

**A.VEERIYA VANDAYAR MEMORIAL  
SRI PUSHPAM COLLEGE (AUTONOMOUS)**

**POONDI-613 503, THANJAVUR (DT)**



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**SYLLABUS**

*M.C.A.,*

**(From 2020 - 2021 onwards)**

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## **MCA (Master of Computer Applications)**

### **Program Outcomes of M.C.A**

- Students are able to understand the fundamental of computer applications and all its principles and perspectives.
- Students can develop ability to analyse a problem, identify and define the computing requirements, which may be appropriated to its solution.
- The students will be able to undertake careers involving problem solving using computer science technologies.
- The students gain ability to pursue advanced studies and research in computer Applications

### **Program Specific Outcomes of M.C.A**

- ❖ On the completion of M.C.A.programme students gain exposure in the latest technological development in the area of machine learning and human computer interaction.
- ❖ The Students acquire the first hand knowledge about programming language, coding and software development for various industries.
- ❖ The students learn Mobile application development system and about the hardware for various electronic gadgets.
- ❖ The students can widen the scope of the employment in almost all the industries.
- ❖ The students can become entrepreneurs themselves and set up software, hardware development companies.

### MCA(Master of Computer Applications) - 2020

S. No	Semester	Category	Course code	Course Title	Maximum marks			Minimum marks for pass			Hours /week	Credits
					CIA	E.E	TOTAL	CIA	E.E	TOTAL		
1	<b>I</b>	Core	20P1CA1	Internet and Web Technology	25	75	100	10	30	50	5	4
2		Core	20P1CA2	Accounting and Financial Management	25	75	100	10	30	50	5	4
3		Core	20P1CA3	Mathematical foundations of Computer Science	25	75	100	10	30	50	5	4
4		Core	20P1CA4	Organizational Behaviour	25	75	100	10	30	50	4	4
5		Core	20P1CA5	Software Engineering	25	75	100	10	30	50	5	4
6		Core-PL	20P1CAP1	Object Oriented Analysis and Design Lab	40	60	100	16	24	50	3	3
7		Core-PL	20P1CAP2	Web Design-Python Lab	40	60	100	16	24	50	3	3
8		Skill - I	20P1CAS1	Group Communication	40	60	100	16	24	50	3	2
9	<b>II</b>	Core	20P2CA6	Optimization Techniques	25	75	100	10	30	50	5	5
10		Core	20P2CA7	Compiler Design	25	75	100	10	30	50	5	5
11		Core	20P2CA8	<b>Big Data Analytics</b>	25	75	100	10	30	50	5	4
12		Elective-1	20P2CAEL1A/ 20P2CAEL1B/ 20P2CAEL1C	<b>Distributed Programming using J2EE/ Semantic Web/ Peer – to – Peer Computing</b>	25	75	100	10	30	50	5	4
13		Elective-II	20P2CAEL2A/ 20P2CAEL2B/ 20P2CAEL2C	<b>Soft Computing / Introduction to Machine Learning / Human Computer Interaction</b>	25	75	100	10	30	50	4	4
14		Core-PL	20P2CAP3	<b>Big Data AnalyticsLab</b>	40	60	100	16	24	50	3	2
15		Core –PL	20P2CAP4	Distributed Programming using J2EE lab	40	60	100	16	24	50	3	2
16		Skill-II	20P2CAS2	Interpersonal Skills	40	60	100	16	24	50	3	2
				<b>MOOC</b>								
17	<b>III</b>	Core	20P3CA9	Cross Platform - Mobile Applications Development	25	75	100	10	30	50	6	4
18		Core	20P3CA10	Dot Net frame work with C# Programming	25	75	100	10	30	50	6	4
19		Elective– III	20P3CAEL3A/ 20P3CAEL3B/ 20P3CAEL3C	<b>Enterprise Resource Planning / Management Information System / Software Project Management</b>	25	75	100	10	30	50	6	5
20		Elective-IV	20P3CAEL4A/ 20P3CAEL4B/ 20P3CAEL4C	<b>Blockchain Technologies/ Internet of Things / Advances in Web Services</b>	25	75	100	10	30	50	6	4
21		Core -PL	20P3CAP5	<b>Cross Platform – Mobile Applications Development &amp;C# Programming Lab</b>	40	60	100	16	24	50	6	5
22		Skill-III	20P3CAS3	Business Models - IT Industries	40	60	100	16	24	50	3	2
				<b>MOOC</b>								
23	<b>IV</b>	Core	20P4CAPR	Project	40	60	100	16	24	50	6 Months	10
<b>Total Marks-2300</b>											<b>Credits - 90</b>	

### MCA COMPUTER APPLICATION- 2020-2021

Paper Code	Total No. Of Papers	Total Marks	Total Credits	Classification
Core	18	1800	57	✓
Elective	04	400	17	✓
Project	01	100	10	X
Skill	03	300	06	✓
<b>Total</b>	<b>26</b>	<b>2600</b>	<b>90</b>	

### Mandatory Bridge Courses for Non-Computer Science Stream Students

S. No	Semester	Category	Course code	Course Title	Maximum marks			Minimum marks for pass			Hours /week	Credits
					CIA	E.E	TOTAL	CIA	E.E	TOTAL		
1	I	BRIDGE COURSE	20P1CABC1	C Programming and Data Structures	25	75	100	10	30	50	5	5
2		BRIDGE COURSE	20P1CABCP1	C Programming and Data Structures Lab	40	60	100	16	24	50	5	5
3	II	BRIDGE COURSE	20P2CABC2	Java Programming	25	75	100	10	30	50	5	5
4		BRIDGE COURSE	20P2CABCP2	Java Programming Lab	40	60	100	16	24	50	5	5
5	III	BRIDGE COURSE	20P3CABC3	Database Management Systems	25	75	100	10	30	50	5	5
6		BRIDGE COURSE	20P3CABCP3	DBMS Lab	40	60	100	16	24	50	5	5

**GRADING OF COURSE PERFORMANCE (10 POINT SCALE)**

<b>Aggregate Marks</b>	<b>Grade</b>	<b>Grade point</b>
<b>96 and above</b>	<b>S+</b>	<b>10</b>
<b>91-95</b>	<b>S</b>	<b>9.5</b>
<b>86-90</b>	<b>D++</b>	<b>9.0</b>
<b>81-85</b>	<b>D+</b>	<b>9.0</b>
<b>76-80</b>	<b>D</b>	<b>8.0</b>
<b>71-75</b>	<b>A++</b>	<b>7.5</b>
<b>66-70</b>	<b>A+</b>	<b>7.0</b>
<b>61-66</b>	<b>A</b>	<b>6.5</b>
<b>56-60</b>	<b>B</b>	<b>6.0</b>
<b>50-55</b>	<b>C</b>	<b>6.5</b>

**Comprehensive Knowledge Test:** Objective type question pattern with 100 compulsory questions carrying 100 marks to be answered in 3 Hours with 2 Credits. The portion is entire core courses.

**Industrial Internship:** Students have to undergo IT Sector in Industry or Organization where any process related to Computer Application is going on. The period of training should be minimum 5 days. Students have to submit the report of the training underwent with the certificate from the concerned authority of the Industry/Organisation.

**Industrial visit:** Students have to attach a report on the Industrial visit made with the counter signature of staff in charge for the Industrial visit while submitting the Project /Industrial internship report.

**MOOC:** Massive open online course is introduced in the second and third semester as an extra credit course from this academic year 2020-2021. Students can avail any one or more of the courses available in MOOC to equip their skill and knowledge themselves.

**Field Visit / Industrial Visit / Hands on training programme** having minimum 15 hours of contact time as Extra Credit course is introduced for I year PG students to gain experiential learning

Evaluation of the visit report will be held at the end of II Semester.

Components of Evaluation

Internal Marks	40
External marks	60
Total	100

**MCA**

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**Question Pattern for UG and PG Programmes for students to be  
admitted during 2020 – 2021 and afterwards.**

**Total Marks : 75**

**QUESTION PATTERN**

**SECTION – A  
(Question 1 to 10)**

**10 x 2 = 20 Marks**

1. Short Answer Questions.
2. Two Questions from each unit (All are answerable)

**SECTION – B  
(Question 11 to 15)**

**5 x 5 = 25 Marks**

1. 5 Paragraph type questions with “either / or” type choice.
2. One question from each unit of the Syllabus.
3. Answer all the questions.

**SECTION – C  
(Question 16 to 20)**

**3 x 10 = 30 Marks**

1. 5 Essay type questions – any three are answerable.
2. One questions from each unit of the Syllabus.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>I</b>	<b>20P1CA1</b>	<b>Core –INTERNET AND WEB TECHNOLOGY</b>	<b>5</b>	<b>4</b>

### Objective

- ❖ To teach HTML, Java script, VB script, ASP, PHP and MYSQL concepts.
- ❖ To enrich the knowledge of the students by introducing python programming.
- ❖ To impart the basic concepts of threads.
- ❖ To interpret the basic and advanced concepts networking.
- ❖ To inculcate the programming skills, testing and debugging skills.

### Unit I

**Hrs 15**

HTML: Introduction-SGML-Outline of an HTML Document-Head Section-Body section-HTML Forms. DHTML: Introduction-CSS-DHTML Document Objects Model and collections-Event Handling-Filters and Transitions – Data Binding.

### Unit II

**Hrs 15**

JAVASCRIPT: Introduction-Language Elements objects of Java script-Other objects. VBSCRIPT: Introduction-Embedding VBScript code in an HTML Document-Comments-Variables-Operators-Procedures-Conditional Statements-Looping Constructs-object and VBScript-Cookies.

### Unit-III

**Hrs 15**

Python : A Tutorial Introduction – Lexical Convention and Syntax – Types and Objects – operators and expressions – Control Flow - Functions and Functional Programming - Python-Classes and Object oriented Programming – Modules and Packages – Input and output – execution - environment

### Unit-IV

**Hrs 20**

Python Library – Build in functions and exceptions –python run time services – mathematics – data structures and algorithm – string and text handling – data management and object persistence – file handling – operating system services – threads.

### UNIT V

**Hrs 25**

Python network programming – internet application protocols – internet data handling and encoding – cryptographic services – miscellaneous modules – debugging, profiling and testing.

### Course Outcomes:

After completion of the course, students will be able to

- design static and dynamic web pages using markup languages like HTML and XHTML and DHTML.
- create dynamic web pages using DHTML and java script that is easy to navigate and use.
- program server side web pages that have to process request from client side webpages.
- work in a dynamic environment such as MNC as Web designer.
- create attractive websites and there is scope for get recruited as interactive web developer.



## MCA

### **Text Books:**

1. N.P Gopalan,J.Akilandeswari, "Web Technology" A Developer's Perspective, Prentice Hall of India Private Limited, New Delhi, 2008.
2. K. Meena , R. Sivakumar , A.B. Karthick Anand Babu "Web programming using PHP and MySQL" - Himalaya Publishing House – 2011.
3. David Beazley, Python Essential Reference, Sams Publishing, Third Edition.

