

SRI MEENAKSHI GOVT. ARTS COLLEGE FOR WOMEN
(AUTONOMOUS)
MADURAI – 625 002.

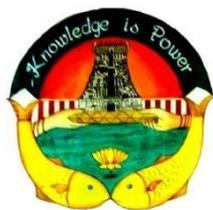
DEPARTMENT OF COMPUTER APPLICATIONS

MASTER OF **C**OMPUTER **A**PPPLICATIONS

SYLLABUS TO BE INTRODUCED FOR THE ACADEMIC
YEAR 2021 – 2022

OUTCOME BASED EDUCATION

UNDER C.B.C.S.



SRI MEENAKSHI GOVT. ARTS COLLEGE FOR WOMEN

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DEPARTMENT OF COMPUTER APPLICATIONS

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**SRI MEENAKSHI GOVT ARTS COLLEGE FOR WOMEN (AUTONOMOUS)
DEPARTMENT OF COMPUTER APPLICATIONS**

DEPARTMENT NAME : Department of Computer Applications (M.C.A)

INTRODUCTION:

The Department of Computer Applications blossomed in the year 1998 offering Master of Computer Applications course approved by AICTE. In August 2018 BCA course was started. The Department has an enterprising faculty team of 3 Assistant Professors, 2 Guest faculties and 1 Programmer. It has more than 100 research publications to its credit. They contribute their share of knowledge to academic community through Invited Talks and Paper presentations in National / International Conferences. The Department takes continuous efforts in upgrading the course content and enhancing students skills.

COURSES OFFERED:

- **B.C.A**
- **M.C.A**
- **M.Phil Computer Applications.**

VISION

Enabling Students to become enterprising Academicians, Young Entrepreneurs and Responsible Citizens.

MISSION

Imparting Quality Knowledge and Essential Virtues Treading Towards Holistic Development.

PROGRAMME OUTCOME OF M.C.A

At the end of the programme the students will be able to:

PO1. Apply the understanding of management principles with computing knowledge to manage
The projects in multidisciplinary environments.(P)

PO2. Computing Skills and apply knowledge of computing to produce effective designs
And solutions for specific problems. (E).

PO3. Applying IT related solutions in an economic, social and environment context.(P)

PO4. Understand and commit to Cyber regulations and responsibilities in Professional
Computing Practices(C)

PO5. Identify opportunities and use innovative ideas to create value and wealth for the
Betterment of the individual and society.(K) .

Programme Specific Outcome (PSO)

After the completion of the programme Post graduate students will be able to

PSO1. An ability to design, develop and evaluate new computer based systems for novel

Applications which meet the desired needs of industry and society.(C)

PSO2. Understanding and ability to use advanced computing techniques and tools.(U)

PSO3: Enable the students to apply the computing and soft skills acquired in the MCA program

For designing and developing innovative applications for the betterment of the society.

PSO4: Provide exposure to techniques that would enable the students to design, implement and evaluate IT solutions.

PSO5: To enable the students to meet the challenges of research and development in computer Science and applications.

PSO6: Comprehend the concepts and applications of International business in the areas related to Finance, Marketing, entrepreneurship, HR, Logistics and supply chain etc.,

PSO7: Communicate professionally and face challenges ethically with concern to social welfare

**MASTER OF COMPUTER APPLICATIONS [2021-2022]
REGULAR CBCS Pattern**

Sem.	Code	Title of the Paper	Duration (Hrs/ Week)	Int. Marks	Ext. Marks	Total	Credits
I	CA1	Mathematical Foundations of Computer Science	5 Hrs	25	75	100	4
	CA2	Operating System	5 Hrs	25	75	100	4
	CA3	C++ and Data structures	5 Hrs	25	75	100	4
	ECA	ELECTIVE-I	5 Hrs	25	75	100	5
	CL1	Lab-1.C++ and datastructures	5 Hrs	40	60	100	3
	CL2	Lab-2. Multimedia & UML	5 Hrs	40	60	100	3
II	CB1	Resource Management techniques	5 Hrs	25	75	100	4
	CB2	Relational Database Management Systems	5 Hrs	25	75	100	4
	CB3	Data communication and networking	5 Hrs	25	75	100	4
	ECB	ELECTIVE-II	5 Hrs	25	75	100	5
	CL3	Lab-3. Client Server Lab	5 Hrs	40	60	100	3
	CL4	Lab-4. Network Security lab	5 Hrs	40	60	100	3
III	CC1	Enterprise Web Application	5 Hrs	25	75	100	4
	CC2	Python Programming	5 Hrs	25	75	100	4
	CC3	Digital Image processing	5 Hrs	25	75	100	4
	ECC	ELECTIVE-III	5 Hrs	25	75	100	5
	CL5	Lab-5. Python Programming	5 Hrs	40	60	100	3
	CL6	Lab-6. Enterprise Web Application lab	5 Hrs	40	60	100	3
	CPS	Internship*			100	100	2
IV	CD1	Data warehousing and mining	5 Hrs	25	75	100	4
	ECD	Elective IV	5 Hrs	25	75	100	5
	CPW	PROJECT		100	100	200	10
Total						2300	90

*Internship will be carried out during the summer vacation of the second semester and the students have to submit a report after the internship. The report will be evaluated by two examiners within the department. The marks will be included in the third semester statement of marks.

Electives

Semester-I

- ECA1. Object Oriented Analysis and Design
- ECA2. Management Information System
- ECA3. Soft Skills

Semester-II

- ECB1. Cloud Computing
- ECB2. Internet of Things
- ECB3. Digital Principles and Computer Organisation

Semester-III

- ECC1. Human Resource Management
- ECC2. Artificial Intelligence
- ECC3. Soft Computing

Semester – IV

- ECD1: Mobile Computing
- ECD2:. Compiler Design
- ECD3:. Software Engineering

SRI MEENAKSHI GOVT. ARTS COLLEGE FOR WOMEN (AUTONOMOUS)

MADURAI – 625 002.

DEPARTMENT OF COMPUTER APPLICATIONS

MASTER OF COMPUTER APPLICATIONS

Distribution of Credits & Marks

Total Credits: 90

Total Marks: 2300

	I	II	III	IV	Credits
Core	18	18	20	4	60
Electives	5	5	5	5	20
Core Project	-	-	-	10	10
Total	23	23	25	19	90

Core Papers : 17

Elective : 4

Core Project : 1

Sri Meenakshi Govt. Arts College for Women
(Autonomous)
Madurai - 625 002

M.C.A. DEGREE EXAMINATION – FROM 2021 TO 2023

BLUE PRINT

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|          | Part-A | Part-B |
|----------|--------|--------|
| UNIT-I   | 2      | 1      |
| UNIT-II  | 2      | 1      |
| UNIT-III | 2      | 1      |
| UNIT-IV  | 2      | 1      |
| UNIT-V   | 2      | 1      |

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PART - A -->  $6 \times 5 = 30$  ( 6 out of 10)

PART - B -->  $3 \times 15 = 45$  ( 3 out of 5 )

Total = 75

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**SCHEME OF EXAMINATION [2019–2020 Onwards]- CBCS Pattern**

| Sem. | Code | Title of the Paper                           | Exam Duration                  | Int. Marks | Ext. Marks | Passing Int. | Minimum Ext. |
|------|------|----------------------------------------------|--------------------------------|------------|------------|--------------|--------------|
| I    | CA1  | Mathematical Foundations of Computer Science | 3 Hrs                          | 25         | 75         | -            | 34           |
|      | CA2  | Operating System                             | 3 Hrs                          | 25         | 75         | -            | 34           |
|      | CA3  | C++ and Data structures                      | 3 Hrs                          | 25         | 75         | -            | 34           |
|      | ECA  | ELECTIVE-I                                   | 3 Hrs                          | 25         | 75         | -            | 34           |
|      | CL1  | Lab-1 C++ and datastructures                 | 3 Hrs                          | 40         | 60         | -            | 27           |
|      | CL2  | Lab-2. Multimedia & UML                      | 3 Hrs                          | 40         | 60         | -            | 27           |
|      | II   | CB1                                          | Resource Management techniques | 3 Hrs      | 25         | 75           | -            |
| CB2  |      | Relational Database Management Systems       | 3 Hrs                          | 25         | 75         | -            | 34           |
| CB3  |      | Data communication and networking            | 3 Hrs                          | 25         | 75         | -            | 34           |
| ECB  |      | ELECTIVE-II                                  | 3 Hrs                          | 25         | 75         | -            | 34           |
| CL3  |      | Lab-3. Client server Lab                     | 3 Hrs                          | 40         | 60         | -            | 27           |
| CL4  |      | Lab-4. Network Security lab                  | 3 Hrs                          | 40         | 60         | -            | 27           |
| III  |      | CC1                                          | Enterprise Web Application     | 3 Hrs      | 25         | 75           | -            |
|      | CC2  | Python Programming                           | 3 Hrs                          | 25         | 75         | -            | 34           |
|      | CC3  | Digital Image processing                     | 3 Hrs                          | 25         | 75         | -            | 34           |
|      | ECC  | ELECTIVE-III                                 | 3 Hrs                          | 25         | 75         | -            | 34           |
|      | CL5  | Lab-5. Python Programming                    | 3 Hrs                          | 40         | 60         | -            | 27           |
|      | CL6  | Lab-6. Enterprise Web Application Lab        | 3 Hrs                          | 40         | 60         | -            | 27           |
|      | CPS  | Internship*                                  |                                |            | 100        | -            | 35           |
| IV   | CD1  | Data warehousing and mining                  | 3 Hrs                          | 25         | 75         | -            | 34           |
|      | ECD  | Elective IV                                  | 3 Hrs                          | 25         | 75         | -            | 34           |
|      | CPW  | PROJECT                                      | 3 Hrs                          | 100        | 100        | -            | 35           |

Aggregate of passing minimum = 50

Programme:M.C.A

Semester : I

Sub.Code : CA1

Part III:Core

Hours : 5 P/W 60HrsP/S

Credits:4

**TITLE OF THE PAPER: Mathematical Foundations of Computer Science**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 4       | -             | 1                  | -   |

**PREAMBLE:**

To know the basic concepts of Mathematical logic, Sets and Lattices, and Boolean Algebra.

| <b>COURSE OUTCOME</b>                                                                                                                   | Unit | Hrs P/S |
|-----------------------------------------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                                                                |      |         |
| <b>UNIT1CO1:</b> Logical operations and predicate calculus neededfor computing skill.                                                   | 1    | 12      |
| <b>UNIT 2 CO2:</b> Basic knowledge set theory, functions and relations concepts needed for designing and solving problems.              | 2    | 12      |
| <b>UNIT 3 CO3:</b> Design and solve Boolean functions, induction principles for defined problems.                                       | 3    | 12      |
| <b>UNIT 4 CO4:</b> Apply the acquired knowledge of lattices in the area of designing.                                                   | 4    | 12      |
| <b>UNIT 5 CO5:</b> Design Apply the acquired knowledge of finite automata theory and to design discrete problems to solve by computers. | 5    | 12      |

**SYLLABUS**

**UNIT - I: Mathematical Logic**

Statements and notations – connectives: Negation, conjunction, disjunction, statement formulas & truth tables, conditional and bi-conditional, well-formed formula, tautologies, equivalence of formulas, duality law, tautological implications, formulas with distinct truth tables, functionally complete sets of connectives, otherconnectives.

**UNIT - II: Counting**

Counting: Introduction – Basic counting Principles – Factorial Notation – Binomial Coefficients – Permutations – Combinations. The Pigeonhole Principle.

**UNIT - III: Properties of the Integers**

Introduction – Order and inequalities, Absolute value – Mathematical Induction – Division Algorithm – Divisibility, Primes – Greatest Common Divisor, Euclidean Algorithm –

Fundamental theorem of arithmetic.

#### **UNIT - IV: Sets and Lattices**

Ordered pairs n-tuples, Cartesian product – Relations and ordering: Relations, properties of binary relation, relation matrix and graph of relation, partition and covering of a set equivalence and compatibility relations, composition of binary relations partial ordering, partial ordered set. Lattices as partially ordered sets.

