance.
2	Understanding of various methods or models for developing a software product.
3	Ability to analyze existing system to gather requirements for proposed system.
4	Gain skill to design and develop softwares.

Objective:	
Sl. No.	
1	- Understand research problem formulation. - Analyze research related information - Follow research ethics - Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity. - Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular. - Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Pre-Requisite:	
Sl. No.	
1.	None

Contents

Chapter	Name of the Topic	Hours	Marks
01	Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.	6	12
02	Effective literature studies approaches, analysis Plagiarism, Research ethics,	6	12
03	Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.	6	12
04	Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.	6	12
05	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.	6	12
06	New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.	6	10
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination		
	Total:		

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
Stuart Melville and Wayne Goddard	"Research methodology: an introduction for science & engineering students'"		
V Rajaraman	"Research		

		Methodology: An Introduction"		

Reference Books:

Ranjit Kumar	Research Methodology: A Step by Step Guide for beginners	● 2nd Edition	

List of equipment/apparatus for laboratory experiments:

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 4	10	10				
B	1 to 4			5	3	5	70
C	1 to 4			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: 60

Practical Internal Sessional Continuous Evaluation 40

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	