### **Reference books:**

1. Chuekmvsiano and Bill Kennedy,'HTML the Definite Guide', O'Reily Publications 2002.
2. Joseph Schmulter, 'Dynamic HTML', Bpb Publications 2000.
3. Michael Dawson, Programming with Python A Users Book, Cengage Learning , India Edition ,2007

## MCA

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>I</b>	<b>20P1CA2</b>	<b>Core – ACCOUNTING AND FINANCIAL MANAGEMENT</b>	<b>5</b>	<b>4</b>

### Objectives :

- To present the whole range of book keeping & accountancy and to give comprehensive coverage to management accounts.
- To teach the concepts related to journal, ledger
- To impart the analysis and interpretation of finance in the minds of students community.
- To inculcate the role of cost in accounting.
- To cultivate the benefits of budget in real life

### Unit I

Accounting Principles and Concepts – Double entry book keeping- Income and expenditure- Accounting record and system- assets and liabilities- Depreciation, Depletion and Amortization - Accounting for depreciation.

### Unit II

Journal – Ledger- Trial Balance- Trading, Manufacturing and profit and Loss account – Balance sheet with Adjustments.

### Unit III

Analysis and interpretation of financial statements –Ratio Analysis.

### Unit IV

Cost Accounting- Methods and Techniques of Cost Accounting- classifications of cost - Material Cost- Labour Cost – Overhead- fixed and variable cost- Cost- volume – profit analysis- marginal costing and decision making.

### Unit V

Budgeting and budgetary control – types of budgets-Preparation of various functional budgets- Preparations of Production Budget –Purchase Budget – Sales Budget -cash budgets-flexible budgets- Advantages of Budgeting and Budgetary control.

### Course Outcomes:

After completion of the course, students will be able to

- preparing financial statements in accordance with appropriate standards.
- prepare ledger accounts using double entry bookkeeping and record journal entries accordingly
- interpreting the business implications of financial statement information
- preparing accounting information for planning and control and for the evaluation of finance.
- prepare Bank reconciliation statement from incomplete statement
- can be placed in the Banking sector, financial sector and customs department.

## **MCA**

### **Text Book(s):**

1. T.S. Grewal, "Double Entry Book Keeping", All India Sultan Chand (Recent Edition)
2. S.N. Maheswari "Principles of Management Accounting ", Sultan Chand, New Delhi (Recent Edition)
3. Shukla, Grewal& Gupta, "Advanced Accounts" Sultan Chand Publications

### **Reference(s):**

1. S.K. Gupta & R.K. Sharma- Practical Problems in Management Accounting (Recent edition)
2. Khan and Jain "Financial Management" Tata McGraw Hill (Recent Edition)

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
I	20P1CA3	Core – MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	5	4

### Objectives:

- To teach about Mathematical techniques required for computer science.
- To impart the essentials of relations and functions in solving the problems.
- To interpret the basics of the algebra in mathematics.
- To cultivate the essence of graph, trees and storage representation in computer science
- To inculcate the basics of vectors and its importance

### Unit I

**Mathematical logic:** statements and notation – connectives – normal forms – the theory of inference for the statements calculus – the predicate calculus – inference theory of the predicate calculus.

### Unit II

**Relations and ordering:** relations – properties of binary relations in a set – relation matrix and the graph of a relation – partition and covering of a set – equivalence relations – compatibility relations – composition of binary relations – partial ordering – partially ordered set; representation and associated terminology – **Functions:** Definition and introduction – composition of function – inverse functions – binary and n-array operations.

### Unit III

**Algebraic structures:** Algebraic systems: examples and general properties – definition and examples – some simple algebraic systems and general properties – Semi groups and monoids: definition and examples – homomorphism of semi groups and monoids – sub-groups and submonoids – Grammars and languages: discussion of Grammars – formal definition of a language.

### Unit IV

**Graph theory:** Basic concepts of graph theory: Basic definitions – paths, reachability and connectedness – matrix representation of graphs – trees – storage representation and manipulation of graphs: Trees: their representation and operations.

### Unit V

**Vector Spaces:** Introduction – Definitions and examples – subspaces – linear transformations – span of a set – linear independence – **Theory of Matrices:** Simultaneous linear equations – characteristic equation and Cayley Hamilton Theorem – Eigen values and Eigen vectors.

### Course Outcomes:

After completion of the course, students will be able to

- understand the significance of algebraic structural ideas used in coding theory and cryptography.
- apply Boolean laws and Boolean functions in combinatorial circuit designs.
- construct Finite State Automation for constructing regular sets as well as context-free grammar to generate context-free language.
- there is career opportunity to work as mathematician in research field.
- recruited as senior analyst in statistics department.

## MCA

### Text Book:

1. Discrete mathematical structures with application to computer science, J.B.Tremblay and R.Manohar, McGraw-hill international edition, 2004.

**Unit – I** : Chapter.1 (Sec: 1.1 to 1.6)

**Unit – II** : Chapter.2 (Sec: 2.3, Sec: 2.4.1 to 2.4.4)

**Unit – III** : Chapter.3 (Sec: 3.1 to 3.3.2)

**Unit – IV** : Chapter.5 (Sec: 5.1 to 5.2.1)

2. Modern Algebra, Arumugam.S, Isaac.A.T, Scitech publications, 2014.

**Unit – V** : Chapter.5 (Sec: 5.0 to 5.5), Chapter.7 (Sec: 7.6 to 7.8)

### General Reference:

1. Applied Discrete structures for computer science, D.Alan, L.Lenneth, Galgotia publication, New Delhi, 1983.
2. Formal languages and their relations to automata, J.E.Hopcroft and A.D.Ullman, Addison – Wesley publishing company, 1969.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>I</b>	<b>20P1CA4</b>	<b>Core – ORGANIZATIONAL BEHAVIOUR</b>	<b>4</b>	<b>4</b>

### Objective:

- ❖ To provide in-depth Knowledge in Organizational Behavior to enhance the problem formulation in solving skills with a focus on Human Relations aspects.
- ❖ To impart the essentials of personality and perception in OB.
- ❖ To cultivate the skills related to learning and improving the interpersonal skills.
- ❖ To inculcate the importance of group dynamics in attaining the goal.
- ❖ To provide the role of politics and leadership in OB.
- ❖ To interpret the role of communication in OB.

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### UNIT 1

**Hrs 15**

**Nature of Organizational Behaviour:** Concept of Organization –concept of organization behaviour-challenges and opportunities for organizational behaviour – Applying OB knowledge to management practices.

**Foundations of organizational Behaviour:** Classical Approach – Neoclassical approach-modern approach-Organizational behaviour models.

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### UNIT II

**Hrs 15**

**Nature of Human Behaviour:** Concept of behaviour – Process of behaviour – Individual differences-Models of Man. **Personality:** Concept of Personality -Personality measurement. **Perception:** Concept of Perception-Interpersonal perception –Developing Perceptual Skills.

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### UNIT III

**Hrs 15**

**Learning:** Concept of Learning – Learning theories – Reinforcement-organizational behaviour modification-Learning organization-Knowledge management. **Interpersonal Behaviour:** Nature of Inter personal behaviour –Transactional Analysis. **Group Dynamics:** Concept of group dynamics-Formal groups-Informal group or organization – Group behaviour-Group decision making – Intergroup behaviour.

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### UNIT IV

**Hrs 15**

**Power and Politics:** Concept of Power -Politics. **Leadership:** Concept of Leadership – Leadership theories-Leadership styles – Leadership styles in Indian organizations- Contemporary issues in Leadership.

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### UNIT V

**Hrs 15**

**Communication:** Concept of Communication – Communication symbols-Communication network- Barriers in communication- Making communication effective-Communication pattern in Indian organization. **Conflict Management:** Concept of conflict- Individual level conflict –Group level conflict- Organizational level conflict-Managing conflict- Negotiation.

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## MCA

### Course Outcomes:

After completion of the course, students will be able to

- understand the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
- understand the applicability of analyzing the complexities associated with management of individual behavior in the organization.
- analyze the complexities associated with management of the group behavior in the organization.
- develop the skills to work as a Manager or CEO in a Corporate sector.
- serve as Management Analysts/Consultants. Management analysts, or management consultants, advise organizations on how to improve their profit, performance and efficiency.
- serve as Human Resources Professionals, Training and Development Managers

### Text Book:

1. L.M.Prasad "Organizational Behaviour" Sultan Chand & Sons Educational Publishers, New Delhi, Fifth Edition 2011.

### References:

1. Fred Luthans "Organizational Behaviour" McGraw Hill Publishers.
2. Hise J. Arnold, Daniel C.Feldman "Organizational Behaviour" McGraw Hill Publishers.
3. Stephen P.Robbins , Nancy Langton "Organizational Behaviour " Pearson Education series.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>I</b>	<b>20P1CA5</b>	<b>Core –SOFTWARE ENGINEERING</b>	<b>5</b>	<b>4</b>

### Objective

- ❖ To teach advances in developing software and different phases in development.
- ❖ To impart the advanced technologies and innovations in developing the modules.
- ❖ To cultivate the knowledge about the different phases and the process models to develop the code.
- ❖ To interpret the essentials of requirement engineering, design engineering in software development life cycle.
- ❖ To inculcate advances in testing tools and its role in testing and debugging

### Unit I

**Hrs 15**

**A Generic view of Process:** Layered Technology-Process Framework-Capability Maturity Model Integration-Process Patterns-Process Assessment-Personal and Team Process Models-Process Technology-Product and Process. **Process Models:** Waterfall Models-Incremental Process Model-Evolutionary Process Model-Specialized Process Model-Unified Process.

### Unit II

**Hrs 15**

**Requirement Engineering:** Tasks-Initiating Requirement Engineering Process-Eliciting Requirements-Developing Use case-Building Analysis Model-Negotiating Requirements-Validating Requirements. **Building Analysis Model:** Requirement Analysis – Analysis Modeling Approaches-Data Modeling Concepts-Object Oriented Analysis-Scenario Based Modeling-Flow Oriented- Class Based –Behavioral Model.

### Unit III

**Hrs 15**

**Design Engineering:** Context of Software Engineering –Design Process and Design Quality-Design Concepts-Design model-Pattern Based Design. **Architectural Design:** Software Architecture-Data Design-Architectural Styles and Pattern-Architectural Design-Alternate Architectural Design-Mapping Data Flow. **User Interface Design:** Golden Rules-User Interface Analysis and Design-Interface Analysis-Interface Design- Design Evaluation.

### Unit IV

**Hrs 15**

**Testing Strategies:** Strategic Approach-Strategic Issues-Strategic for Conventional Software-Strategic for Object Oriented Software-Validation Testing-System Testing-Art of Debugging. **Testing Tactics:** Testing fundamentals-Black box Testing-White Box Testing-Basis Path Testing-Control Structure Testing-Object Oriented Testing-Testing Methods Applicable-Interclass Test Case Design-Testing for Specialized Environments-Testing Patterns.