#### **UNIT - V: Boolean Algebra**

Boolean algebra - Boolean functions. Finite state machines: Introductory sequential circuits, equivalence of finite state machines.

#### **TEXT BOOK(S)**

1. Discrete Mathematical Structures with Applications to Computer Science. by J.P. Tremblay & R. Manohar, Tata McGraw Hill, Publishing Company Ltd. (35<sup>th</sup> Reprint 2008)
2. Schaum's Outlines- Discrete Mathematics by Seymour Lipschutz, Marc Lars Lipson, III-Edn. Tata McGraw Hill, Education Pvt. Ltd., New Delhi. 5<sup>th</sup> Reprint 2012.  
UNIT-I : TB 1 – Chapter 1 – Section 1.1, 1.2  
UNIT-II : TB 2 – Chapter 6 – Section 6.1 – 6.6  
UNIT-III: TB 2 – Chapter 11 – Section 11.1 – 11.7  
UNIT-IV : TB 1 – Chapter 2 – Section 2.1.8, 2.1.9, 2.3.1 – 2.3.9, 4.1.1 – 4.1.5  
UNIT-V : TB 1 – Chapter 4 – Section 4.2 – 4.3, 4.6

#### **REF. BOOK(S)**

1. Discrete Mathematics by G. Balaji, II-ed., G. Balaji Publishers.

| UNITS  | TOPIC                                                                                                          | LECTURE HOURS | MODE OF TEACHING |
|--------|----------------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT 1 |                                                                                                                |               |                  |
|        | Statements and notations – connectives: Negation, conjunction, disjunction, statement formulas & truth tables, | 4             | Black board      |
|        | conditional and bi-conditional, well-formed formula, tautologies, equivalence of formulas,                     | 4             | Black board      |
|        | duality law, tautological implications, formulas                                                               | 4             | Black board      |

|          |                                                                                                                                                      |        |                                |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------------------|
|          | with distinct truth tables, functionally complete sets of connectives, other connectives.                                                            |        |                                |
| UNIT 11  |                                                                                                                                                      |        |                                |
|          | Counting: Introduction – Basic counting Principles                                                                                                   | 4      | Black board                    |
|          | Factorial Notation – Binomial Coefficients                                                                                                           | 4      | Black board                    |
|          | Permutations – Combinations. The Pigeonhole Principle.                                                                                               | 4      | Black board                    |
| UNIT III |                                                                                                                                                      |        |                                |
|          | Introduction – Order and inequalities, Absolute value – Mathematical Induction                                                                       | 4      | Black board                    |
|          | Division Algorithm – Divisibility, Primes – Greatest Common Divisor, Euclidean Algorithm –                                                           | 4<br>1 | Blackboard<br>PPT Presentation |
|          | Fundamental theorem of arithmetic.                                                                                                                   | 3      | Black board                    |
| UNIT IV  |                                                                                                                                                      |        |                                |
|          | Ordered pairs n-tuples, Cartesian product – Relations and ordering: Relations, properties of binary relation, relation matrix and graph of relation, | 4      | Black board                    |
|          | partition and covering of a set equivalence and compatibility relations, composition of binary relations partial ordering,                           | 4      | Black board                    |
|          | partial ordered set. Lattices as partially ordered sets.                                                                                             | 4      | Black board                    |
| UNIT V   |                                                                                                                                                      |        |                                |
|          | Boolean algebra - Boolean functions.                                                                                                                 | 4      | Black board                    |

|  |                                                                         |   |                   |
|--|-------------------------------------------------------------------------|---|-------------------|
|  | functions. Finite state machines:                                       | 4 | PPT presentations |
|  | Introductory sequential circuits, equivalence of finite state machines. | 4 | Black board       |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 3    | 2    | 4                                  | 4     | 2     | 4     | 4     | 4     | 2     | 3.5                |
| CO2                   | 4                        | 5    | 4    | 4    | 2    | 4                                  | 5     | 2     | 4     | 4     | 5     | 2     | 3.6                |
| CO3                   | 4                        | 5    | 4    | 4    | 2    | 4                                  | 4     | 2     | 4     | 5     | 4     | 2     | 3.7                |
| CO4                   | 4                        | 4    | 5    | 3    | 2    | 5                                  | 4     | 2     | 4     | 5     | 4     | 2     | 3.6                |
| CO5                   | 4                        | 5    | 4    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 4     | 2     | 3.7                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.62               |

|                                                                                     |           |         |          |         |                                                              |
|-------------------------------------------------------------------------------------|-----------|---------|----------|---------|--------------------------------------------------------------|
| Mapping                                                                             | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%                                                      |
| Scale                                                                               | 1         | 2       | 3        | 4       | 5                                                            |
| Relation                                                                            | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0                                                      |
| Quality                                                                             | Very Poor | Poor    | Moderate | High    | Very High                                                    |
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos \& PSOs}}$ |           |         |          |         | $\frac{\text{Total of Mean Score}}{\text{Total No. of Cos}}$ |

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer:

Department of Computer Applications

**Programme : M.C.A**

**Semester : I**

**Sub.Code : CA2**

**Part III:Core**

**Hours : 5 P/W 60 HrsP/S**

**Credits :4**

**TITLE OF THE PAPER: OPERATING SYSTEMS**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 3       | -             | 1                  | 1   |

**PREAMBLE:**

The objective of this course is to enable the students to clearly understand the underlying concepts of the operating system.

| <b>COURSE OUTCOME</b>                                                                              | Unit | Hrs P/S |
|----------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                           |      |         |
| <b>UNIT 1 CO1:</b> Implement the algorithms in process management and solving the issues of IPC.   | 1    | 12      |
| <b>UNIT 2 CO2:</b> Able to demonstrate the mapping between the physical memory and virtual memory. | 2    | 12      |
| <b>UNIT 3 CO3:</b> Able to understand file handling concepts in OS perspective                     | 3    | 12      |
| <b>UNIT 4 CO4:</b> Able to perform the services with the recent OS.                                | 4    | 12      |
| <b>UNIT 5 CO5:</b> Understand the basic structure used in the current operating system.            | 5    | 12      |

**SYLLABUS**

**UNIT-I**

Introduction: What is an Operating System – Mainframe Systems – Desktop Systems – Multiprocessor Systems – Distributed Systems – Clustered Systems – Real-Time Systems – Handheld Systems – Processes: Process Concept – Process Scheduling – Operation on Processes – Cooperating Processes – Interprocess Communication – Communication in Client-Server Systems.

**UNIT-II**

CPU Scheduling: Basic Concepts – Scheduling Criteria – Scheduling algorithms – Multiple-Processor Scheduling - Real-Time Scheduling - Process Synchronization: Background – The Critical-Section Problem – Synchronization Hardware – Semaphores – Classical Problems of Synchronization – Critical Regions.

**UNIT-III**

Deadlocks: System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock - File-System Interface: File Concept – Access Methods – Directory Structure – Protection.

**UNIT-IV**

Memory Management: Background– Swapping – Contiguous Memory Allocation – Paging – Segmentation – Segmentation with Paging – Virtual Memory: Background – Demand Paging

Process Creation – Page Replacement –Allocation of Frames – Thrashing.

### **UNIT-V**

Mass - Storage Structure: Disk Structure – Disk Scheduling – Disk Management. Case Study – Windows 2000 and the LINUX Systems.

### **TEXT BOOK**

Operating System Concepts by Silberschatz Galvin, VI-Ed. Addison-Wesley, Reprint-2012 Publishing Company.

UNIT-I Chapter : 1.1 – 1.8, 4.1 –4.6.

UNIT-II Chapter: 6.1 – 6.5, 7.1 –7.6.

UNIT-III Chapter: 8.1 – 8.7, 11.1 – 11.3, 11.6.

UNIT-IV Chapter: 9.1 – 9.6, 10.1 – 10.6

UNIT-V Chapter: 14.1 – 14.3, 20,21

### **REF. BOOKS**

1. Operating System By MadnicandDonovan
2. Modern Operating System By Andrew S.Tanenbaum, Prentice Hall of India, NewDelhi(1996)
3. Operating System Concepts By William Stallings–Prentice, Hall InternationalPublications.

### **E-LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/102/106102132/>
2. [nptel.ac.in/courses/106108101/](https://nptel.ac.in/courses/106108101/)
3. [w3schools.in/operating-system-tutorial](http://w3schools.in/operating-system-tutorial)
4. <https://swayam.gov.in/course/237-operating-system>

| UNITS    | TOPIC                                   | LECTURE HOURS | MODE OF TEACHING |
|----------|-----------------------------------------|---------------|------------------|
| UNIT I   |                                         |               |                  |
|          | Operating System-classification         | 4             | Black board      |
|          | Processes:                              | 4             | PPT              |
|          | Interprocess Communication              | 4             | Black board      |
| UNIT II  |                                         |               |                  |
|          | CPU Scheduling                          | 4             | Black board      |
|          | Scheduling algorithms                   | 4             | Black board      |
|          | - Process Synchronization<br>Semaphores | 4             | PPT              |
| UNIT III |                                         |               |                  |
|          | Deadlocks                               | 4             | Black board      |
|          | Deadlock Avoidance Algorithm            | 4             | Black board      |
|          | File-System Interface                   | 4             | PPT              |
| UNIT IV  |                                         |               |                  |
|          | Memory Management                       | 4             | Black board      |
|          | Paging – Segmentation                   | 4             | Black board      |

|  |                                 |   |             |
|--|---------------------------------|---|-------------|
|  | Page Replacement-<br>algorithms | 4 | Black board |
|--|---------------------------------|---|-------------|

|        |                                  |   |             |
|--------|----------------------------------|---|-------------|
| UNIT V |                                  |   |             |
|        | Mass - Storage<br>Structure      | 2 | Black board |
|        | Case Study –<br>Windows 2000.    | 4 | PPT         |
|        | Case Study –the<br>LINUXSystems. | 3 | PPT         |

| Course<br>Outcomes<br>(Cos) | Programme Outcomes (Pos) |         |         |         |         | Programme Specific Outcomes (PSOs) |          |          |          |          |          |          | Mean<br>scores<br>of<br>Cos |
|-----------------------------|--------------------------|---------|---------|---------|---------|------------------------------------|----------|----------|----------|----------|----------|----------|-----------------------------|
|                             | PO<br>1                  | PO<br>2 | PO<br>3 | PO<br>4 | PO<br>5 | PSO<br>1                           | PSO<br>2 | PSO<br>3 | PSO<br>4 | PSO<br>5 | PSO<br>6 | PSO<br>7 |                             |
| CO1                         | 4                        | 4       | 4       | 3       | 2       | 5                                  | 4        | 2        | 5        | 3        | 4        | 1        | 3.3                         |
| CO2                         | 5                        | 5       | 5       | 4       | 1       | 4                                  | 5        | 1        | 3        | 5        | 4        | 2        | 3.5                         |
| CO3                         | 4                        | 5       | 4       | 4       | 1       | 4                                  | 4        | 2        | 4        | 5        | 4        | 1        | 3.4                         |
| CO4                         | 4                        | 3       | 5       | 5       | 2       | 5                                  | 4        | 2        | 4        | 5        | 5        | 2        | 3.5                         |
| CO5                         | 4                        | 5       | 5       | 5       | 2       | 5                                  | 4        | 3        | 5        | 4        | 4        | 2        | 3.7                         |
| Mean Overall Score          |                          |         |         |         |         |                                    |          |          |          |          |          |          | 3.5                         |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of Cos}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

|                     |          |          |
|---------------------|----------|----------|
| BLOOM'S<br>TAXANOMY | INTERNAL | EXTERNAL |
| KNOWLEDGE           | 50%      | 50%      |
| UNDERSTANDING       | 30%      | 30%      |
| APPLY               | 20%      | 20%      |

Course Designer: Department of Computer Applications

**Programme: M.C.A**  
**Semester : I**  
**Sub.Code : CA3**

**Part III: Core**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits :4**

**TITLE OF THE PAPER: C++ AND DATA STRUCTURES**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 4       | -             | 1                  | -   |

**PREAMBLE:**

To enable the students to understand the basic concepts of C++ and data structures and salient features of computer algorithms.

| <b>COURSE OUTCOME</b>                                                                                    | Unit | Hrs P/S |
|----------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                                 |      |         |
| <b>UNIT 1 CO1:</b> Able to understand the concepts of data types, data structures and linear structures. | 1    | 12      |
| <b>UNIT 2 CO2:</b> Able to apply the OOPs concepts of Inheritance and over loading                       | 2    | 12      |
| <b>UNIT 3 CO3:</b> Application of arrays in list and queue structure                                     | 3    | 12      |
| <b>UNIT 4 CO4:</b> To design and implement simple and advanced data structure concepts in C++.           | 4    | 12      |
| <b>UNIT 5 CO5:</b> to design a search application using data structures                                  | 5    | 12      |

**SYLLABUS**

**UNIT I:**

Object Oriented Programming concepts- Encapsulation- Programming Elements- Program Structure- Enumeration Types- Functions and Pointers- Default arguments- Overloading Functions- Scope and Storage Class- Pointer Types- Arrays and Pointers- Call-by-Reference.

**UNIT II:**

Classes- Constructors and Destructors- Static Member and member functions- friend Functions -this Pointer- Overloading- Overloading Operators- Unary Operator Overloading- Binary Operator Overloading- Inheritance- Virtual function- Files- Command line argument-Template.

**UNIT III:**

Introduction- Arrays- Operation on arrays- Polynomial Representation- Polynomial Addition- Stack: definition- representation- operations- infix to post fix- evaluation of postfix expression- Queues - definition- Representation- operations - Circular queues- lists- Queue and Linked Lists.

**UNIT IV:**

Trees- operations on trees-Binary Trees – definitions-Operations on binary trees - Binary Tree

Representations – node representation, internal and external nodes- array representation – linked representation - Binary tree Traversals- converting forest into binary tree-Binary search tree-operations on binary search tree.

**UNIT V:**

Graphs – application of graphs – array representation – Linked representation of Graphs - Shortest path algorithm– Dijkstra’s algorithm - – Graph Traversals-DFS and BFS – spanning tree mining costing spanning tree-Hashing.

**TEXT BOOK:**

1. “Object Oriented Programming with C++” by E.Balagurusamy, 4<sup>th</sup> edition. Reprint-2009. Tata McGraw-Hill Publishing Company Limited. NewDelhi
2. Horowitz, Sahni& Dinesh Mehta , "Fundamental of data structures in C++",Galgotia,2003

**REFERENCE BOOKS:**

1. Schaum’s Outlines – “Programming with C++” , Second edition, Tata McGrawHill,2000
2. Jean, Paul tremblay, Paul. G Sorenson, "An introduction to data structures with application", Tata McGraw Hill,2002
3. YashavantKanetkar, “Let Us C++” , BPB publications, First Edition,1999.

**E-LEARNING RESOURCES:**

1. <https://www.w3schools>
2. <https://www.programiz.com/dsa>
3. <https://nptel.ac.in/courses/106102064/1>
4. <https://nptel.ac.in/courses/106/105/106105151/>
5. <https://nptel.ac.in/courses/106/102/106102064/>

| UNITS  | TOPIC                                                                                                     | LECTURE HOURS | MODE OF TEACHING |
|--------|-----------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT 1 |                                                                                                           |               |                  |
|        | Object Oriented Programming concepts- Encapsulation- ProgrammingElements                                  | 4             | Black Board      |
|        | - Program Structure- Enumeration Types- Functions and Pointers- Default arguments- Overloading Functions- | 4             | PPT              |
|        | Scope and Storage Class- Pointer Types- Arrays and Pointers- Call-by-Reference.                           | 4             | Black Board      |

|          |                                                                                                                              |   |             |
|----------|------------------------------------------------------------------------------------------------------------------------------|---|-------------|
| UNIT 11  |                                                                                                                              |   |             |
|          | Classes- Constructors and Destructors- Static Member and                                                                     | 4 | Black Board |
|          | member functions- friend Functions -this Pointer                                                                             |   |             |
|          | Overloading- Overloading Operators- Unary Operator Overloading- Binary Operator Overloading-                                 | 4 | Black Board |
|          | Inheritance- Virtual function- Files- Command line argument- Template.                                                       | 4 | Black Board |
| UNIT III |                                                                                                                              |   |             |
|          | Introduction- Arrays- Operation on arrays- Polynomial Representation- Polynomial Addition-                                   | 4 | Black Board |
|          | Stack: definition- representation- operations- infix to post fix- evaluation of postfix expression                           | 4 | Black Board |
|          | Queues - definition- Representation- operations - Circular queues- lists- Queue and Linked Lists.                            | 4 | Black Board |
| UNIT IV  |                                                                                                                              |   |             |
|          | Trees- operations on trees-Binary Trees – definitions-Operations on binary trees representations                             | 4 | Black Board |
|          | Representations – node representation, internal and external nodes- array representation – linked representation -           | 4 | PPT         |
|          | Binary Tree Binary tree Traversals- converting forest into binary tree-Binary search tree- operations on binary search tree. | 4 | Black Board |
| UNIT V   |                                                                                                                              |   |             |
|          | Graphs – application of graphs – array representation – Linked representation of Graphs                                      | 4 | PPT         |
|          | Shortest path algorithm– Dijkstra’s algorithm - –Graph                                                                       | 4 | Black Board |

|  |                                                                                   |   |             |
|--|-----------------------------------------------------------------------------------|---|-------------|
|  | Traversals-DFS and BFS –<br>spanning tree mining costing<br>spanningtree-Hashing. | 4 | Black Board |
|--|-----------------------------------------------------------------------------------|---|-------------|

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.3                |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 2     | 4     | 4     | 5     | 1     | 3.6                |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 4                                  | 4     | 3     | 4     | 5     | 4     | 2     | 3.5                |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 5     | 2     | 3.6                |
| CO5                   | 4                        | 4    | 5    | 5    | 2    | 4                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.5                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.5                |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications .

Programme:M.C.A  
Semester : I  
Sub.Code : ECA1

Part III:Elective  
Hours : 5 P/W 60 HrsP/S  
Credits :5

**TITLE OF THE PAPER: OBJECT ORIENTED ANALYSIS AND DESIGN**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 3       | -             | 1                  | 1   |

**PREAMBLE:**

To learn about Object Oriented Analysis and Design Concepts and UML Diagrams.

| <b>COURSE OUTCOME</b>                                                                                                           | Unit | Hrs P/S |
|---------------------------------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                                                        |      |         |
| <b>UNIT 1 CO1:</b> Able to understand the object oriented concepts and to apply object oriented life cycle model for a project. | 1    | 12      |
| <b>UNIT 2 CO2:</b> Able to design static and dynamic models using UML diagrams.                                                 | 2    | 12      |
| <b>UNIT 3 CO3:</b> Able to perform object oriented analysis to identify the objects from the problemSpecification.              | 3    | 12      |
| <b>UNIT 4 CO4:</b> Able to identify and refine the attributes and methods for designing the object oriented system              | 4    | 12      |
| <b>UNIT 5 CO5:</b> Able to learn the open source CASE tools and to apply them in various domains.                               | 5    | 12      |

**SYLLABUS**

**UNIT - I**

Introduction – Two Orthogonal views – object oriented Systems development Methodology – Object orientation – unified approach – Object Basics – object oriented philosophy – objects – classes – attributes – behavior and methods – Message passing -Encapsulation and information hiding – hierarchy – polymorphism – object relationship and associations – aggregation – a case study – advanced topics.

**UNIT - II**

Object oriented system development life cycle (SDLC) – development process – building high quality software – use-case driven approach – reusability –Object oriented methodologies – introduction – Booch methodology – Jacobson methodologies – patterns – frame works – unified approach.

**UNIT - III**

Unified modeling language – introduction – static and dynamic models – modeling – unified modeling language - UML diagrams – UML class diagrams – Use-case diagram – UML dynamic modeling- model management –OOA process – introduction – difficulty in analysis - business object analysis – use-case driven object oriented analysis – business processing modeling – use-case model – developing effective documentation.

## UNIT - IV

Object analysis – classification – common class patterns approach – use-case driven approach – CRC – naming classes – object relationships – associations – Super-Sub class relationships – aggregation – class responsibility – object responsibility - Object oriented design process and design axioms – introduction – design process – design axioms- design patterns.

## UNIT - V

Designing classes – introduction - object oriented design philosophy – UML object constraint – designing classes – class visibility – defining attributes – designing methods and protocols – Packages and managing classes – Access layer – Object storage and object interoperability – introduction – object store and persistence – Database management systems – database organization and access control – distributed databases.

### TEXT BOOK:

Object Oriented Systems Development – Ali Bahrami – Irwin/McGraw Hill Publications – 1999. (Chapters 1 to 11)

**REF. BOOK:** OOAD by Grady Booch

### E-LEARNING RESOURCES:

- <https://nptel.ac.in/courses/106/105/106105153/>

| UNITS    | TOPIC                                                                                                  | LECTURE HOURS | MODE OF TEACHING |
|----------|--------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT I   |                                                                                                        |               |                  |
|          | Introduction — object oriented Systems development Methodology – Object orientation – unified approach | 4             | Black Board      |
|          | Object Basics – object oriented philosophy attributes – behavior and methods                           | 4             | Black Board      |
|          | a case study – advanced topics                                                                         | 4             | ICT -NPTEL       |
| UNIT II  |                                                                                                        |               |                  |
|          | Object oriented system development life cycle (SDLC                                                    | 4             | PPT              |
|          | Object oriented methodologies                                                                          | 4             | Black board      |
|          | patterns – frame works                                                                                 | 4             | Black board      |
| UNIT III |                                                                                                        |               |                  |
|          | Unified modeling language                                                                              | 4             | ICT- NPTEL       |
|          | UML diagrams                                                                                           | 4             | PPT              |
|          | OOA process                                                                                            | 4             | Black board      |
| UNIT IV  |                                                                                                        |               |                  |
|          | Object analysis – classification                                                                       | 4             | Black board      |
|          | object relationships                                                                                   | 4             | Black board      |
|          | Object oriented design process and design axioms                                                       | 4             | Black board      |
| UNIT V   |                                                                                                        |               |                  |
|          | Designing classes                                                                                      | 4             | Black board      |
|          | Packages and managing classes –                                                                        | 4             | Black board      |
|          | Object storage and object interoperability                                                             | 4             | Black board      |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.3                |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 4     | 2     | 3.7                |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 4                                  | 4     | 2     | 4     | 5     | 4     | 1     | 3.5                |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 5     | 2     | 3.6                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.7                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.6                |

|                                                                                   |           |         |                                                                                          |         |           |
|-----------------------------------------------------------------------------------|-----------|---------|------------------------------------------------------------------------------------------|---------|-----------|
| Mapping                                                                           | 1-20%     | 21-40%  | 41-60%                                                                                   | 61-80%  | 81-100%   |
| Scale                                                                             | 1         | 2       | 3                                                                                        | 4       | 5         |
| Relation                                                                          | 0.0-1.0   | 1.1-2.0 | 2.1-3.0                                                                                  | 3.1-4.0 | 4.1-5.0   |
| Quality                                                                           | Very Poor | Poor    | Moderate                                                                                 | High    | Very High |
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ |           |         | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |         |           |

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications

**Programme: M.C.A**  
**Semester : I**  
**Sub.Code : ECA2**

**Part III:Elective**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits:5**

**TITLE OF THE PAPER: MANAGEMENT INFORMATION SYSTEMS**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 3       | -             | 2                  | -   |

**PREAMBLE:**

To enrich knowledge on concepts of Management Information Systems: Decision Making, Database Management technology, Client / Server Computing, and Decision Support System.

| <b>COURSE OUTCOME</b>                                                                                                                                             | Unit | Hrs P/S |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                                                                                          |      |         |
| <b>UNIT 1 CO1:</b> Understand the leadership role of Management Information Systems in achieving business competitive advantage through informed decision making. | 1    | 12      |
| <b>UNIT 2 CO2:</b> Analyze and synthesize business information and systems to facilitate evaluation of strategic alternatives                                     | 2    | 12      |
| <b>UNIT 3 CO3:</b> Effectively communicate strategic alternatives to facilitate decision making.                                                                  | 3    | 12      |
| <b>UNIT 4 CO4:</b> Able to manage the Database design                                                                                                             | 4    | 12      |
| <b>UNIT 5 CO5:</b> Able to develop Client – Server programming application basics                                                                                 | 5    | 12      |

**SYLLABUS**

**UNIT – I**

**MANAGEMENT INFORMATION SYSTEMS : AN OVERVIEW-** Introduction – Management Information Systems – Definitions of MIS – Framework for MIS Organization and Management Triangle – Information Needs and its Economics – Systems Approach – Meaning and Objectives of MIS – Disadvantages of Information Systems – approaches of MIS Development – Constraints in Developing an MIS – MIS and Use of Computer – Limitations of MIS.