### Unit V

**Hrs 15**

**Project Management:** Management Spectrum – People –Product-Process-Project-W5HH Principle-Critical Practices. **Quality Management:** Quality Concepts-Software quality Assurance-Software Reviews-Technical Reviews –Statistical SQA-Software Reliability-ISO 9000 Quality Standards-SQA Plan. **Change Management:** Software Configuration management-SCM Repository-SCM Process-Configuration Management for Web Engineering.



## MCA

### Course Outcomes:

After completion of the course, students will be able to

- understand of the role and impact of software engineering in contemporary business, global, economic, environmental and societal context.
- elicit the requirements for real, time problems. Analyze and use open source tools for project designing.
- develop User Interface design for the given system and develop the usecase.
- work as software engineer, team leader, project leader and tester in a software company or MNC
- improve the skills to develop the Quality Software that satisfies the needs of the customer and organization.
- can become a entrepreneur for a software company

### Reference:

1. Software Engineering (Sixth Edition) by ROGER S. PRESSMAN, McGraw-Hill International Edition.
2. Richard E. Fairley, "Software Engineering Concepts", McGraw-Hill Book Company -1985.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>I</b>	<b>20P1CAP1</b>	<b>OBJECT ORIENTED ANALYSIS AND DESIGN LAB</b>	<b>3</b>	<b>3</b>

### OBJECTIVES

- Introduction to UML notations and diagrams.
  - Hands on exposure of involving analysis and design with UML diagrams.
  - Understand the relationship between classes and objects.
  - Know the basics of activity diagrams.
  - Understand the essentials of Usecase.
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1. Use case, class diagrams in online ticket reservation systems
  2. Use case, class diagrams in hotel reservation systems
  3. Use case, class diagrams in student information system
  4. Use case, class diagrams in sales & marketing system
  5. Use case, class diagrams in banking system and inventory tracking system.
  6. Behavioral diagrams for application systems
  7. State chart diagram for application systems
  8. Component diagrams for systems
  9. Deployment diagrams for systems – Test cases,
  10. Integration test cases for systems

### Course Outcomes :

After completion of the course, students will be able to

- understand the essentials of the object oriented programming concepts such as encapsulation, inheritance and polymorphism.
- establish the relationship between the classes and the objects.
- develop the skills about UML notations which is the basic building block for constructing the different diagrams.
- there is scope and carrier opportunity to work as software engineer, team leader, project leader and tester in a software company
- improve the skills to develop the interactive diagrams such as class diagrams, use case diagrams, activity diagrams etc.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>I</b>	<b>20P1CAP2</b>	<b>Core – WEB DESIGN-PYTHON LAB</b>	<b>3</b>	<b>3</b>

### Objective

- ❖ To teach Web technology concepts.
- ❖ To illustrate the components of XML and HTML.
- ❖ To interpret essentials of Geolocation and IPaddress.
- ❖ To cultivate the principles of python programming in the minds of the students community.
- ❖ To inculcate the basics of Log checker.

1. Using for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4... 1/10.
2. Write a program using a for loop that calculates exponentials. Your program should ask the user for a base and an exponent exp, and calculate baseexp
3. Write a method fact that takes a number from the user and prints its factorial.
4. Write a function roots that computes the roots of a quadratic equation. Check for complex roots and print an error message saying that the roots are complex.
5. Write a Python script to generate Password
6. Python script to parse XML/HTML code
7. Tweet Search using Python
8. Geo Location of an IP Address
9. Log Checker in Python
10. Write a Python script to get all the links from a website

### Course Outcomes:

After completion of the course, students will be able to

- read, Learn and Write the codes easily
- acquire the skills in Python as it is a high-level programming language that has English-like syntax.
- understand the essentials of Python such as Improved Productivity,portability,dynamically typed etc
- know the benefits of python that is free of cost ,Free and Open-Source.
- Find the carrier opportunity to work as a programmer in software company and incorporate the essential codings in the research field

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>I</b>	<b>20P12CAS1</b>	<b>GROUP COMMUNICATION</b>	<b>3</b>	<b>2</b>

### Objective

- ❖ To impart dynamic Skills for developing Personality.
- ❖ To interpret the basics of planning.
- ❖ To inculcate the essentials of group in attaining the goal
- ❖ To cultivate the basics of scheduling.
- ❖ To illustrate of different methodologies in group communication.

### Goal Setting

- Benefits of goal setting
- Steps involved in setting goals.
- Setting goals on six areas of life and Living with goals.

### Time Management

- Understanding the time wasters.
- Planning and scheduling using four quadrants.
- Developing daily schedules.

### Course Outcomes

After completion of the course, students will be able to

- know the essentials of Group communication(i.e the act of sending and receiving messages to multiple members of a group).
- implement the methodologies of group communication in business environment to exchange ideas
- determine goals and motivate other members.
- serve as a trainer in an organization and be recruited as team leader

## MCA

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>II</b>	<b>20P2CA6</b>	<b>Core – OPTIMIZATION TECHNIQUES</b>	<b>5</b>	<b>5</b>

### Objectives:

- To impart different techniques to optimize for decision making
- To illustrate the basics of game theory.
- To interpret the role of queuing in Optimization techniques.
- To inculcate importance of inventory models .
- To teach the essentials of replacement theory.

### Unit I

**Linear Programming:** Introduction – solved examples – modeling in OR – Methodology in OR – Applications and limitations in OR – Formulation of LPP – Model formulation – solved problems – Graphical solution method – solved problems.

### Unit II

**Game Theory:** Introduction – optimal solution of to person zero sum game – rules for determining a saddle point – solved problems – Games with mixed strategy – The graphical method – Use of dominance property.

### Unit III

**Queuing Problems:** Introduction – Classification of queues – the Queueing problems (M/M/1) : ( $\infty$ /FCFS) model – (M/M/1) : (N/FCFS) model – (M/M/C) : ( $\infty$ /FCFS) model – (M/M/C) : (N/FCFS) model – solved problems

### Unit IV

**Inventory Models:** Introduction – Deterministic models – purchasing problem with no shortages – production problems with no shortages - purchasing problem with shortages – production problems with shortages – solved problems.

### Unit V

**Replacement Theory:** Introduction – Replacement policy for equipment which deteriorates gradually – replacement of items that fail suddenly – Individual Replacement policy – Group Replacement Policy – problems in mortality and staffing – solved problems.

### Course Outcomes:

After completion of the course, students will be able to

- identify the different optimization techniques that are possible for a sequence of code
- design performance enhancing optimization techniques
- Manage procedures with optimal overheads and Ensure better utilization of resources
- incorporate different Optimization methods in many areas of study to find solutions
- there is carrier opportunity to Work as Business Analyst in a corporate company.
- sharpen their knowledge and develop the skills to minimize costs in the production of a good or service, maximize profits, minimize raw material in the development of a good, or maximize production

## MCA

### Textbook:

Problems in Operations Research - PK. GUPTA and MANMOHAN, Sultan Chand & Sons (Fourteenth Edition), 2014.

Unit – I : Chapters 0, 1, 2 (Pages: 1 – 19, 43 – 53)

Unit – II : Chapters 20 (Pages: 471 – 486)

Unit – III : Chapters 22 (Pages: 535 – 550)

Unit – IV : Chapters 23 (Pages: 571 – 583)

Unit – V : Chapters 24 (Pages: 619 – 635)

### Reference:

1. Operation Research, Kanthi Swarub, P. K. Gupta and Manmohan, Sultan Chand & Sons, New Delhi, 1982.
2. Operation Research – Principles and Practice, Don T. Philips, A. Ravindran, James J. Solberg, John Wiley & Sons, 1976.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>II</b>	<b>20P2CA7</b>	<b>Core –COMPILER DESIGN</b>	<b>5</b>	<b>5</b>

### Objective

- To illustrate the concepts and techniques for designing compiler.
- To describe design principles of compiler.
- To cultivate the skills related to grammars, Parsers.
- To inculcate advances in Parser.
- To impart the concepts related to symbol tables, error detection and recovery.
- To interpret the knowledge about the code optimization techniques.

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### Unit I

**Hrs 15**

Introduction to compilers: Compilers and Translators, Structure of a Compiler, Compiler Writing tools, programming Languages. High Level programming Languages, Definitions of programming Languages, Lexical and Syntactic structure of a Languages - Finite Automata and Lexical analysis, Role of a lexical analyzer, Regular expressions, Finite Automata Minimizing the number of syntactic specification of programming languages.

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### Unit II

**Hrs 15**

Context free grammars, derivations and parse trees, capabilities of context free grammars-Basic parsing techniques: Shift reproduce parsing-Operator precedence parsing-Top down parsing-predictive parsers-Automatic Construction of efficient parsers. LR parser - Constructing SLR - Canonical LR and LALR parsing Tables - Using Ambiguous Grammars - Automatic parser Generator - Implementation of LR parsing Tables.

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### Unit III

**Hrs 15**

Syntax Directed Translation: Schemes - Implementation - Intermediate Code - postfix Notation - parse Tree and Syntax Trees - Three Address Code- Quadruples and Triples - Translation of Assignment Statements - Boolean Expression - postfix Translations - Translation with a Top - Down parser.

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### Unit IV

**Hrs 15**

Symbol Tables, Contents data Structures, representing scope information. Runtime Storage Administration, Implementation and Storage allocation and of simple stack allocation schemes and block structured languages, Error detection and recovery, Lexical phase Error, Syntactic phase error, Semantic errors.

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### Unit V

**Hrs 15**

Introduction to Code Optimization, principle Sources of Optimization, Loop Optimization, DAG Representation of basic blocks, Global data flow Analysis, Code generation, problems in Code Generation Register allocation and Assignment, Code Generation from DAG's, peephole Optimization.

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## MCA

### Course Outcomes:

After completion of the course, students will be able to

- introduce the various phases of a compiler, To give the basic ideas on automata theory, To know the various parsing techniques.
- Understand about the code optimization techniques
- know the structure and various phases of compiler and To implement lexical analyzer
- know the essentials of basic parsing techniques
- students can be designated as Compiler engineer.

### Reference:

1. Alfred V. Aho and Jeffrey D. Ullman, "principles of Compiler Design", Addison Wesley, Narosa ISE, 1991 Reprint.

### General References:

1. William A. Barret, Rodney M. Bates, David A. Gustafson and D. Couch - "Compiler Construction Theory and practice", Galgotia publishing Co, 1990.
2. Jean - paul Tembly and Paul G. Sorenson, - "The Theory and John D. Couch - "The Theory and practice of Compiler writing", McGraw Hill 1985.



## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
<b>II</b>	<b>20P2CA8</b>	<b>Core -Big Data Analytics</b>	<b>5</b>	<b>4</b>

### Objectives

- 1.To provide an overview of an exciting growing field of big data analytics.
2. To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map-Reduce.
3. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
4. To enable to have skills that will help them to solve complex real-world problems in for decision support.