**UNIT - II**

**INFORMATION SYSTEMS FOR DECISION MAKING:** Introduction – Transaction Processing Systems – Management Information Systems – Intelligent Support Systems – Office Automation Systems.

**UNIT - III**

**DATABASE MANAGEMENT TECHNOLOGY:** Introduction – Data vs Information – Data Hierarchy – Methods for Organizing Data in Files – limitations of File-Based Systems – Database and Database Management Systems – Entity Relationship Diagram – Fourth Generation Languages(4GLs) – Recent Development in Databases – Principles of Database Management – The Database Administrator.

**UNIT - IV**

**CLIENT-SERVER COMPUTING:** Introduction – Definition of Client-Server Computing – Components and Functions of a Client-Server System – Development of Client-Server System–

Client-Server Security – Client-Server Costs Computation – Advantages of Client-Server System – Disadvantages/Obstacles of a Client-Server System.

**UNIT - V**

**DECISION SUPPORT SYSTEM:** Introduction – Definitions – Evolution of DSS - Objectives of DSS – Classifications of DSS – Characteristics of DSS – Components of a DSS – Functions of a DSS – Development of DSSs – Group Decision Support Systems – Executive Information Systems – Success Criteria for DSS/EIS – Relationship between MIS and DSS – DSS Measures of Success in Organizations – Applications of a DSS – TPS, MIS, DSS and EIS – Future Developments in DSS.

**TEXT BOOK(S):**

1. Management information systems by A.K.Gupta S.Chand & Company Ltd., New Delhi, II-Edition 2003.

**REFERENCE BOOK(S):**

1. Management Information Systems by Kenneth C. Laudon , Carol Guercio Traver, 12th Edition.

**E-LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/122/105/122105022/>

| UNITS    | TOPIC                                                                     | LECTURE HOURS | MODE OF TEACHING |
|----------|---------------------------------------------------------------------------|---------------|------------------|
| UNIT I   |                                                                           |               |                  |
|          | MANAGEMENT INFORMATION SYSTEMS : AN OVERVIEW                              | 4             | Black Board      |
|          | Framework for MIS Organization and Management                             | 4             | PPT              |
|          | Systems Approach-MIS                                                      | 4             | PPT              |
| UNIT II  |                                                                           |               |                  |
|          | INFORMATION SYSTEMS FOR DECISION MAKING<br>Transaction Processing Systems | 4             | Black Board      |
|          | Management Information Systems – Intelligent Support Systems              | 4             | PPT              |
|          | Office Automation Systems.                                                | 4             | PPT              |
| UNIT III |                                                                           |               |                  |
|          | DATABASE MANAGEMENT TECHNOLOGY                                            | 4             | Black Board      |
|          | Entity Relationship Diagram – Fourth Generation Languages(4GLs)           | 4             | Black Board      |
|          | The Database Administrator-recent development.                            | 4             | PPT              |
| UNIT IV  |                                                                           |               |                  |
|          | Definition of Client-Server Computing                                     | 4             | Black Board      |
|          | Components and Functions of a Client-Server System                        | 4             | Black Board      |
|          | Development of Client-Server                                              | 4             | PPT              |

| System |                                                                                                                                      |   |             |
|--------|--------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
| UNIT V |                                                                                                                                      |   |             |
|        | Definitions – Evolution of DSS<br>Objectives of DSS –<br>Classifications of DSS                                                      | 4 | Black Board |
|        | Components of a DSS –<br>Functions of a DSS                                                                                          | 4 | Black Board |
|        | Relationship between MIS and<br>DSS – DSS Measures of Success<br>in Organisations – Applications of<br>a DSS – TPS, MIS, DSS and EIS | 4 | PPT         |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 4     | 3     | 4     | 1     | 3.3                |
| CO2                   | 5                        | 5    | 4    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 4     | 2     | 3.6                |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 4                                  | 4     | 2     | 4     | 5     | 4     | 1     | 3.5                |
| CO4                   | 4                        | 3    | 5    | 4    | 2    | 5                                  | 4     | 2     | 5     | 4     | 5     | 2     | 3.5                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 4                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.6                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.5                |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                     |                                                                                          |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of POs \& PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications.

**Programme : M.C.A**

**Semester : I**

**Sub.Code :ECA3**

**Part III : Elective**

**Hours :5P/W 60Hrs P/S**

**Credits :5**

**TITLE OF THE PAPER: SOFT SKILLS**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 4       | -             | 1                  | -   |

**PREAMBLE:**

To sharpen memory skills and other study skills which are vital for academic excellence.

To give training for positive thinking which will keep the students in a good stead at the time of crisis

| <b>COURSE OUTCOME</b>                                                                                                                                                                                                                           | Unit | Hrs P/S |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                                                                                                                                                                        |      |         |
| <b>UNIT 1 CO1:</b> Resilience – learning to keep going when things don't go according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict.                                                                   | 1    | 12      |
| <b>UNIT 2 CO2:</b> time and resource management, conflict resolution, teaching and mentoring others                                                                                                                                             | 2    | 12      |
| <b>UNIT 3 CO3: Teamwork</b> – learning to connect and work with others to achieve a set task and group learning to increase the memory power.                                                                                                   | 3    | 12      |
| <b>UNIT 4 CO4: Communication</b> – demonstrating clear briefing and listening skills, not being afraid to ask for help and support when necessary.                                                                                              | 4    | 12      |
| <b>UNIT 5 CO5:</b> Positive thinking and <b>Leadership</b> – assessing the requirements of a task, identifying the strengths within the team, utilizing the diverse skills of the group to achieve the set objective, awareness of risk/safety. | 5    | 12      |

**SYLLABUS**

**Unit I - Introduction**

- Definition of Personality
- Components of Personality – structural and functional aspects.
- Determinants of Personality- biological, psychological and socio-cultural factors.
- Assessment of Personality – observation, interview and psychological tests.
- Misconceptions and Classifications.
- Need for personality development.

**Unit II - Self-Awareness and Self Motivation**

- Self analysis through SWOT and Johari window.
- Elements of motivation.
- Seven rules of motivation.
- Techniques and strategies for self motivation.
- Motivation checklist and Goal setting based on the principle of SMART.
- Self motivation and life.

**Unit III - General Knowledge and current affairs**

- Regional, National and International events.

- Geographical, political and historical facts.
- Information on sports and other recreational activities.
- Basic knowledge with regard to health and health promotion.

#### **Unit IV - Memory, decision making and study skills**

- Definition and importance of memory.
- Causes of forgetting.
- How to forget (thought stopping), how to remember (techniques for improving memory)
- The technique of passing exams.
- The rational decision making process.
- Improving creativity in decision making and components of creativity.

#### **Unit V - Power of positive thinking**

- Thinking power- seven steps for dealing with doubt.
- Traits of positive thinkers and high achievers,
- Goals and techniques for positive thinking.
- Enhancement of concentration through positive thinking.
- Practicing a positive lifestyle.

#### **PRACTICAL TRAINING**

The course would include the following practical exercises.

Ice-breaking, Brainstorming and stimulation exercises. Thought stopping. Memory and study skills training.

#### **REFERENCES:**

1. Mile, D.J. Power of positive thinking. Delhi: Rohan Book Company.
2. Pravesh Kumar. All about self-motivation. New Delhi: Goodwill Publishing House.
3. Dudley, G.A. Double your learning power. Delhi: Konark Press. Thomas publishing Group Ltd.
4. Lorayne, H. How to develop a super power memory. Delhi: Konark Press. Thomas publishing Group Ltd.
5. Hurlock, E.B. Personality Development, 28<sup>th</sup> Reprint. New Delhi: Tata McGraw Hill.

#### **E-LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/109/107/109107121/>

| UNITS  | TOPIC                                                                                       | LECTURE HOURS | MODE OF TEACHING |
|--------|---------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT 1 |                                                                                             |               |                  |
|        | Definition of Personality<br>Components of Personality – structural and functional aspects. | 4             | Black Board      |
|        | Determinants of Personality- biological, psychological and socio-cultural factors.          | 4             | Black Board      |

|          |                                                                                                                        |   |             |
|----------|------------------------------------------------------------------------------------------------------------------------|---|-------------|
|          | Assessment of Personality – observation, interview and psychological tests.                                            |   |             |
|          | Misconceptions and Classifications.<br>Need for personality development.                                               | 4 | PPT         |
| UNIT 11  |                                                                                                                        |   |             |
|          | Self analysis through SWOT and Johari widow.<br>Elements of motivation.                                                | 4 | Black Board |
|          | Seven rules of motivation.<br>Techniques and strategies for self motivation.                                           | 4 | Black Board |
|          | Motivation checklist and Goal setting based on the principle of SMART.<br>Self motivation and life.                    | 4 | PPT         |
| UNIT III |                                                                                                                        |   |             |
|          | Regional, National and Internationalevents.<br>Geographical, political and historicalfacts.                            | 4 | Black Board |
|          | Information on sports and other recreational activities.                                                               | 4 | Black Board |
|          | Basic knowledge with regard to health and health promotion.                                                            | 4 | PPT         |
| UNIT IV  |                                                                                                                        |   |             |
|          | Definition and importance of memory.<br>Causes of forgetting.                                                          | 4 | Black Board |
|          | How to forget (thought stopping), how to remember (techniques for improving memory)<br>The technique of passing exams. | 4 | Black Board |
|          | The rational decision making process.                                                                                  | 4 | PPT         |

|        |                                                                                                        |   |             |
|--------|--------------------------------------------------------------------------------------------------------|---|-------------|
|        | Improving creativity in decision making and components of creativity.                                  |   |             |
| UNIT V |                                                                                                        |   |             |
|        | Thinking power- seven steps for dealing with doubt.<br>Traits of positive thinkers and high achievers, | 4 | Black Board |
|        | Goals and techniques for positive thinking.<br>Enhancement of concentration through positivethinking.  | 4 | Black Board |
|        | Practicing a positive life style.                                                                      | 4 | PPT         |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 3                        | 3    | 3    | 2    | 4    | 2                                  | 3     | 4     | 3     | 3     | 4     | 4     | 3.3                |
| CO2                   | 3                        | 2    | 3    | 3    | 4    | 4                                  | 3     | 4     | 4     | 3     | 4     | 3     | 3.5                |
| CO3                   | 3                        | 2    | 3    | 2    | 4    | 2                                  | 3     | 4     | 4     | 3     | 4     | 4     | 3.4                |
| CO4                   | 3                        | 3    | 3    | 3    | 4    | 3                                  | 3     | 4     | 3     | 4     | 5     | 4     | 3.5                |
| CO5                   | 3                        | 2    | 3    | 2    | 2    | 3                                  | 4     | 4     | 3     | 4     | 3     | 5     | 3.3                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       | 3.4   |                    |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications .

**Programme : M.C.A**  
**Semester : I**  
**Sub.Code : CL1**

**Part III: Practical**  
**Hours : 5 P/W 75 rsP/S**  
**Credits :3**

**TITLE OF THE PAPER: C++ AND DATA STRUCTURES LAB**

| Pedagogy | Hours | PracticalLab | TUTORIAL | ICT |
|----------|-------|--------------|----------|-----|
|          | 5     | 4<br>-       | 1        | -   |

**PREAMBLE:**

The basic aim of this paper is to develop the programming skill to the students to solve the problems using Data structure algorithm

**COURSE OUTCOME**

At the end of the Semester, the Students will be able to

CO1 : able to understand the OOPs concepts

CO2 : able to apply all functionalities into programs

CO3 : able to implement basic data structure operations.