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#### Unit – I

**Hrs 18**

##### **Getting Ready to Use R and Hadoop:**

Installing R – Installing RStudio – Understanding the features of R language – Installing Hadoop – Understanding Hadoop features – Learning the HDFS and MapReduce architecture – Understanding Hadoop subprojects.

##### **Writing Hadoop MapReduce Programs:**

Introducing Hadoop MapReduce – Understanding the Hadoop MapReduce scenario – Understanding the Hadoop MapReduce fundamentals – Learning the different ways to write Hadoop MapReduce in R.

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#### Unit – II:

**Hrs 18**

##### **Integrating R and Hadoop :**

Introducing RHIPE – Understanding the architecture of RHIPE – Understanding the RHIPE function –Introducing RHadoop.

##### **Using Hadoop Streaming with R :**

Understanding the basics of Hadoop streaming - Understanding how to run Hadoop streaming with R - Exploring the HadoopStreaming R package.

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#### Unit – III:

**Hrs 18**

**Learning Data Analytics with R and Hadoop :** Understanding the data analytics project life cycle - Understanding data analytics problems- Computing the frequency of stock market change – Predicting the sale price of blue book for bulldozers – case study.

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#### Unit IV:

**Hrs 18**

##### **Understanding Big Data Analysis with Machine Learning :**

Introduction to machine learning–Supervised machine-learning algorithms –Unsupervised machine learning algorithm –Recommendation algorithms –Steps to generate recommendations in R –Generating recommendations with R and Hadoop.

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#### Unit – V:

##### **Importing and Exporting Data from Various DBs:**

Learning about data files as database – Understanding MySQL– Understanding Excel– Understanding MongoDB– Understanding SQLite– Understanding PostgreSQL - Understanding Hive - Understanding HBase

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## MCA

### Course Outcomes:

After completion of the course, students will be able to

- teach the fundamental techniques and principles in achieving big data analytics with Scalability and streaming capability.
- cultivate the skills that will help them to solve complex real-world problems in for decision support.
- Understand the benefits of structured, semistructured and unstructured data collected by organizations
- Find the carrier opportunity in data analytics department machine learning projects, predictive modeling and other advanced analytics applications.

### Books for Study:

1.Vignesh Prajapat , " Big Data Analytics with R and Hadoop"– Packet Publishing Pvt. Ltd,2013.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
<b>II</b>	<b>20P2CAEL1A</b>	<b>Distributed Programming using J2EE</b>	<b>5</b>	<b>4</b>

### Objective

- To impart knowledge about the distributed environment, its architecture, application development with RMI.
- To interpret the essentials of Java Servlets, Java Server Pages, Struts and EJB using J2EE technologies.
- To inculcate the importance of different networking technologies.
- To cultivate the skills related to session bean and entity bean in the minds of the students.
- To teach the importance of client,server and the different communication technologies.

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### UNIT I:

**Client/Server Concepts:** Client/Server, File Server, Database server, Group server, Object Server, Web server, Middleware – General middleware –Service specific middleware. Client/Server Building blocks – RPC – Messaging – Peer- to- Peer. Web Services – SOA, SOAP, WSDL, REST Services.

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### UNIT II :

**Distributed Computing using RMI:** Introduction – RMI Architecture – RMI Exceptions – Developing Applications with RMI –RMI with Database connectivity  
Evolution of the web applications: The HTTP protocol – Web containers and web applications.

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### UNIT III:

**Java server pages :** JSP: JSP overview – JSP syntax and semantics- Expressions- JSP elements – Expressions- Scriptlets- Request and Response objects – Redirection and forwarding – JSP with database connectivity – session tracking: Hidden form fields – URL rewriting – The Cookie class – The Session tracking class

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### UNIT IV:

**Introduction J2EE platform** – J2EE Architecture – Containers – J2EE Technologies: Component – service – communication technologies – Developing J2EE application

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### UNIT V:

**EJB Architecture and Design:** Introduction to EJB – The EJB containers and its services- Working with EJB – Session Bean and Business Logic – Entity Bean and Persistence.  
**JMS and Message Driven Beans:** The JMS architecture – Message Driven beans

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## **MCA**

### **Course Outcomes:**

After completion of the course, students will be able to

- understand the difference between RMI and Javaframework.
- work with the basic and advanced features of RMI.
- create applications using various dataproviders,JSP,Integrate all the features of J2EE.
- Find an carrier opportunity to serve as Hardware engineer and Network engineer.
- serve as engineer and develop the skills to work in multiple platform

### **Text Books:**

1. Robert Orfali, Dan Harkey and Jeri Edwards, “The Essential Client / Server Survival Guide”, Galgotia Publications Pvt.Ltd, 2002 (Unit 1).
2. Professional Java server programming – Subrahmanyam Allamaraju and Cedric Buest .

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>II</b>	<b>20P2CAEL1B</b>	<b>ELECTIVE – IV Semantic Web</b>	<b>5</b>	<b>4</b>

### Objective

- To interpret about the Semantic Web Applications.
- To inculcate the concepts regarding OWL.
- To cultivate the essentials of rule languages.
- To illustrate the importance of semantic web software tools.
- To teach the importance of semantic web.

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### UNIT – I

**Hrs 18**

**RDF and RDF Schema:** Introduction – XML Essential-RDF-RDF Scheme-A Summary of RDF /RDF Scheme vocabulary.

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### UNIT - II

**Hrs 18**

**OWL:** Introduction-Requirements for Web Ontology Description Languages-Header Information, versioning and Annotation Properties-Properties-Classes Individuals Data types- A Summary of the OWL vocabulary.

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### UNIT - III

**Hrs 18**

**Rule Languages:** Introduction-Usage Scenarios for Rule Language-Data log-Rule ML-SWRL-TRIPLE-**Semantic Web services**-Introduction-Web service Essential-OWLS Service Ontology-An OWLs Example.

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### UNIT - IV

**Hrs 18**

**Ontology Sources:** Introduction – Metadata Upper Ontologies – Other Ontologies of Interest – Ontology Libraries. **Semantic Web Software Tools:** Introduction – Metadata and Ontology Editors - Reasoners – Other tools.

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### UNIT - V

**Hrs 18**

**Applications:** Software Agents – Introduction – Agent Forms – Agent Architecture – Agent in the Semantic Web Context – **Semantic Desktop:** Introduction – Semantic desktop meta data – Semantic Desktop Ontologies - Semantic Desktop Architecture - Semantic Desktop Related Applications.

**Ontology Applications In Art:** Introduction – Ontologies for the Description of Works of Art – Meta data Schemas for the Description of Works of Art- Semantic Annotation of Art Images.

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## **MCA**

### **Course Outcomes:**

After completion of the course, students will be able to

- develop an application using ontology languages and tools.
- understand the concepts of semantic web.
- use ontology related tools and technologies for application creation.
- Search for career opportunity to design and develop applications using semantic web in web creation department.
- designated as semantic web developer.

### **Text Books:**

"Semantic Web: Concepts, Technologies and applications" K.K. Breitman, M.A. Casanova and W. Truszkowski Springer-verlag London Limited, 2007, India Reprint by Rakmo press(p) Ltd, New Delhi 2010.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
<b>II</b>	<b>20P2CAEL1C</b>	<b>Elective-1C PEER-TO-PEER COMPUTING</b>	<b>5</b>	<b>4</b>

### Objective

- To impart about the Peer-to-Peer computing techniques.
- To interpret the basics of apache tomcat server.
- To inculcate the essentials of power server.
- To demonstrate the importance of IEEE standards.
- To teach the importance of Granularity.

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### UNIT-I

**Hrs 15**

**Overview of Peer-to-Peer:** Introduction – Batch Modes – On-Line Modes – Client Server – Peer-to- Peer System. File-Sharing Peer-to-Peer System: Introduction –Famous Napster Model – Gnutella –BitTorrent – Common Features – Legal Challenges – The need for More Powerful Computers: Introduction –Problem of Parallel Computers – CPU Power Sharing Examples – Need for Parallel Algorithms – Metrics in Parallel Systems – Problems – Desirable Characteristics of P2P Systems – Enabling Technologies – Overview of Our Solution – Comparison

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### UNIT - II

**Hrs 15**

**Web Server and Related Technologies** – Introduction – Web Servers – Apache Tomcat – Starting the Tomcat Server – Better Development Environment – Directories – Mapping Between URL and Servlet – Selection of Web Servers – Introduction to Servlet: Servlets – Servlet Lifecycle – Servlet Collaboration – Basic Structure of Servlet – Sending and Receiving Information – Testing Second Servlet (Without html File ) Further Tests – Compiling the Servlet – Java Network Programming – Introduction – URL Connection – Socket Communication – datagram – Difference – Testing and Enhancements of Servlets:Introduction – Debugging Techniques – Global Parameters – Synchronization – Tips to Speed Testing – Troubleshooting.

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### UNIT - III

**Hrs 15**

**Power Server:** Model1: Introduction – Model Without Web Server – Model1 –First Test – Second Test Troubleshooting – Further Tests. PowerServer: Model 2 Introduction – Power Server with Web Server – Model 2 – Server Side Programs – Phase 1 Testing – invokeServer Program – Phase 2 Testing – Power Server: Model 3 – Server Program of Model 3 –Client Program of Model 3 – divide. Java Module –Sshare2.java Module-Share2.java – Testing – Comparison with Model1.

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### UNIT-IV

**Hrs 15**

**Power Server: Model 4** – Introduction –Power Server with Web Server – Model 4 – Server Side Program – Testing the invokeServer2 Program – Testing the system. Power Server – Model 5 : Introduction – Power Server –model5- Server Side Program – Client side Program – Testing – Comparison with Model 4 – Further Tests – Other Improvements. Wireless P2P System: Introduction – IEEE802 Standards – Bluetooth – Wireless LAN –

## MCA

Wireless Routers – Internet-Enabled Devices – Internet- Enabled Devices – Problems of Mobile Phones- Extending the Power of Mobile Phones – Wireless P2P Systems with Mobile Phones – Implementation of Wireless P2P Systems- Introduction – Client-Mobile Phone- Tier 1 Server Program –phoneServlet.java – Tier 2 Server Side Program – Tools for Mobile Phone Development – Testing for mobile Phone Development – Testing the Wireless P2P – Experiments with More Sub-tasks.

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### UNIT-V

**Hrs 15**

Computer Architecture – Introduction - Classification of Computer Architectures – Granularity –General or Specially Designed Processors - Processor Networks – Shared Networks – Shared Memory Connection . Distributed and Parallel Algorithm – Introduction – Overview of Serial Sorting – Characteristics of Sortin Algorithms – Parallel Sorting Algorithms for MIMD with shared Memory – Parallel Sorting Algorithms for MIMD with Distuibrated Memory – Infrastructure and Future Development – -Infrastructure –Incentives – Maintenance – Future P2P Development – Problems of Data –Sharing P2P System – Efficient Parallel Algorithms – Re-Visiting Speed Up –Applications- Further Improvements.

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### Course Outcomes:

After completion of the course, students will be able to

- understand the concepts of client and server
- build the system and implement the networking technologies
- understand and develop the skills about the servlet programming
- work in a dynamic environment and serve as network engineer
- there is carrier opportunity to work as service engineer
- 

### REFERENCE BOOK

1. Alfred Wai-Sing Loo, "Peer-to-Peer Computing"- Springer International Edition 2010.



## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>II</b>	<b>20P2CAEL2A</b>	<b>ELECTIVE - III SOFT COMPUTING</b>	<b>4</b>	<b>4</b>

### Objective

- ❖ To demonstrate Artificial Intelligence, Neural network and Fuzzy system concepts.
- ❖ To cultivate the knowledge representation and predicate logic in the minds of the students.
- ❖ To impart the core of the different learning algorithms in AI.
- ❖ To interpret the importance of ADALINE and MEDALINE in soft computing.
- ❖ To illustration the basic concepts of fuzzification and defuzzification.

### UNIT – I

**Hrs 15**

**Problems, Problem Spaces and Search:** Defining the Problem as a State Space Search – Production Systems – Problem Characteristics – Production System characteristics – Issues in the Design of Search Programs – Additional Problems. **Heuristic Search Techniques:** Generate and Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means-Ends Analysis.

### UNIT - II

**Hrs 15**

**Knowledge Representation Issues:** Representing and Mappings – Approach to Knowledge Representation – Issues in Knowledge Representation – The Frame Problem. **Using Predicate Logic:** Representing Simple Facts in Logic – Representing Instance and Isa Relationships – Computable Functions and Predictions – Resolution. **Representing Knowledge using Rules:** Procedural versus Declarative knowledge – Logic Programming–Logic Programming–Forward versus Backward Reasoning–Matching.

### UNIT - III

**Hrs 15**

**Artificial Neural Networks: Concepts** –Neural Attributes –Modeling-basic model of a Neuron-Learning in Artificial Neural Networks-Characteristics of ANNs-Important ANNs Parameter-Artificial Neural Network Topology-Learning Algorithm-Discrimination ability-ANN adaptability-The Stability-Plasticity Dilemma. **Neural Network Paradigms:** McCulloch-Pitts Model-The Perceptron

### UNIT - IV

**Hrs 15**

**ADALINE and MADALINE Models:**–Winner-Takes-All Learning Algorithm-Back-Propagation Learning Algorithm-Cerebellum Model Articulation controller(CMAC)-Adaptive Resonance Theory(ART) Paradigm-Hopfield Model-Competitive Learning Model-Memory Type Paradigms-Linear Associative Memory (LAM) – Real Time Models – Linear Vector Quantization(LVQ) Self-Organizing Map(SOM) Probabilistic Neural Network(PNN) – Radial Basis Function(RBF) – Time –Delay Neural Net(TDNN) Cognitron and Necognitron Models-Simulated Annealing – Boltzmann Machine- Other Paradigm.

### UNIT - V

**Hrs 15**

**FUZZY LOGIC:** Propositional Logic– The Membership function – Fuzzy logic – Fuzzy Rule Generation – Defuzzification of Fuzzy Logic – Time- Dependent Fuzzy Logic – Temporal Fuzzy Logic(TFL) - Applying Temporal Fuzzy Operators – Defuzzification of Temporal Fuzzy Logic – Example: Applicability of TFL in Communications Systems- Fuzzy Neural Networks – Fuzzy Artificial Neural Network(FANN) Fuzzy Neural Example- Neuro-Fuzzy Control- Fuzzy Neural Net –A Reality? **Applications:** Signal Processing –Image Data Processing – Communication Systems- Intelligent Control- Optimization Techniques- Other Applications – Tools and Companies.

## MCA

### Course Outcomes:

After completion of the course, students will be able to

- discuss on machine learning through neural networks
- apply knowledge in developing a fuzzy expert system
- model neuro fuzzy system for clustering and classification
- discover knowledge to develop genetic algorithm and machine learning system
- serve as machine learning researchers, ai engineer, data mining and machine learning engineer, data scientist, business intelligence

### Text Book:

1. Stamatios V. Katakis, "Understanding Neural Networks and Fuzzy logic". Prentice –Hall of India Private Limited, New Delhi, 2000.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence" Second Edition, Tata McGraw – Hill publishing Computing Ltd. New Delhi, 1999.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>II</b>	<b>20P2CAEL2B</b>	<b>Core – INTRODUCTION TO MACHINE LEARNING</b>	<b>4</b>	<b>4</b>

### OBJECTIVES:

- To impart the basic concepts of machine learning and probability theory.
- To describe supervised learning and their applications.
- To illustrate unsupervised learning like clustering and EM algorithms.
- To demonstrate the theoretical and practical aspects of probabilistic graphical models.
- To inculcate other learning aspects such as reinforcement learning, representation learning, deep learning, neural networks and other technologies.

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### UNIT- I INTRODUCTION

Machine Learning – Types of Machine Learning – Supervised Learning – Unsupervised Learning – Basic Concepts in Machine Learning – Machine Learning Process – Weight Space – Testing Machine Learning Algorithms – A Brief Review of Probability Theory – Turning Data into Probabilities – The Bias-Variance Tradeoff.

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### UNIT- II SUPERVISED LEARNING

Linear Models for Regression – Linear Basis Function Models – The Bias-Variance Decomposition – Bayesian Linear Regression – Common Regression Algorithms – Simple Linear Regression – Multiple Linear Regression – Linear Models for Classification – Discriminant Functions – Probabilistic Generative Models – Probabilistic Discriminative Models – Laplace Approximation – Bayesian Logistic Regression – Common Classification Algorithms – k-Nearest Neighbors – Decision Trees – Random Forest model – Support Vector Machines.

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### UNIT- III UNSUPERVISED LEARNING

Mixture Models and EM – K-Means Clustering – Dirichlet Process Mixture Models – Spectral Clustering – Hierarchical Clustering – The Curse of Dimensionality – Dimensionality Reduction – Principal Component Analysis – Latent Variable Models (LVM) – Latent Dirichlet Allocation (LDA).

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### UNIT- IV GRAPHICAL MODELS

Bayesian Networks – Conditional Independence – Markov Random Fields – Learning – Naive Bayes Classifiers – Markov Model – Hidden Markov Model.

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## UNIT- V

### ADVANCED LEARNING

Reinforcement Learning – Representation Learning – Neural Networks – Active Learning – Ensemble Learning – Bootstrap Aggregation – Boosting – Gradient Boosting Machines – Deep Learning.

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### Course Outcomes:

After completion of the course, students will be able to

- implement probabilistic discriminative and generative algorithms for an application and analyze the results.
- use a tool to implement typical clustering algorithms for different types of applications.
- design and implement ML in research field.
- implement appropriate learning algorithms for any real time application using an open source tool.
- find career opportunity to serve as Machine Learning Researchers, AI Engineer, Data Mining and Machine Learning Engineer, Data Scientist, Business Intelligence

### REFERENCES:

1. Ethem Alpaydin, "Introduction to Machine Learning", Third Edition, Prentice Hall of India, 2015.
2. Christopher Bishop, "Pattern Recognition and Machine Learning", Springer, 2006.
3. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012.
4. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", Second Edition, CRC Press, 2014.
5. Tom Mitchell, "Machine Learning", McGraw-Hill, 2017.
6. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning", Second Edition, Springer, 2008.
7. Fabio Nelli, "Python Data Analytics with Pandas, Numpy, and Matplotlib", Second Edition, Apress, 2018.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
II	20P2CAEL2C	<b>Elective - IVA HUMAN COMPUTER INTERACTION</b>	<b>4</b>	<b>4</b>

### Objective

- ❖ To impart the concepts and techniques for effective interaction between Human and Computers
  - ❖ To interpret the concepts and techniques for effective interaction between Human and Computers
  - ❖ To inculcate the importance of spoken dialogue system and recommender system.
  - ❖ To cultivate the importance of the ontology tool in HCI.
  - ❖ To teach the objectives of ambient intelligence in Computing.
  - ❖ To describe the interaction skills and various methodologies to establish effective HCI.
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### Unit I:

**Hrs 15**

Cognitive Psychology and Computer Science - Capabilities of Human-Computer Interaction (HCI)-Goals of Human-Computer Interaction (HCI)-Roles of Human, Computer and Interaction in HCI- Basic User Interfaces - Advanced User Interfaces - Justification of Interdisciplinary Nature - Standard Framework of HCI -HCI Design Principles -Interface Levels in HCI- Steps in Designing HCI Applications-Graphical User Interface Design -Popular HCI Tools-Architecture of HCI Systems- Advances in HCI- Overview-HCI Sample Exercises  
**Usability Engineering** -Introduction-HCI and Usability Engineering -Usability Engineering Attributes-Process of Usability-Need for Prototyping.

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### Unit II

**Hrs 15**

**Modelling of Understanding Process-** Introduction- Goals, Operators, Methods and Selection Rules (GOMS) - Cognitive Complexity Theory (CCT) - Adaptive Control of Thought-Rational (ACT-R) - State, Operator, and Result (SOAR) -Belief-Desire-Intention (BDI) - ICARUS-Connectionist Learning with Adaptive Rule Induction On-line (CLARION) - Subsumption Architecture -**Spoken Dialogue System** - Introduction -Factors Defining Dialogue System - General Architecture of a Spoken Dialogue System-Dialogue Management (DM) Strategies -Computational Models for Dialogue Management- Statistical Approaches to Dialogue Management - Learning Automata as Reinforcement Learners -Case Study: Learning Dialogue Strategy Using Interconnected Learning Automata -Software and Toolkits for Spoken Dialogue Systems Development.

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### Unit III

**Hrs 15**

**Recommender Systems-** Introduction- HCI Study Based on Personalisation - Personalisation in Recommender Systems -Relation between Information Filtering and Recommender Systems -Application Areas of Recommender Systems-Recommender System Field as an Interdisciplinary Area of Research-Phases of Recommender Systems -User Profiling Approaches-Classification of Recommendation Techniques -Advantages and Disadvantages of Recommender System Approaches -Need of Software Agent-based Approach in Recommender Systems-Evaluating Recommender Systems-Integrated Framework for Recommender Systems-Case Study: Music Recommender System .

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# MCA

## Unit IV

Hrs 15

**Advanced Visualisation Methods** - Ontology Definition -Ontology Visualisation Method -Space Dimensions of Ontology Visualisation -Ontology Languages -Ontology Visualisation Tools -Ontology Reasoning -Reasoner Case Study 1: Teaching Ontology with C Programming Language -Case Study 2: Activity for Ontology Creation with a Case of a Software Company Scenario -Case Study 3: Activity for History Ontology Creation.