CO 4 : Understand the concepts of TREE traversal and its implementations

**LAB CYCLE:**

1. Program for function overloading.
2. Program for default arguments.
3. Program for unary operator overloading using memberfunction.
4. Program for binary operator overloading using memberfunction.
5. Program for unary operator overloading using friendfunction.
6. Program for binary operator overloading using friendfunction.
7. Program for sequential filehandling.
8. Program for polynomial addition using arrays.
9. Program for single inheritance.
10. Program for virtual function.
11. Program for stack class implementation using arrays.
12. Program for stack class implementation using linked lists
13. Program for queue class implementation using arrays.
14. Program for queue class implementation using linked lists.
15. Program for infix to postfix conversion.

16. Program for evaluation of post fix expression.
  17. Program for operations on singly linkedlist.
  18. Program for operations ongraphs.
  - 19.Program for binary treetraversals.
-

**Programme: M.C.A**  
**Semester : I**  
**Sub.Code : CL2**

**Part III: Practical**  
**Hours : 5 P/W 75 Hrs.P/S**  
**Credits:3**

**TITLE OF THE PAPER: MULTIMEDIA AND UML LAB**

| Pedagogy | Hours | PracticalLab | TUTORIAL | ICT |
|----------|-------|--------------|----------|-----|
|          | 5     | 4            | 1        | -   |

**PREAMBLE:**

1. To manipulate images by various techniques supported by image editing tools.
2. To create 2D animation using guide layer, various tweening methods supported by animation software.
3. To model the object using wireframe and making it to animate and transform.

**COURSE OUTCOME**

At the end of the Semester, the Students will be able to

CO1 : able to develop an animation using Flash

CO2 : Able to develop an application and modification using Photoshop

CO 3 : understand the concepts of 3D object development using 3D Max

CO4 : able to draw all types of UML diagram using Star UML.

**LAB CYCLE:**

**Adobe Photoshop – (Image creation and Manipulation):**

1. Working with Selection Tools , Copy, Cut, Paste, Move Tool
2. Working with Lasso, Polygonal Lasso tool , Transform and Opacity options
3. Working with Quick Select Tool (or Magic Wand Tool), Invert Selection Tool
4. Working with Paint Bucket Tool, Color Picker, Brush Tool
5. Working with Layers, Eraser Tool
6. Working with Text and Transform Tool
7. Working with Color Balance
8. Working with Crop and Canvas
9. Working with Clone Stamp Tool, Smudge Tool
10. Working with Filters , effects

**Macromedia FLASH – ( 2D Animation):**

1. Motion Tweening
2. Shape Tweening
3. Working with multiple Layers
4. Animation using guide layer
5. Animation using Masking Effect

6. Working with Fade-in, Fade-out and Zoom-in, Zoom-out options
7. Working with Image Effects like blur, ripple
8. Sparkling Glass Effect
9. Flash Slide Show Presentation
10. Working with Flash Scripts in order to control the animation

**3D Studio MAX – (3D Animation and rendering):**

1. Working with Build-in 3D Objects.
2. Simulation of a building.
3. Materials and Textures
4. Creation of user defined objects and Organization of Objects in a Scene.
5. Simulation of Bomb blast.
6. Illuminating Scenes Using Lights.
7. Creating an Underwater Scene
8. Cloth, Hair, and Fur Creation
9. Character Animation

**UML DIAGRAMS USING TOOLS**

**Programme: M.C.A**  
**Semester : II**  
**Sub.Code : CB1**

**Part III: Core**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits :4**

**TITLE OF THE PAPER: RESOURCE MANAGEMENT TECHNIQUES**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 5       | -             | -                  | -   |

**PREAMBLE:**

To focus on logics of Resource Management techniques.

| <b>COURSE OUTCOME</b>                                                                                                 | Unit | Hrs P/S |
|-----------------------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                                              |      |         |
| <b>UNIT 1 CO1:</b> Analyze the LPP and IPP Understand of Transportation problem                                       | 1    | 12      |
| <b>UNIT 2 CO2:</b> Apply transportation and assignment models to find optimal solution in warehousing and Travelling, | 2    | 12      |
| <b>UNIT 3 CO3:</b> To prepare project scheduling using PERT and CPM                                                   | 3    | 12      |
| <b>UNIT 4 CO4:</b> Able to use optimization concepts in real world problem                                            | 4    | 12      |
| <b>UNIT 5 CO5:</b> Identify and analyze appropriate queuing model to reduce the waiting time in queue.                | 5    | 12      |

**SYLLABUS**

**UNIT-I**

Simplex Method – Big M method – Two phase simplex method.

**UNIT-II**

Transportations and Assignment problems.

**UNIT-III**

Network Model – CPM and PERT.

**UNIT-IV**

Game Theory – Simulations – Monte – Carlo Simulation – Generation of random numbers.

**UNIT-V**

Dynamic programming Cargo loading Model – Work - force size Model – Equipment Replacement model – Investment model.

**TEXT BOOKS**

Operations Research – An Introduction by Hamdy A. Taha. Ninth Edition, Dorling Kindersley Pvt. Ltd., Noida, India, 2012.

UNIT -I: Chapter 3 – 3.3, 3.4

UNIT -II: Chapter 5 – 5.3.1, 5.3.2, 5.4

UNIT -III: Chapter 6 – 6.1, 6.2, 6.5

UNIT -IV: Chapter 15 – 15.4 (Exclude LPP Method)  
Chapter 19 – 19.1, 19.2, 19.4

UNIT - V : Chapter 12 – 12.3.1, 12.3.2, 12.3.3, 12.3.4

**REFERENCEBOOKS**

1. Resource Management Techniques by V. Sundaresan, K.S. Ganapathy Subramanian, K. Ganesan, A.R. Publications, Chennai, (7<sup>th</sup> Edition).
2. Operations Research by Karthi Swarup, P.K. Gupta and Manmohan, Sultan Chand and Sons, (9<sup>th</sup> Edition), New Delhi.
3. Linear Programming by Dr. S. Arumugam and A. Thangapandi, Isacc, New Gamma Publishing House, Palyamkottai.

| UNITS    | TOPIC                       | LECTURE HOURS | MODE OF TEACHING |
|----------|-----------------------------|---------------|------------------|
| UNIT I   |                             |               |                  |
|          | Simplex method              | 4             | Black Board      |
|          | Big M method                | 4             | Black Board      |
|          | Two phase simplex method.   | 4             | Black Board      |
| UNIT II  |                             |               |                  |
|          | Transportations problems.   | 4             | Black Board      |
|          | Assignment problems.        | 4             | Black Board      |
|          | Problem practices           | 4             | Black Board      |
| UNIT III |                             |               |                  |
|          | Network model               | 4             | Black Board      |
|          | PERT                        | 4             | Black Board      |
|          | CPM                         | 4             | Black Board      |
| UNIT IV  |                             |               |                  |
|          | Game Theory – Simulations – | 4             | Black Board      |

|        |                                                 |   |             |
|--------|-------------------------------------------------|---|-------------|
|        | Generation of random numbers.                   |   |             |
|        | Monte – Carlo Simulation –                      | 4 | Black Board |
|        | Generation of random numbers.                   | 4 | Black Board |
| UNIT V |                                                 |   |             |
|        | Dynamic programming Cargo loadingModel          | 4 | Black Board |
|        | Work - force size Model                         | 4 | Black Board |
|        | Equipment Replacement model – Investment model. | 4 | Black Board |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.3                |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 4     | 2     | 3.7                |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 4                                  | 4     | 2     | 4     | 5     | 4     | 1     | 3.46               |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 5     | 2     | 3.6                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.66               |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.6                |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications .

**Programme: M.C.A**  
**Semester : II**  
**Sub.Code : CB2**

**Part III: Core**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits :4**

**TITLE OF THE PAPER: RELATIONAL DATABASE MANAGEMENT SYSTEMS**

| Pedagogy                                                                                                                                                                                                                                                                                                                                                                            | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT  |         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|---------------|--------------------|------|---------|
|                                                                                                                                                                                                                                                                                                                                                                                     | 5     | 4       | -             | 1                  | -    |         |
| <b>PREAMBLE:</b>                                                                                                                                                                                                                                                                                                                                                                    |       |         |               |                    |      |         |
| <ol style="list-style-type: none"> <li>1. To learn the data correlation and know about various databasemodels.</li> <li>2. To enrich the importance of and process of datanormalization.</li> <li>3. To learn the transactions and concurrent executions of transactions and identify the issues and supporting mechanisms ofRDBMS.</li> </ol>                                      |       |         |               |                    |      |         |
| <b>COURSE OUTCOME</b>                                                                                                                                                                                                                                                                                                                                                               |       |         |               |                    | Unit | Hrs P/S |
| At the end of the Semester, the Students will be able to                                                                                                                                                                                                                                                                                                                            |       |         |               |                    |      |         |
| <b>UNIT 1 CO1:</b> Identify the methodology of conceptual modeling through Entity Relationship model.                                                                                                                                                                                                                                                                               |       |         |               |                    | 1    | 12      |
| <b>UNIT 2 CO2:</b> Define program-data independence, data models for database systems, database schema and database instances                                                                                                                                                                                                                                                       |       |         |               |                    | 2    | 12      |
| <b>UNIT 3 CO3:</b> Identify Structure Query Language statements used in creation and manipulation of Database. Develop a simple database applications using normalization.                                                                                                                                                                                                          |       |         |               |                    | 3    | 12      |
| <b>UNIT 4 CO4:</b> understand the concepts of Data Storages.                                                                                                                                                                                                                                                                                                                        |       |         |               |                    | 4    | 12      |
| <b>UNIT 5 CO5:</b> Acquire the knowledge about different special purpose databases and to critique how they differ from traditional database systems                                                                                                                                                                                                                                |       |         |               |                    | 5    | 12      |
| <b>SYLLABUS</b>                                                                                                                                                                                                                                                                                                                                                                     |       |         |               |                    |      |         |
| <b>UNIT – I</b>                                                                                                                                                                                                                                                                                                                                                                     |       |         |               |                    |      |         |
| Purpose of database systems – View of data – Data models – Database languages – Transaction and storage management – Database Administrator – Types of database user – Structure of database management system – Entity Relationship model – Basic concepts – Design issue – Mapping constraints – keys – ER diagram – Weak entity set – Extended ER features – Design of ERschema. |       |         |               |                    |      |         |
| <b>UNIT – II</b>                                                                                                                                                                                                                                                                                                                                                                    |       |         |               |                    |      |         |
| Relational model – Structure of Relational Databases – Relational Algebra – The tuple relational calculus – SQL – Basic structure – Set operations – Aggregate functions – Null values–Nestedsubqueries–Derivedrelation–Views–Modificationofdatabase–Joined relation–DataDefinitionLanguage–IntegrityConstraints–Domainconstraint–Referential                                       |       |         |               |                    |      |         |

integrity – Assertion – Trigger – Functional dependencies.

### **UNIT – III**

Relational database design – Decomposition – Normalization using functional dependency – Normalization using multivalued dependencies – Normalization using join dependency – Domain key normal form – Object oriented data model – Persistent programming language – Object relational databases – Complex types – Querying with complex type – Comparison of object oriented and object relational databases.

### **UNIT – IV**

Storage and file structure – RAID – Tertiary storage – File organization – Organization of records in file – Data dictionary storage – Storage structure for object oriented database – Indexing and Hashing – Ordered indices – B+ tree index files – B tree index files – Static hashing – Dynamic hashing – Multiple key access.

### **UNIT – V**

Transactions – Transaction state – Implementation of atomicity and durability – Concurrent executions – Serialiability – Recoverability – Implementation of isolation – Transaction definition in SQL – Testing for serialiability – Concurrency control – Lock based protocols – Time stamp based protocols – Validation based protocols – deadlock handling – Recovery system – failure classification – log based recovery – Shadow paging – Recovery with concurrent transactions – Buffer management.

### **TEXT BOOKS**

Database system concepts, A.Silberchatz, H.F.Korth and S.Sudarshan, Tata Mcgraw hill publications, III edition.

Unit –I : Chapter 1,2.1 to 2.8

Unit –II : Chapter 3.1 to 3.3, 4.2 to 4.11, 6.1 to 6.5

Unit – III : Chapter 7.2 to 7.6, 8.2,8.4,9.2,9.3,9.5

Unit – IV: Chapter 10.3 to 10.8, 11.2 to 11.6

Unit – V : Chapter 13.3 to 13.9, 14.1 to 14.3, 14.6,15.1,15.4,15.5 to 15.7.

### **REFERENCE BOOKS**

1. Database Management Systems ,Raghuramakrishnan, Mcgraw Hill, 1998.

2. Introduction to database system, C.J.Date, Addison Wesley publications, V edition.

3. Modern database management, Mefadden, IV edition.

**E-RESOURCES:**

1. <https://www.pearson.com>
2. [www.tutorialspoint.com/sql/ sql-rdbms-concepts.htm](http://www.tutorialspoint.com/sql/sql-rdbms-concepts.htm)
3. [beginnersbook.com/2015/04/rdbms-concepts](http://beginnersbook.com/2015/04/rdbms-concepts)
4. [beginnersbook.com/2015/04/dbms-tutorial](http://beginnersbook.com/2015/04/dbms-tutorial)
5. [www.tutorialspoint.com/dbms/index.htm](http://www.tutorialspoint.com/dbms/index.htm)

| UNITS   | TOPIC                                                                                                                                                                                    | LECTURE HOURS | MODE OF TEACHING |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT 1  |                                                                                                                                                                                          |               |                  |
|         | Purpose of database systems –<br>View of data – Data models –<br>Database languages                                                                                                      | 4             | Black Board      |
|         | Transaction and storage<br>management – Database<br>Administrator – Types of<br>database user – Structure of<br>database managementsystem                                                | 4             | Black Board      |
|         | — Entity Relationship model –<br>Basic concepts – Design issue –<br>Mapping constraints – keys – ER<br>diagram – Weak entity set –<br>Extended ER features – Design of<br>ER schema.     | 4             | Black Board      |
| UNIT 11 |                                                                                                                                                                                          |               |                  |
|         | Relational model – Structure of<br>Relational Databases – Relational<br>Algebra – The tuple relational<br>calculus –                                                                     | 4             | Black Board      |
|         | SQL – Basic structure – Set<br>operations – Aggregate functions<br>– Null values – Nested sub<br>queries – Derived relation –<br>Views – Modification of database<br>– Joined relation – | 4             | PPT              |

|          |                                                                                                                                                                               |   |             |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|          | Data Definition Language – Integrity Constraints – Domain constraint – Referential integrity – Assertion – Trigger – Functional dependencies.                                 | 4 | Black Board |
| UNIT III |                                                                                                                                                                               |   |             |
|          | Relational database design – Decomposition – Normalization using functional dependency – Normalization using multivalued dependencies – Normalization using join dependency – | 4 | Black Board |
|          | Domain key normal form – Object oriented data model – Persistent programming language – Object relational databases – Complex types –                                         | 4 | Black Board |
|          | Querying with complex type – Comparison of object oriented and object relational databases.                                                                                   | 4 | Black Board |
| UNIT IV  |                                                                                                                                                                               |   |             |
|          | Storage and file structure – RAID – Tertiary storage – File organization – Organization of records in file –                                                                  | 4 | Black Board |
|          | Data dictionary storage – Storage structure for object oriented database                                                                                                      | 4 | PPT         |
|          | Indexing and Hashing – Ordered indices – B+ tree index files – B tree index files – Static hashing – Dynamic hashing – Multiple key access                                    | 4 | Black Board |
| UNIT V   |                                                                                                                                                                               |   |             |
|          | Transactions – Transaction state – Implementation of atomicity and durability – Concurrent executions –                                                                       | 4 | Black Board |
|          | Serialibility – Recoverability – Implementation of isolation – Transaction definition in SQL – Testing for serialibility –                                                    | 4 | PPT         |

|  |                                                                                                                                                                                                                                                                      |   |             |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|  | Concurrency control – Lock based protocols – Time stamp based protocols – Validation based protocols – deadlock handling – Recovery system – failure classification – log based recovery – Shadow paging – Recovery with concurrent transactions –Buffer management. | 4 | Black Board |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.3                |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 4     | 2     | 3.7                |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 4                                  | 4     | 2     | 4     | 5     | 4     | 1     | 3.46               |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 5     | 2     | 3.6                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.7                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.56               |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications .

**Programme: M.C.A**  
**Semester : II**  
**Sub.Code : CB3**

**Part III: Core**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits :4**

**TITLE OF THE PAPER: DATA COMMUNICATIONS AND NETWORKING**

| Pedagogy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT  |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|---------------|--------------------|------|---------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 5     | 3       | -             | 1                  | 1    |         |
| <b>PREAMBLE:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |         |               |                    |      |         |
| To enable the students                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |         |               |                    |      |         |
| <ul style="list-style-type: none"> <li>• to understand about fundamentals of networks</li> <li>• to learn about network concepts</li> <li>• to learn about layer functions</li> </ul>                                                                                                                                                                                                                                                                                                                                                      |       |         |               |                    |      |         |
| <b>COURSE OUTCOME</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |         |               |                    | Unit | Hrs P/S |
| At the end of the Semester, the Students will be able to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |         |               |                    |      |         |
| <b>UNIT 1 CO1:</b> Understand the components of a data communications system.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |         |               |                    | 1    | 12      |
| <b>UNIT 2 CO2:</b> Identify key considerations in selecting various transmission media in networks.                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |         |               |                    | 2    | 12      |
| <b>UNIT 3 CO3:</b> Usage of the various error detection and correction schemes and the various types of signals and their features.                                                                                                                                                                                                                                                                                                                                                                                                        |       |         |               |                    | 3    | 12      |
| <b>UNIT 4 CO4:</b> Identify and define roles and features of various data transmission protocols.                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |         |               |                    | 4    | 12      |
| <b>UNIT 5 CO5:</b> Understand the network security methods and its applications                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |         |               |                    | 5    | 12      |
| <b>SYLLABUS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |         |               |                    |      |         |
| <b>UNIT I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |         |               |                    |      |         |
| Introduction: Data Communication – Networks – Distributed Processing, Network criteria, Applications -Protocols and Standards, - Standards Organizations – Standards Creation committees, Forums, Regulatory Agencies. Basic Concepts: Line Configuration – Point-to-Point, Multipoint - Topology – Mesh, Star, Tree, Bus, Ring, Hybrid Topologies -Transmission Mode – Simplex, Half-Duplex - Full Duplex - Categories of Networks – LAN, WAN, MAN - Internetworks. The OSI Model: The Model – Functions of the Layers.                   |       |         |               |                    |      |         |
| <b>UNIT II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |         |               |                    |      |         |
| Transmission of Digital Data: Interfaces and Modems: Digital Data Transmission – Parallel Transmission, Serial Transmission - Transmission Media: Guided Media – Twisted-Pair Cable, Coaxial Cable, Optical Fiber - Unguided Media – Radio Frequency Allocation, Propagation of Radio Waves, Terrestrial Microwave, Satellite Communication, Cellular Telephony. Error Detection and Correction: Types of Errors, Detection, Vertical Redundancy Check, Longitudinal Redundancy Check, Cyclic Redundancy Check, Checksum, ErrorCorrection. |       |         |               |                    |      |         |
| <b>UNIT III</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |         |               |                    |      |         |
| Data Link Control: Line Discipline – ENQ/ACKJ, Poll/Select - Flow Control – Stop-and-Wait, Sliding Window - Error Control – Automatic Repeat Request, Stop-and-Wait ARQ, Sliding Window ARQ. Switching: Circuit Switching – Space-Division Switches, Time-Division                                                                                                                                                                                                                                                                         |       |         |               |                    |      |         |

Switches, TDM Bus, Space-and Time division switching combinations, Public switched telephone network – Packet Switching – Datagram Approach, Virtual circuit approach, Circuit-switched connection versus virtual-circuit connection - Message Switching.

#### **UNIT IV**

Local Area Networks: Project 802 – IEEE 802, LLC, MAC, PDU – Ethernet – Access method: CSMA/CD, Addressing, Electrical specifications, Frame format, Implementation -Other Ethernet Networks – Switched Ethernet, Fast Ethernet, Gigabit Ethernet – Token Bus – Token Ring – Access method: Token passing, Addressing, Electrical specifications, Frame format, Implementation - FDDI – Access method: Token passing, Addressing, Electrical specifications, Frame format, Implementation - Comparison. Metropolitan Area Networks: IEEE 802.6 (DQDB) – Access method: Dual Bus, Distributed Queues – Ring Configuration – Operation, and Implementation. Networking and Internetworking Devices: Repeaters – Bridges – Routers – Gateways – Other Devices – Multiprotocol Routers, Brouters, Switches, Routing Switches.

#### **UNIT V**

Network Security: Security Attacks - Security Services – A model for network security – Symmetric encryption principles –Symmetric block encryption algorithms – Public-Key cryptography Principles – Public-Key cryptography algorithms – X.509 certificates.

#### **TEXT BOOK:**

1. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw Hill Publishing Company Limited, New Delhi, 2<sup>nd</sup> Edition, Third Reprint 2001. (Unit I to UnitIV)

#### **UNIT-I**

Chapter 1(Sections 1.2-1.5), Chapter 2(Sections 2.1-2.5), Chapter 3(Sections 3.1,3.2)

#### **UNIT-II**

Chapter 6(Sections 6.1-6.1), Chapter 2(Sections 7.1-7.2), Chapter 9

#### **UNIT-III**

Chapter10, Chapter 14(Sections 14.1 –14.3)

#### **UNIT-IV**

Chapter 12, Chapter 13(Sections 13.1), Chapter 21 (Sections:21.1-21.5)

2. Network Security Essentials: Applications and Standards by William Stallings, Fourth Edition, Second Impression 2012, Pearson Education Publications. (UnitV)

#### **UNIT-V**

Chapters 1 (Sections: 1.3,1.4,1.7), Chapter 2 (Sections: 2.1,2.2,3),  
Chapter 3 (Sections: 3.4,3.5), Chapter 4 (Sections: 4.4)