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## Unit V

Hrs 15

**Ambient Intelligence: The New Dimension of Human-Computer Interaction** - Introduction - Ambient Intelligence Definition-Context-aware Systems and Human-Computer Interaction -Middleware - Modelling Data for AmI Environment -Development of Context-awareness Feature in Smart Class Room— A Case Study - Context-aware Agents for Developing AmI Applications—A Case Study

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## Course Outcomes:

After completion of the course, students will be able to

- interpret the contributions of human factors and technical constraints on human computer interaction.
- evaluate the role of current hci theories in the design of software.
- design and develop interfaces related to real applications.
- serve as front-end designer/developer, product managers & designers.
- interaction designer, user experience designer/researcher.
- human factors engineer
- implement human computer interfaces for different applications using various tools and technologies.

## Text book:

1. K. Meena, R. Sivakumar, "Human-Computer Interaction", PHP Learning Private limited Delhi-110092, 2015.

## Reference:

1. "Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale", "Human-Computer Interaction", 3<sup>rd</sup> Edition, Pearson publications, 2008.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>II</b>	<b>20P2CAP3</b>	<b>Big Data Analytics Lab</b>	<b>3</b>	<b>2</b>

### Objectives:

- To teach the usage and implementation of Big Data Analytics development packages.
- To provide an overview of an exciting growing field of big data analytics.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map- Reduce.
- To interpret the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To enable skills that will help them to solve complex real-world problems in for decision support.

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1. Study of Hadoop ecosystem
  2. Programming exercises on Hadoop
  3. Programming exercises in No SQL
  4. Implementing simple algorithms in Map- Reduce (3) - Matrix multiplication, Aggregates, joins, sorting, searching etc.
  5. Implementing any one Frequent Itemset algorithm using Map-Reduce
  6. Implementing any one Clustering algorithm using Map-Reduce
  7. Implementing any one data streaming algorithm using Map-Reduce
  8. Mini Project: One real life large data application to be implemented (Use standard Datasets available on the web)
    - a. Twitter data analysis
    - b. Fraud Detection
    - c. Text Mining etc.

## **MCA**

### **Course Outcomes:**

After completion of the course, students will be able to

- understand the fundamental techniques and principles in achieving big data analytics with
- understand scalability and streaming capability.
- improve the skills that will help them to solve complex real-world
- solve problems for decision support.
  
- combine structured, semistructured and unstructured data collected by organizations that can be mined for information.
- develop the projects in connection with machine learning, predictive modeling and other advanced analytics applications.
- work as business analyst and build several database.



## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>II</b>	<b>20P2CAP4</b>	<b>Distributed Programming using J2EE Lab</b>	<b>3</b>	<b>2</b>

### Objectives:

- To the usage and implementation of distributed application development packages.
  - To impart knowledge about the distributed environment, its architecture, application development with RMI.
  - To cultivate skills regarding Java Servlets
  - To sharpen and widen the knowledge of student communities in connection with Java Server Pages, Struts and EJB using J2EE technologies.
  - To interpret the concepts related to client,server and its communication technologies
  - To impart knowledge about the session bean and entity bean.

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#### 1. Distributed applications using RMI

a. Simple RMI application

b. RMI application with a server and more than one clients

c. RMI application with Database Connectivity

2. JSP program to implement form data validation to accept correct data
3. JSP script to demonstrate the use of <jsp:include .....> by displaying an external webpage and <jsp:plugin .....> to run an applet
4. JSP program for demonstrating creation and accessing Java Beans
5. Enterprise Java Beans

a. Session Bean

i. Stateless Session Bean

ii. Stateful Session Bean

b. Entity Bean

i. Container Managed Persistence

ii. Bean Managed Persistence

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## **MCA**

### **Course Outcomes:**

After completion of the course, students will be able to

- develop and execute RMI concept.
- work with the basic and advanced features of RMI.
- create applications using various data providers.
- create web application using JSP and integrate all the features of J2EE.
- find career opportunity to get employed as web engineer in IT industry.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>II</b>	<b>20P2CAS2</b>	<b>INTERPERSONAL SKILLS</b>	<b>3</b>	<b>2</b>

### Objectives:

- To teach the effect of behaviour on oneself, other peoples and our organisation.
- To inculcate effective first impressions.
- To make best use of body language, listening and oral communication.
- To provide strengths and areas for development.
- To enable to identify personality types.

### Interpersonal Skills

#### Understanding others

- Fundamentals of assertiveness
- Understanding difficult people
- Understanding body language
- Steps in understanding others and relationship building

#### Team building

- Building team and working in teams
- Dos and don'ts in team work
- Roles played by members and by team leaders

#### Problem solving techniques

- Steps involved in problem solving
- Methods in problem solving
- Creative thinking
- Overcoming problems using creative thinking exercise.

### Course Outcomes:

After completion of the course, students will be able to

- Create a positive work environment through improved awareness of personality styles.
- Improve their self-awareness when communicating and reduce office friction.  
Build rapport to enrich relationships.
- Persuade and influence others with a focused communication approach.
- Improve the skills to attend the competitive exams
- Improve the creativity skills

## MCA

Semester	Subject code	Title of the course	Hours of Teaching /Week	No. of Credits
<b>III</b>	<b>20P3CA9</b>	<b>Core – Cross Platform - Mobile Applications Development</b>	<b>6</b>	<b>4</b>

### OBJECTIVES:

- To impart the need and characteristics of mobile applications.
  - To teach the right user interface for mobile application.
  - To illustrate the design issues in the development of mobile applications.
  - To inculcate the development procedure for mobile application.
  - To interpret mobile applications using various tools and platforms.
- 

### Unit I

#### Mobile Development Using Xamarin

What is Xamarin – What's new: Mobile Development Techniques – Mobile UI – Xamarin Forms Custom Renderers – Building Mobile User Interfaces – Xamarin Forms Architecture – Platform UI Specification Approach – Xamarin Forms or a Platform-Specific UI.

### Unit II

#### Xamarin Views

Xamarin Forms - Creating Xamarin Forms Solution – Adding Xamarin.Forms views – UI Design Using Layouts – Xamarin Forms Layouts – Android Layout – iOS Layout

### Unit III

#### Xamarin Controls

Xamarin.Forms Views – Android controls – iOS controls – Making a Scrollable List – Data Adapters – Xamarin.Forms Listview – Android Listview – iOS TableView

### Unit IV

#### Navigation & Database

Navigation Patterns – Xamarin.Forms Navigation – android Navigation – iOS Navigation – Data Access with SQLite and Data Binding.

### Unit V

#### Custom Renderers & Cross – Platform Architecture

Custom Renderers – Preparing custom renderers – Creating Custom renderers – android, iOS, Windows phone custom renderers – Cross platform Architecture – Shared code and Platform specific code – Core Library – PCL – Dependency Injection.

## MCA

### Course Outcomes:

After completion of the course, students will be able to

- development Using Xamarin and Design the right user interface for mobileapplication.
- implement mobile application using UI toolkits andframeworks.
- design a mobile application that is aware of the resource constraints of mobile devices.
- understand the essence of web based mobile application that accesses internet and locationdata.
- develop the app for android environment and work in a dynamic environment as a designer.
- find the carrier opportunity to Work as App developer in MNC to communicate with mobile apps

### Text book:

Xamarin Mobile Application Development: Cross-Platform C# and Xamarin.Forms Fundamentals 2015 by Dan Hermes, Apress

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III</b>	<b>20P3CA10</b>	<b>DOT NET FRAMEWORK WITH C# PROGRAMMING</b>	<b>6</b>	<b>4</b>

### Objective

- To illustrate programming techniques in c#.
  - To teach about the role of datatypes ,variables and flow controls and methods.
  - To cultivate the knowledge about inheritance and interfaces.
  - To inculcate the exception handling concepts in the minds of the students.
  - To impart the essentials of threads and synchronization.
- 

### UNIT – I

#### The NET Architecture:

The Vision and goals of.NET – The Building blocks of.NET – An overview of.NET framework:  
The NET Evolution – Design goals of the.NET framework – The .NET framework Architecture  
– An overview of.NET application.

### UNIT – II

#### Class overview:

Introduction to C# - Data types – Operators – Flow Control – Methods and Parameters – Fields – Instance Methods.

### UNIT – III

#### Advanced of Class:

Access Modifier – Static – Extension Methods – Nested Class – Partial Class – Inheritance – Interface – Value Types.

### UNIT – IV

Exception Handling – Generics (Basic,Methods) – Delegates and Lamba Expressions – Events  
Delegates &Lambda Expressions

### UNIT – V

Building Custom collections – More collection interfaces – Primary collections class -  
Multithreading (Basic, Working with System. Threading, Asynchronous Tasks – Cancelling a  
Task,Thread Synchronization)

## **MCA**

### **Course Outcomes:**

After completion of the course, students will be able to

- list the major elements of the .NET Framework
- analyze the basic structure of a C#application
- write various applications using C# Language in the .NETFramework
- develop distributed application using.NET Framework
- serve as software engineer using .NETFramework
- play the role of CEO in a software company or MNC.

### **Reference Book**

Essential C# 6.0, 5th Edition - **Mark Michaelis & Eric Lippert**

## MCA

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>III</b>	<b>20P3CAEL3A</b>	<b>Elective-2A ENTERPRISE RESOURCE PLANNING</b>	<b>6</b>	<b>5</b>

### Objective

- To teach the concepts related to Enterprise resource planning.
- To cultivate the knowledge about the Industry and financial system.
- To demonstrate about the implementation of the client and server
- To interpret of SAP in ERP.
- To impart innovative technologies in improving the business.

### Unit I

**Hrs 12**

Integrated Management Information - seamless Integration - Supply Chain Management - Integrated data Model - Benefits of ERP - Business Engineering and ERP - Definition of Business engineering - principles of business engineering - Business engineering with information technology.

### Unit II

**Hrs 12**

Building the Business model - ERP implementation - an Overview - Role of Consultant, Vendors and Users, Customization - precautions - ERP post implementation options - ERP Implementation Technology - Guidelines for ERP Implementation.

### Unit III

**Hrs 12**

ERP domain - MPG / PRO - IFS /Avalon - Industrial and financial System - Baan IV SAP - Market Dynamics and dynamic strategy.

### Unit IV

**Hrs 12**

Description - Multi - Client Server solution - Open technology - User Interface - Application Integration.

### Unit V

**Hrs 12**

Basic architectural Concepts - The system control interfaces - Services - presentation interface - Database Interface.

### Course Outcomes:

After completion of the course, students will be able to

- make basic use of enterprise software, and its role in integrating business functions
- analyze the strategic options for erp identification and adoption.
- design the erp implementation strategies.
- create reengineered business processes for successful erp implementation.
- work as erp programmer,erp administrator,erp analyst,erp project manager,erp executive

### Reference:

1. Vinod kumar Garg and N.K. Venkita krishnan, "Enterprise Resource Planning - Concepts and practice", PH,1998.

### General Reference:

1. Jose Anonio Fernandez, "The SAP R/3 Handbook", Tata Mc Graw Hill publications, 1998.



## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III</b>	<b>20P3CAEL3B</b>	<b>Elective-2B MANAGEMENT INFORMATION SYSTEM</b>	<b>6</b>	<b>5</b>

### Objective

- To teach about various information systems required to design MIS.
- To provide information for decision making on planning, initiating, organizing, and controlling the operations of the subsystems of the firm
- To provide a synergistic organization in the process.
- To facilitate decisions-making process by furnishing information in the proper time frame.
- To illustrate of artificial intelligence in problem solving regarding business processes

### Unit – I

**Foundation of Information Systems in business:** Foundation concepts: Information systems in business – Foundation concepts: The component of Information systems.