#### **REFERENCE BOOK(s):**

1. Computer Networks, Andrew S. Tanenbaum, Prentice Hall of India, 4<sup>th</sup> Edition, 2006.

#### **E-LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/105/106105082/>

| UNITS    | TOPIC                                                                                                                                                                                                                                       | LECTURE HOURS | MODE OF TEACHING |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT 1   |                                                                                                                                                                                                                                             |               |                  |
|          | Introduction: Data Communication – Networks – Distributed Processing, Network criteria, Applications                                                                                                                                        | 4             | Black Board      |
|          | Protocols and Standards, - Standards Organizations – Standards Creation committees, Forums, Regulatory Agencies. Basic Concepts: Line Configuration – Point-to-Point, Multipoin - Topology – Mesh, Star, Tree, Bus, Ring, Hybrid Topologies | 4             | Black Board      |
|          | Transmission Mode – Simplex, Half-Duplex - Full Duplex - Categories of Networks – LAN, WAN, MAN - Internetworks. The OSI Model: The Model – Functions of the Layers.                                                                        | 4             | PPT              |
| UNIT 11  |                                                                                                                                                                                                                                             |               |                  |
|          | Transmission of Digital Data: Interfaces and Modems: Digital Data Transmission – Parallel Transmission, Serial Transmission                                                                                                                 | 4             | Black Board      |
|          | Transmission Media: Guided Media – Twisted-Pair Cable, Coaxial Cable, Optical Fiber - Unguided Media – RadioFrequency Allocation, Propagation of Radio Waves, Terrestrial Microwave, Satellite Communication,                               | 4             | Black Board      |
|          | Cellular Telephony. Error Detection and Correction: Types of Errors, Detection, Vertical Redundancy Check, Longitudinal Redundancy Check, Cyclic Redundancy Check, Checksum, Error Correction                                               | 4             | PPT              |
| UNIT III |                                                                                                                                                                                                                                             |               |                  |

|         |                                                                                                                                                                                                                                                                                                                                   |   |             |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|         | Data Link Control: Line Discipline – ENQ/ACKJ, Poll/Select - Flow Control – Stop-and-Wait, Sliding Window - Error Control – Automatic Repeat Request, Stop-and-Wait ARQ, Sliding Window ARQ. Datagram Approach, Virtual circuit approach, Circuit-switched connection versus virtual-circuit connection - MessageSwitching.       | 4 | Black Board |
|         | Switching: Circuit Switching – Space-Division Switches, Time-Division Switches, TDM Bus, Space-and Time division switching combinations, Public switched telephone network – Packet Switching –                                                                                                                                   | 4 | Black Board |
|         | Datagram Approach, Virtual circuit approach, Circuit-switched connection versus virtual-circuit connection - Message Switching.                                                                                                                                                                                                   | 4 | PPT         |
| UNIT IV |                                                                                                                                                                                                                                                                                                                                   |   |             |
|         | Local Area Networks: Project802 – IEEE 802, LLC, MAC, PDU– Ethernet – Access method: CSMA/CD, Addressing, Electrical specifications, Frame format, Implementation -Other Ethernet Networks – Switched Ethernet, Fast Ethernet, Gigabit Ethernet – Token Bus – Token Ring – Access method: Token passing,Addressing,               | 4 | Black Board |
|         | Electrical specifications, Frame format, Implementation - FDDI – Access method: Token passing, Addressing, Electrical specifications, Frame format, Implementation - Comparison. Metropolitan Area Networks: IEEE 802.6 (DQDB) –Access method: Dual Bus, Distributed Queues – Ring Configuration – Operation, and Implementation. | 4 | Black Board |

|               |                                                                                                                                                                 |   |                                 |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---------------------------------|
|               | Networking and Internetworking Devices: Repeaters – Bridges – Routers – Gateways – Other Devices – Multiprotocol Routers, Brouters, Switches, Routing Switches. | 4 | ICT – Net materials NPTEL notes |
| <b>UNIT V</b> |                                                                                                                                                                 |   |                                 |
|               | Network Security: Security Attacks - Security Services – A model for network security                                                                           | 4 | Black Board                     |
|               | Symmetric encryption principles –Symmetric block encryption algorithms –                                                                                        | 4 | PPT                             |
|               | Public-Key cryptography Principles – Public-Key cryptography algorithms – X.509 certificates.                                                                   | 4 | Black Board                     |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.26               |
| CO2                   | 5                        | 5    | 5    | 5    | 2    | 4                                  | 5     | 2     | 4     | 5     | 4     | 2     | 3.66               |
| CO3                   | 4                        | 5    | 4    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 4     | 1     | 3.53               |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 5     | 2     | 3.6                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 5     | 3     | 5     | 4     | 4     | 2     | 3.8                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.57               |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of Cos}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications .

**Programme: M.C.A**  
**Semester : II**  
**Sub.Code : ECB1**

**Part III: Elective**  
**Hours : 5 P/W 60 Hrs.P/S**  
**Credits: 5**

**TITLE OF THE PAPER: CLOUD COMPUTING**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 3       | -             | 1                  | 1   |

**PREAMBLE:**

This gives an idea of cloud computing and its services available today which may led to the design and development of simple cloud service and focused on some key challenging issues around cloudcomputing.

| <b>COURSE OUTCOME</b>                                                                                            | Unit | Hrs P/S |
|------------------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                                         |      |         |
| <b>UNIT 1 CO1:</b> Compare the strengths and limitations of cloud computing                                      | 1    | 12      |
| <b>UNIT 2 CO2:</b> Analyze and Identify the architecture, infrastructure and delivery models of cloud computing. | 2    | 12      |
| <b>UNIT 3 CO3:</b> Effectivelymanage the challenges and facilitate user authentications.                         | 3    | 12      |
| <b>UNIT 4 CO4:</b> Address the core issues of cloud computing such as security, privacy and interoperability.    | 4    | 12      |
| <b>UNIT5CO5:</b> Design Cloud Services and Set a private cloud And apply suitable virtualizationconcept.         | 5    | 12      |

**SYLLABUS**

**UNIT-I:**

**Introduction to Cloud computing:** Definition –Cloud Deployment models – Private Vs Public clouds – Business drivers for Cloud Computing – Cloud Technologies –Technology Challenges.

**UNIT-II:**

**Infrastructure as a Service (IaaS):** Storage as a service : Amazon storage service – Compute as a service: Amazon Elastic compute cloud – Hp cloud system matrix

**Platform as a service (PaaS):** Google App Engine – PaaS Storage Aspects – Software as a Service (**SaaS**): Social computing service – case study : Face book, Twitter, Picasa.

**UNIT-III:**

**Cloud challenges:** Scaling computation: Scale out Vs Scale up – Amdahl’s Law- Scaling storage – CAP theorem – Multi tenancy levels – Tenants and users – Authentication-

Availability – Failure Detection – Application Recovery.

**UNIT-IV:**

**Designing cloud Security:** Introduction – Cloud security requirements: Physical Security – Virtual Security- Risk Management: Concepts – Process- Security Design Patterns- Selecting a cloud service provider: Listing the Risks – security criteria for selecting a cloud service provider.

**UNIT-V:**

**Cloud Management:** Managing IaaS : Management of cloud system Matrix-Managing PaaS : Management of windows Azure- Managing SaaS: Monitoring Force.com : NetCharts.

**TEXT BOOKS:**

1. DinkarSitaram , GeethaManjunath ,” Syngress Moving to the cloud” Elsevier2012
2. GautamShroff, “Enterprise Cloud Computing Technology Architecture Applications”, Cambridge University Press; First Edition,2010.

**REF. BOOKS:**

1. Dimitris N. Chorafas, “Cloud Computing Strategies” CRC Press; First Edition2010.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach” McGraw-Hill Osborne Media; FirstEdition

**E-LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/105/106105167/>

| UNITS   | TOPIC                                                                         | LECTURE HOURS | MODE OF TEACHING    |
|---------|-------------------------------------------------------------------------------|---------------|---------------------|
| UNIT 1  |                                                                               |               |                     |
|         | <b>Introduction to Cloud computing:</b> Definition –Cloud Deployment models – | 4             | Black Board         |
|         | Private Vs Public clouds – Business drivers for Cloud Computing –             | 4             | Black Board         |
|         | Cloud Technologies –Technology Challenges                                     | 4             | ICT – web materials |
| UNIT 11 |                                                                               |               |                     |
|         | <b>Infrastructure as a Service (IaaS):</b> Storage as a service :             | 4             | Black Board         |

|                 |                                                                                                                            |   |                     |
|-----------------|----------------------------------------------------------------------------------------------------------------------------|---|---------------------|
|                 | Amazon storage service –<br>Compute as a service: Amazon<br>Elastic compute cloud – Hp cloud<br>system matrix              |   |                     |
|                 | <b>Platform as a service (PaaS):</b><br>Google App Engine – PaaS<br>Storage Aspects –                                      | 4 | PPT                 |
|                 | <b>Software as a Service (SaaS):</b><br>Social computing service – case<br>study : Face book, Twitter,<br>Picasa.          | 4 | ICT – Web Materials |
| <b>UNIT III</b> |                                                                                                                            |   |                     |
|                 | <b>Cloud challenges:</b> Scaling<br>computation: Scale out Vs Scale<br>up – Amdahl’s Law- Scaling<br>storage               | 4 | Black Board         |
|                 | CAP theorem – Multi tenancy<br>levels – Tenants and users –                                                                | 4 | Black Board         |
|                 | Authentication- Availability –<br>Failure Detection – Application<br>Recovery.                                             | 4 | Black Board         |
| <b>UNIT IV</b>  |                                                                                                                            |   |                     |
|                 | <b>Designing cloud Security:</b><br>Introduction – Cloud security<br>requirements: Physical Security –<br>Virtual Security | 4 | Black Board         |
|                 | Risk Management: Concepts –<br>Process- Security Design<br>Patterns-                                                       | 4 | PPT                 |
|                 | Selecting a cloud service<br>provider: Listing the Risks –<br>security criteria for selecting a<br>cloud serviceprovider.  | 4 | Black Board         |
| <b>UNIT V</b>   |                                                                                                                            |   |                     |
|                 | <b>Cloud Management:</b> Managing<br>IaaS : Management of cloud<br>system Matrix-Managing                                  | 4 | Black Board         |

|  |                                                 |   |     |
|--|-------------------------------------------------|---|-----|
|  | PaaS : Management of windows Azure-             | 4 | PPT |
|  | Managing SaaS: Monitoring Force.com :NetCharts. | 4 | PPT |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 5                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 2     | 3.5                |
| CO2                   | 5                        | 5    | 5    | 4    | 1    | 5                                  | 5     | 3     | 4     | 5     | 4     | 2     | 3.8                |
| CO3                   | 4                        | 4    | 4    | 5    | 2    | 4                                  | 4     | 2     | 4     | 5     | 4     | 2     | 3.4                |
| CO4                   | 5                        | 3    | 5    | 5    | 1    | 4                                  | 4     | 2     | 5     | 4     | 5     | 1     | 3.5                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 4     | 3     | 5     | 4     | 4     | 1     | 3.6                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.5                |

|                                                                                   |           |         |                                                                                          |         |           |
|-----------------------------------------------------------------------------------|-----------|---------|------------------------------------------------------------------------------------------|---------|-----------|
| Mapping                                                                           | 1-20%     | 21-40%  | 41-60%                                                                                   | 61-80%  | 81-100%   |
| Scale                                                                             | 1         | 2       | 3                                                                                        | 4       | 5         |
| Relation                                                                          | 0.0-1.0   | 1.1-2.0 | 2.1-3.0                                                                                  | 3.1-4.0 | 4.1-5.0   |
| Quality                                                                           | Very Poor | Poor    | Moderate                                                                                 | High    | Very High |
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ |           |         | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |         |           |

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications.

**Programme: M.C.A**  
**Semester : II**  
**Sub.Code : ECB2**

**PartIII: Elective**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits :5**

**TITLE OF THE PAPER: INTERNET OF THING**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 4       | -             | 1                  | -   |

**PREAMBLE:**

To understand the concept of M2M (Machine to Machine) with necessary protocols and applications of IoT.

| <b>COURSE OUTCOME</b>                                                  | Unit | Hrs P/S |
|------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to               |      |         |
| <b>UNIT 1 CO1:</b> Analyze various protocols for IoT                   | 1    | 12      |
| <b>UNIT 2 CO2:</b> Develop web services to access/control IoT devices. | 2    | 12      |
| <b>UNIT 3 CO3:</b> Design a portable IoT using Raspberry Pi            | 3    | 12      |
| <b>UNIT 4 CO4:</b> Deploy an IoT application and connect to the cloud. | 4    | 12      |
| <b>UNIT 5 CO5:</b> Analyze applications of IoT in real time scenario   | 5    | 12      |

**SYLLABUS**

**UNIT-I:**

Introduction to Internet of Things: Introduction – Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT Levels and Deployment Templates – Domain Specific IoTs: Home Automation – Cities – Environment – Energy – Retail – Agriculture – Health and Lifestyle.

**UNIT-II:**

IOT and M2M: Introduction to M2M – Difference between IoT and M2M – Need for IoT Systems Management – SNMP – Network Operator Requirements – IoT Platforms Design Methodology : Introduction – IoT Design Methodology.

**UNIT-III:**

IoT Physical Devices and Endpoints :IoT Device – Exemplary Device: Raspberry Pi, About the board. Linux on Raspberry Pi, Raspberry Interfaces – other IoT Devices.

**UNIT-IV:**

IoT Physical Servers and Cloud Offerings: Introduction to Cloud Storage Models and Communication APIs – WAMP – AutoBahn for IoT – Xively Cloud for IoT – Amazon Web Services for IoT.

**UNIT-V:**

Case Studies of IoT Design: Home Automation – Cities – Environment – Agriculture – Productivity Applications. An IoT Tool: Chief - Chief Case Studies.