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### Unit – II

Competing with Information Technology: Fundamentals of Strategic Advantage – Using Information Technology for Strategic Advantage.

E-Business systems: E-Business systems – Functional Business systems.

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### Unit – III

Enterprise Business Systems: Getting All the Geese Lined Up: Managing at the Enterprise Level – Customer Relationship Management: The Business Focus – Enterprise Resource Planning: The Business Backbone – Supply Chain Management: The Business Network.

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### Unit – IV

Electronic Commerce Systems: Electronic Commerce Fundamentals – E-Commerce Applications and Issues.

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### Unit – V

Decision Support Systems: Decision Support in Business – Artificial Intelligence Technologies in Business.

### Course Outcomes:

After completion of the course, students will be able to

- evaluate the role of information systems in today's competitive business environment.
- identify and describe important features of organizations in order to build and use information systems successfully.
- demonstrate systems analysis, design and decision making in a business setting.
- describe the fundamentals of hardware, software, database management, data communications and systems related to the management activities of an organization.
- serve as managers, CEO and end-users in organizations or corporate companies.
- identify the principal management challenges posed by the ethical and social impact of information systems and management solutions.

## **MCA**

### **Reference:**

1. "Management Information Systems " , James A O'Brien, George M Marakas, Ramesh Behl, Ninth Edition, TMH Publications, 2010.

### **General Reference:**

1. "Management Information System", Gordon B. Davis Margre the H.Olson, Mc Graw Hill, 3rd Reprint 2000.

**MCA**

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No.of Credits
<b>III</b>	<b>20P3CAEL3C</b>	<b>SOFTWARE PROJECT MANAGEMENT</b>	<b>6</b>	<b>5</b>

**Objectives:**

- To provide an awareness of the need for project planning and management.
- To impart about software effort estimation and activity planning.
- To illustrate risk and people management.
- To interpret about project monitoring and control mechanisms.
- To inculcate about software quality management.

**UNIT- I****Hrs 18****INTRODUCTION**

Basics of Software Project Management: Definition – Software Projects Versus Other Types of Project – Contract Management and Technical Project Management – Activities – Plans, Methods and Methodologies – Requirement Specification – Management Control – Overview of Project Planning – Introduction to Step Wise Project Planning – Programme Management and Project Evaluation: Programme Management, Benefits, Evaluation, Technical Assessment, Cost -Benefit Analysis, Risk Evaluation – Selection of an Appropriate Project Approach: Choosing Technologies, Process Models, Software Prototyping, Dynamic Systems Development Method, Managing Iterative Processes.

**UNIT- II****Hrs 18****SOFTWARE EFFORT ESTIMATION AND ACTIVITY PLANNING**

Software Effort Estimation: Problems with Over and Under Estimates – Basis of Software Estimating – Techniques – Expert Judgment – Cosmic Full Function Points – A Procedural Code Oriented Approach – COCOMO: A Parametric Model – Activity Planning: Objectives – Project Schedules – Projects and Activities – Sequencing and Scheduling Activities – Network Planning Models – Formulating A Network Model – Identifying Critical Path – Shortening the Project Duration – Identifying Critical Activities – Activity-on-arrow Networks.

**UNIT- III****Hrs 18****SOFTWARE RISK AND PEOPLE MANAGEMENT**

Categories of Risk – Framework for Dealing with Risk – Risk Identification – Risk Assessment – Risk Planning – Risk Management – Evaluating Risks to the Schedule – Applying the PERT Technique – Monte Carlo Simulation – Critical Chain Concepts – Resource Allocation: Nature of Resources – Identifying Resource Requirements – Scheduling Resources – Creating Critical Paths – Counting the Cost – Cost Schedules – Scheduling Sequence.

**UNIT- IV****Hrs 18****SOFTWARE PROJECT MONITORING AND CONTROL**

Creating the Framework – Collecting the Data: Partial Completion Reporting – Risk Reporting – Visualizing Progress: Gantt chart – Slip chart – Ball Charts – The Timeline – Cost Monitoring – Earned Value Analysis – Prioritizing Monitoring – Getting the Project Back to Target – Change Control.

**SOFTWARE QUALITY MANAGEMENT**

Managing Contracts: The ISO 12207 Approach, Supply Process, Types, Stages, Contract Management Managing People and Organizing Teams: Understanding Behaviour, Organizational Behaviour, Motivation, The Oldham-Hackman Job Characteristics Model, Decision Making, Leadership, Dispersed and Virtual Teams, Software Quality – Importance, Defining Software Quality, ISO 9126, Software Quality Measures, Product Versus Process Quality Management, External Standards, Quality Plans.

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**Course Outcomes:**

After completion of the course, students will be able to

- differentiate between various software process models.
- prepare project planning documents.
- estimate the software cost for projects.
- perform effective activity planning.
- act as project manager, software engineer and team leader..
- develop the software which best meets the needs of the user.

**REFERENCES:**

1. Bob Hughes, Mike Cotterell, "Software Project Management", Fourth Edition, Tata McGraw-Hill, 2011.
2. Walker Royce, "Software Project Management: A Unified Framework", Pearson Education, 2004.
3. Rishabh Anand, "Software Project Management", S. K. Kataria, 2013.
4. S. A. Kelkar, "Software Project Management: A Concise Study Paperback", Prentice Hall of India, 2013.
5. Ramesh Gopalaswamy, "Managing Global Software Projects", Tata McGraw Hill, 2001.
6. Humphrey Watts, "Managing the software process", Addison Wesley, 1989.
7. Ashfaq Ahmed, "Software Project Management Process Driven Approach", Auerbach Publications, 2011.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III</b>	<b>20P3CAEL4A</b>	<b>BLOCKCHAIN TECHNOLOGIES</b>	<b>6</b>	<b>4</b>

### OBJECTIVES:

- To describe a blockchain system's fundamental components, how they fit together and examine a decentralization using blockchain.
- To explain how Cryptocurrency works, from when a transaction is created to when it is considered part of the blockchain.
- To illustrate the components of Ethereum and programming languages for Ethereum.
- To teach the basics Hyperledger and Web3.
- To provide details of alternative blockchain and blockchain projects in different perspective.

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### UNIT- I

#### INTRODUCTION TO BLOCKCHAIN

History of Blockchain – Types of Blockchain – Consensus – Decentralization using Blockchain – Blockchain and Full Ecosystem Decentralization – Platforms for Decentralization.

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### UNIT- II

#### INTRODUCTION TO CRYPTOCURRENCY

Bitcoin – Digital Keys and Addresses – Transactions – Mining – Bitcoin Networks and Payments – Wallets – Alternative Coins – Theoretical Limitations – Bitcoin limitations – Name coin – Prime coin – Zcash – Smart Contracts – Ricardian Contracts.

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### UNIT- III

#### ETHEREUM

The Ethereum Network – Components of Ethereum Ecosystem – Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain, Fee Schedule – Supporting Protocols – Solidity Language.

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### UNIT- IV

#### WEB3 AND HYPERLEDGER

Introduction to Web3 – Contract Deployment – POST Requests – Development Frameworks - Hyperledger as a Protocol – The Reference Architecture – Hyperledger Fabric – Distributed Ledger – Corda.

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### UNIT- V

#### ALTERNATIVE BLOCKCHAINS AND NEXT EMERGING TRENDS

Kadena – Ripple – Rootstock – Quorum – Tendermint – Scalability – Privacy – Other Challenges – Blockchain Research – Notable Projects – Miscellaneous Tools.

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## MCA

### Course Outcomes:

After completion of the course, students will be able to

- understand the technology components of blockchain and how it works behind – the scenes.
- be aware of different approaches to developing decentralized applications.
- understand the bitcoin and its limitations by comparing with other alternative coins.
- establish deep understanding of the ethereum model, its consensus model and code execution.
- understand the architectural components of a hyperledger and its development framework.
- aware of the alternative blockchains and emerging trends in blockchain.

### REFERENCES:

1. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Second Edition, Packt Publishing, 2018.
2. Arshdeep Bahga, Vijay Madisetti, "Blockchain Applications: A Hands On Approach", 2017.
3. Andreas Antonopoulos, Satoshi Nakamoto, "Mastering Bitcoin", O'Reilly, 2014.
4. Roger Wattenhofer, "The Science of the Blockchain" CreateSpace Independent Publishing, 2016.
5. A. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.
6. Alex Leverington, "Ethereum Programming" Packt Publishing, 2017.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching / Week	No. of Credits
<b>III</b>	<b>20P3CAEL4B</b>	<b>ELECTIVE - III INTERNET OF THINGS (IoT)</b>	<b>6</b>	<b>4</b>

### Objectives

To impart knowledge to make the students

- To teach the fundamentals of Internet of Things.
- To interpret a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.
- To inculcate IoT using Raspberry Pi
- To demonstrate IoT with Galileo and Arduino
- To impart the concept of Internet of Things in the real world scenario

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### Unit I

**Hrs 18**

Introduction and definition to IOT - What is an IOT? - Explore the scenario for application of IOT Communication definitions Concepts - Capturing and Storing the data - What to do with the data...applying Expert Systems and Machine Learning; IOT Detailed understanding of Solution Architecture - IOT Device Architecture - IOT Network/Communication Architecture with an understanding on client server and loosely couple storage servers and message queues - IOT Application Architecture.

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### Unit II

**Hrs 18**

Programming Fundamentals with C using Arduino IDE - Understanding the Arduino IDE - Installing and Setting up the Arduino IDE - Connecting the Arduino IDE with devices - Program Structure in C - Basic Syntax - Data Types / Variables / Constants - Operators, Conditional Statements and Loops - Functions, Array and Pointers - Strings and I/O - Using Arduino C Library functions for Serial, delay and other invoking functions - Working with LED and Switch example on Arduino C Library functions

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### Unit III

**Hrs 18**

Working with Arduino for data acquisition with IOT Devices - Understanding Sensors and Devices - Understanding basic electronic components and power elements - Understanding the Inputs from Sensors - Working with Temperature Sensors - Working with Ultrasound Sensor - Working with humidity sensor - Working with Motion Sensor - Working with IR Sensor - Working with Proximity Sensor - Working with Photo Diode - Working with Accelerometer and vibration sensor - Measuring Voltage and Current

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## MCA

### **Unit IV**

**Hrs 18**

Working with Arduino for data acquisition with IOT Devices - Understanding the Outputs - Activating LED Lights - Activating Relays - Activating Buzzer - Running DC Motors - Running - Stepper Motors and Servo Motors

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### **Unit V**

**Hrs 18**

Programming Fundamentals with Web Applications for handling Data Communication from IOT Device - Understanding the data capture through web services - Creating and Programming a rest web service with PHP - Calling and accessing the Web Service in a Client; Building and Using Communication Devices to data transfer from IOT Devices - Understanding the Communication Principles to Transfer the data from IOT Devices; Remote Communication to cloud/external application - Using WIFI to Transfer the data from IOT Sensor.

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### **Course Outcomes:**

After completion of the course, students will be able to

- design a portable iot using arduino/ equivalent boards and relevant protocols
- develop web services to access/control iot devices
- deploy an iot application and connect to the cloud
- analyze applications of IoT in real time scenario
- work as network engineer and service engineer.

### **Reference:**

1. Michael Margolis, "Arduino Cookbook" 2nd Edition, O'Reilly Media, 2011
2. Michael Collier, Robin Shahan, "Fundamentals of Azure", Microsoft Press, 2015, ISBN: 978-0-7356-9722-5
3. Rick Rainey, "Azure Web Apps for Developers", Microsoft Press, 2015, ISBN: 978-1-5093-0059-4
4. Microsoft Azure, "Introduction to Microsoft Azure Storage", <https://docs.microsoft.com/en-us/azure/storage/common/storage-introduction>



## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III</b>	<b>20P3CAEL4C</b>	<b>Core – ADVANCES IN WEB SERVICES</b>	<b>6</b>	<b>4</b>

### Objective:

- ❖ To teach the concepts about Web services.
- ❖ To explain the role of SOAP.
- ❖ To impart the knowledge in the minds of the students about Geospatial web services .
- ❖ To interpret the working principles and the technologies of the web services.
- ❖ To impart the knowledge about software quality assurance.
- ❖ To cultivate the knowledge in the minds of the students about mongoDB and python programming.

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### Unit I

**Hrs 18**

API - applications of API- web services- architecture of web services- tools and technologies enabling web services -soap-wscl- wsfl- wsdli= benefits and challenges of using web services- types of web services- soap web services- rest web services - comparison of soap with REST web services

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### Unit II

**Hrs 18**

Web service security- security threats and countermeasure- web service security standards- example of building secure web services- security best practices- xml-parsing xml using DOM- XINS- generic frame work for testing web service transaction – understanding errors.

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### Unit III

**Hrs 18**

Geospatial web services- web services in multimedia communications- machine learning in web service discovery- web services in machine learning server- Microsoft Web Services – Google Web Services – Amazon Cloud based Web Services

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### Unit IV

**Hrs 18**

JAX- WS – JAX –RS- example- lightweight restful web service –calling and creating web service in java- json web service example – creating soap web service with spring frame work

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### Unit V

**Hrs 18**

Creating soap and rest web service with mongoDB- soap ad restful web service with python – python web service framework- python web service library – machine learning prediction as a restful web service

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# MCA

## Course Outcomes:

After completion of the course, students will be able to

- acquire the skills regarding communication between devices over the internet and are usually independent of the technology or language the devices are built on as they use standardised eXtensible Markup Language (XML) for information exchange.
- know the essentials of XML-based information exchange systems that use the Internet for direct application-to-application interaction. Gain the knowledge about the open standards such as TCP/IP, HTTP, Java, HTML, and XML.
- understand the importance of programs, objects, messages, or documents.
- search for job in connection with Back-end web developers, Front-end web developers, Internet application developers, Internet developers, Intranet developers, Web architects, Web content developers, Web designers.

## Text book:

1. Web Services Hand Book – Dr.T.S.Baskaran, jazyam publications, ISBN 978-93-87360-09-9
2. Features of Future Web Services–Dr.T.S.Baskaran, Jami publications, ISBN 978-93-87354-21-0

## Reference books:

<https://www.springer.com/gp/book/9781461475347>  
<https://www.routledge.com/Advances-in-Web-based-GIS-Mapping-Services-and-Applications/Li-Dragicvic-Veenendaal/p/book/9781138117815>  
<https://www.guru99.com/web-service-architecture.html>  
<https://www.sciencedirect.com/topics/computer-science/web-service-architecture>  
<https://www.w3.org/TR/ws-arch/>  
<https://towardsdatascience.com/build-your-own-python-restful-web-service-840ed7766832>  
<https://www.pythonforbeginners.com/python-on-the-web/how-to-access-various-web-services-in-python>  
<https://wiki.python.org/moin/WebServices>

## MCA

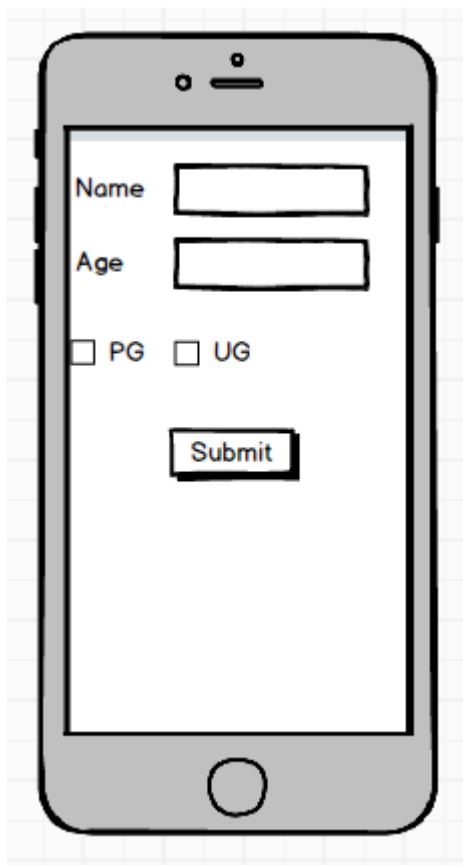
Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III</b>	<b>20P3CAP5</b>	<b>Core PL Lab V Cross Platform – Mobile Applications Development Lab</b>	<b>3</b>	<b>3</b>

### OBJECTIVES

- To interpret the need and characteristics of mobile applications.
- To illustrate the right user interface for mobile application.
- To facilitate the design issues in the development of mobile applications.
- To demonstrate the development procedure for mobile application.
- To provide mobile applications using various tools and platform

### Perform the experiments in J2ME / Android SDK framework

1. Timer: Create a Page, change the background and Foreground colour randomly using Xamarin Timer
2. Platform Specific: Create a form like below based on the platform change the Font Name, Font Size and display the form information in the Message Box.



The diagram shows a mobile phone screen with a form. The form contains the following elements:

- A text input field labeled "Name".
- A text input field labeled "Age".
- Two checkboxes: one labeled "PG" and one labeled "UG".
- A "Submit" button at the bottom of the form.

## MCA

3. Zoom: Using Pinch gesture class to Zoom the image in Xamarin Forms.
4. Animation: Create a button, using button click event animate images in Xamarin Forms.
5. Dependency Service: Using Dependency Service find the sum of a number, which enters by the user in the Xamarin Forms.
6. Android DB: Store & Retrieve the Form data into the SQLite.
7. Windows Phone DB: Store & Retrieve the Form data into the SQLite.
8. Navigation: Implementing Navigation using Pushing and Popping and Handling the Back button.
9. Master Detail Page: Create Navigation drawer using the MasterDetailPage.
10. Tabbed Page: Using Tabbed page load different page based on Tab click, one tab form should be implemented Popup menu handling.

### Course Outcomes:

After completion of the course, students will be able to

- develop the app using Xamarin.
- design the right user interface for mobile application.
- implement mobile application using UI toolkits and frameworks.
- design a mobile application that is aware of the resource constraints of mobile devices.
- develop web based mobile application that accesses internet and location data.
- develop the app for android environment.
- create database and communicate with mobile apps

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
III	20P3CAP6	Core –PL-Software Lab – C# PROGRAMMING LAB	3	2

### Objective

- To illustrate Programming techniques in c#.
- To teach about the role of datatypes ,variables and flow controls and methods.
- To cultivate the knowledge about inheritance and interfaces.
- To inculcate the exception handling concepts in the minds of the students.
- To explain threads and synchronization.

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### Programs

1. C# program for Ascending & Descending order.
2. C# Program for Matrix Multiplication.
3. C# program for stack and queue collections.
4. C# Program to perform various string operations.
5. Write a program in C# Sharp to find the factorial of a given number using recursion.
6. Writing a C# program using Extension Methods to generate Random File Nameconcept into Date Time class, FileCopy concept into the DirectoryInfo class.
7. Writing a C# Program to find the sum of Number using Delegates to print each step
8. Writing a C# program to change Background and Foreground of the colour using Events in C# (One event change background colour, one event change foreground colour), both events should be call every 3 seconds
9. Writing a C# program Copy one folder into another folder using Task functionality
10. Writing a C# program create a “FileCopy command” using coping file via Command line arguments

### Course Outcomes:

After completion of the course, students will be able to

- develop the .net and javaframework.
- work with the basic and advanced features of c#language.
- create applications using various dataproviders.
- create mobile application using .net compactframework.
- integrate all the features of c# language and build complex web applications in .net framework.

## MCA

Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>III</b>	<b>20P3CAS3</b>	<b>Business Models –IT Industries</b>	<b>3</b>	<b>2</b>

### Objective

- ❖ To teach about industries and to get orientation in standards of quality and process.
- ❖ To illustrate the basics of insurance, logistics
- ❖ To cultivate some specialized quality standards in business.

### Industry Verticals/ Domains

- Fundamentals of business.
- Types of businesses like Manufacturing, Retail, Telecom, Banking, Insurance, Logistics / SCM, Public Sector etc.

### Quality Orientation

- ❖ Students should be exposed to various quality standards that are followed by the industries like ISO, CMM, PCMM, CMMI, BS7799 and TickIT.

### Process Orientation

- ❖ Students should be exposed to various process standards that are followed by the industries like Six sigma, Five S, Lean, TQM, TPM, Kaizen, Kanban etc.

### COURSE OUTCOMES

After completion of the course, students will be able to

- understand the necessity of quality standards
- know the importance of insurance and logistics
- develop the skills to manipulate the business initiatives.
- find career opportunity to get employed as business analyst and project manager

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Semester	Subject code	Title of the course	Hours of Teaching/ Week	No. of Credits
<b>IV</b>	<b>20P4CAPR</b>	<b>Project</b>	<b>Six months</b>	<b>10</b>

### Main Project

#### Objective

- To teach technical and Software development Skills.
- To inculcate the importance of the front end and back end tools in developing the modules.
- To explain the working principles of the modules and test the modules.
- To illustrate the different phases of software development life cycle.
- To describe the different testing types and know the importance of testing and debugging.
- To cultivate have to undergo industrial Software Development projects using recent Technologies.

#### COURSE OUTCOME

After completion of the course, students will be able to

- to develop the software codes using front end and back end tools
- build the modules
- understand the different process modes involved in project development.
- develop the skills to test the code
- work in a MNC as project leader and project manager