**TEXT BOOKS**

ArshdeepBahga, Vijay Madiseti, “Internet of Things - A Hands on Approach” Universities Press 2015.

**REFERENCE BOOKS:**

1. HonboZhou , “The Internet of Things in the Cloud” A Middleware Perspective” CRC Press 2012.
2. Dieter Uckelmann,Mark Harrison, Florian Michahelles “Architecture the Internet of Things” Springer 2011.

**E-LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/105/106105166/>
2. [www.pubnub.com/blog/2015-05-27-internet-of-things-101-getting-started-w-raspberry-pi/](http://www.pubnub.com/blog/2015-05-27-internet-of-things-101-getting-started-w-raspberry-pi/)
3. [www.theinternetofthings.eu/what-is-the-internet-of-things](http://www.theinternetofthings.eu/what-is-the-internet-of-things)
4. [www.ibm.com/blogs/bluemix/2015/04/tutorial-using-a-raspberry-pi-python-iot-twilio-](http://www.ibm.com/blogs/bluemix/2015/04/tutorial-using-a-raspberry-pi-python-iot-twilio-)

| <b>UNITS</b>    | <b>TOPIC</b>                                                                                                           | <b>LECTURE HOURS</b> | <b>MODE OF TEACHING</b> |
|-----------------|------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------|
| <b>UNIT 1</b>   |                                                                                                                        |                      |                         |
|                 | Introduction to Internet of Things:<br>Introduction – Physical Design of IoT – Logical Design of IoT                   | 4                    | Black Board             |
|                 | IoT Enabling Technologies – IoT Levels and Deployment<br>Templates – Domain Specific<br>IoTs: Home Automation – Cities | 4                    | Black Board             |
|                 | Environment – Energy – Retail–<br>Agriculture – Health and<br>Lifestyle.                                               | 4                    | PPT                     |
| <b>UNIT 11</b>  |                                                                                                                        |                      |                         |
|                 | IOT and M2M: Introduction to<br>M2M – Difference between IoT<br>and M2M – Need for IoT                                 | 4                    | Black Board             |
|                 | Systems Management – SNMP –<br>Network Operator Requirements                                                           | 4                    | Black Board             |
|                 | IoT Platforms Design<br>Methodology : Introduction –IoT<br>Design Methodology.                                         | 4                    | PPT                     |
| <b>UNIT III</b> |                                                                                                                        |                      |                         |
|                 | IoT Physical Devices and<br>Endpoints : IoT Device                                                                     | 4                    | Black Board             |
|                 | Exemplary Device: Raspberry Pi,<br>About the board.                                                                    | 4                    | PPT                     |
|                 | Linux on Raspberry Pi, Raspberry<br>Interfaces – other IoT Devices                                                     | 4                    | Black Board             |
| <b>UNIT IV</b>  |                                                                                                                        |                      |                         |
|                 | IoT Physical Servers and Cloud<br>Offerings: Introduction to Cloud<br>Storage Models and<br>Communication APIs         | 4                    | Black Board             |
|                 | WAMP – AutoBahn for IoT –<br>Xively Cloud for IoT                                                                      | 4                    | Black Board             |
|                 | Amazon Web Services for IoT                                                                                            | 4                    | Black Board             |
| <b>UNIT V</b>   |                                                                                                                        |                      |                         |
|                 | Case Studies of IoT Design:<br>Home Automation –Cities                                                                 | 4                    | Black Board             |

|  |                                                     |   |             |
|--|-----------------------------------------------------|---|-------------|
|  | Environment Agriculture Productivity Applications . | 4 | PPT         |
|  | An IoT Tool: Chief - Chief Case Studies.            | 4 | Black Board |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.33               |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 2     | 4     | 5     | 4     | 2     | 3.66               |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 5                                  | 4     | 3     | 4     | 4     | 4     | 1     | 3.53               |
| CO4                   | 4                        | 4    | 5    | 4    | 2    | 4                                  | 4     | 2     | 5     | 5     | 5     | 2     | 3.6                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.66               |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.56               |

|                                                                                   |           |         |                                                                                          |         |           |
|-----------------------------------------------------------------------------------|-----------|---------|------------------------------------------------------------------------------------------|---------|-----------|
| Mapping                                                                           | 1-20%     | 21-40%  | 41-60%                                                                                   | 61-80%  | 81-100%   |
| Scale                                                                             | 1         | 2       | 3                                                                                        | 4       | 5         |
| Relation                                                                          | 0.0-1.0   | 1.1-2.0 | 2.1-3.0                                                                                  | 3.1-4.0 | 4.1-5.0   |
| Quality                                                                           | Very Poor | Poor    | Moderate                                                                                 | High    | Very High |
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ |           |         | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |         |           |

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications.

**Programme: M.C.A**  
**Semester : II**  
**Sub.Code : ECB3**

**PartIII: Elective**  
**Hours : 5 P/W 60 Hrs.P/S**  
**Credits:5**

**TITLE OF THE PAPER: DIGITAL PRINCIPLES AND COMPUTER ORGANISATION**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |         |               |                    |      |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|---------------|--------------------|------|---------|
| Pedagogy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT  |         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 5     | 4       | -             | 1                  | -    |         |
| <b>PREAMBLE:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |         |               |                    |      |         |
| To develop knowledge in digital logic, combinational logic circuit, flip-flops, registers, basic structure of computer, I/O system, memory system, and processing unit.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |         |               |                    |      |         |
| <b>COURSE OUTCOME</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |         |               |                    | Unit | Hrs P/S |
| At the end of the Semester, the Students will be able to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |         |               |                    |      |         |
| <b>UNIT 1 CO1:</b> Understand the concept of Gates and its circuit designs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |         |               |                    | 1    | 12      |
| <b>UNIT 2 CO2:</b> Understand the design principles of Flip Flops and counters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |         |               |                    | 2    | 12      |
| <b>UNIT 3 CO3:</b> Comprehend basic input/output functioning including program controlled I/O and interrupt I/O and design Instruction formats .                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |         |               |                    | 3    | 12      |
| <b>UNIT 4 CO4:</b> Understand the design and functioning of a machines central processing unit (CPU).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |         |               |                    | 4    | 12      |
| <b>UNIT 5 CO5:</b> Be through with organization of memory hierarchies including Cache and Virtual Memory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |         |               |                    | 5    | 12      |
| <b>SYLLABUS</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |         |               |                    |      |         |
| <b>UNIT - I</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |         |               |                    |      |         |
| <b>Describing logic circuits:</b> Boolean constants and variables, Truth tables, OR operations with OR Gates, AND operations with AND Gates, NOT operation, Describing logic circuit algebraically, Evaluating logic circuit operations, Implementing circuits from Boolean expressions, NOR Gates and NAND Gates, Boolean Theorems, Demorgan's Theorems, Universality of NAND Gates and NOR Gates. <b>Combinational logic circuits :</b> Sum of Products form, Simplifying logic circuits, Algebraic simplification, Designing combinational logic circuits, Karnaugh map method, Exclusive OR and Exclusive NOR circuits. |       |         |               |                    |      |         |
| <b>UNIT - II</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |         |               |                    |      |         |
| Flip-Flops and their Applications: Clock Signals and clocked Flip-Flops, Clocked S-R Flip-Flop, Clocked J-K Flip-Flops, Clocked D Flip-Flops, D Latch, Master/Slave Flip-Flops, Asynchronous (Ripple) Counter, Asynchronous Down Counter, Synchronous (Parallel)                                                                                                                                                                                                                                                                                                                                                            |       |         |               |                    |      |         |

counters, Integrated circuit registers: Parallel – in / Parallel –out, Serial – in / Serial – out, Parallel – in / Serial – out, Serial – in / Parallel – out.

### **UNIT - III**

Instruction Codes – Computer Registers – Computer Instruction – Timing and control – Instruction Cycle – Memory reference Instruction – Input – Output and Interrupt – Programming the Basic Computer – Assembly Language – The Assembler – Program loops – subroutines.

### **UNIT - IV**

Central Processing Unit – General Register Organization – Stack Organization – Instruction forms – Addressing mode – Data Transfer and manipulation – Program Control.

### **UNIT - V**

Input-Output organization – Input-Output Interface – Priority Interrupt – DMA – IOP. – Memory Organisation – Memory Hierarchy – Associative memory – Cache memory – Virtual memory.

### **TEXT BOOK(S)**

1. Computer System Architecture by M.Morris Mano, III-Edn, 1998. UNIT III, IV &V
2. Digital Systems Principles and Applications by Ronald J. Tocci, Neal S. Widmer, Gregory L.Moss, Pearson Prentice Hall, Sixth Edition. UNIT I &II  
UNIT I: Chapters 3.1 – 3.12, 4.1 – 4.6 UNIT II: Chapters: 5.4 – 5.8, 5.13, 7.1,7.4, 7.6, 7.18 – 7.22 UNIT III: Chapter 5.1 – 5.7, 6.3 – 6.5, 6.7 UNIT IV: Chapter: 8.2 – 8.7 UNIT V: Chapter 11.2,11.5 – 11.7,12.1, 12.4 – 12.6.

### **REFERENCE BOOK(S)**

1. Digital Principles And Applications by D.P. Leach and A.P. Malvino, Tata McGrawHill, New Delhi, 6th Edition,2006.
2. Compute Organization by Carl Hamacher, ZvonkoVranesic, SafwatZaky, TataMcGraw Hill, 5th Edition, 2002.

### **E-LEARNING RESOURCES:**

1. <http://nptel.ac.in/courses/117106086/1>
2. <https://swayam.gov.in/courses/1392-digital-circuits-and-systems>
3. <https://nptel.ac.in/courses/117/105/117105078/>
4. [https://www.tutorialspoint.com/computer\\_organization/index.asp](https://www.tutorialspoint.com/computer_organization/index.asp)
5. <https://www.studytonight.com/computer-architecture/>

| <b>UNITS</b> | <b>TOPIC</b>                                                                                                                                                                         | <b>LECTURE HOURS</b> | <b>MODE OF TEACHING</b> |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------------|
| UNIT 1       | <b>Describing logic circuits:</b> Boolean constants and variables, Truth tables, OR operations with OR Gates, AND operations with AND Gates, NOT operation, Describing logic circuit | 4                    | Black Board             |

|                 |                                                                                                                                                                                                                       |   |             |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|                 | algebraically, Evaluating logic circuit operations,                                                                                                                                                                   |   |             |
|                 | Implementing circuits from Boolean expressions, NOR Gates and NAND Gates, Boolean Theorems, Demorgan's Theorems, Universality of NAND Gates and NOR Gates.                                                            | 4 | Black Board |
|                 | <b>Combinational logic circuits</b> :Sum of Products form, Simplifying logic circuits, Algebraic simplification, Designing combinational logic circuits, Karnaugh map method, Exclusive OR and Exclusive NORcircuits. | 4 | Black Board |
| <b>UNIT 11</b>  |                                                                                                                                                                                                                       |   |             |
|                 | Flip-Flops and their Applications: Clock Signals and clocked Flip-Flops, Clocked S-R Flip-Flop, Clocked J-K Flip-Flops, Clocked D Flip-Flops, D Latch, Master/Slave Flip-Flops,                                       | 4 | PPT         |
|                 | Asynchronous (Ripple) Counter, Asynchronous Down Counter, Synchronous (Parallel) counters,                                                                                                                            | 4 | Black Board |
|                 | Integrated circuit registers: Parallel – in / Parallel –out, Serial – in / Serial – out, Parallel – in / Serial – out, Serial – in / Parallel – out.                                                                  | 4 | Black Board |
| <b>UNIT III</b> |                                                                                                                                                                                                                       |   |             |
|                 | Instruction Codes – Computer Registers – Computer Instruction – Timing and control –                                                                                                                                  | 4 | Black Board |
|                 | Instruction Cycle – Memory reference Instruction – Input – Output and Interrupt –                                                                                                                                     | 4 | PPT         |
|                 | Programming the Basic Computer – Assembly Language – The Assembler – Program loops – subroutines.                                                                                                                     | 4 | Black Board |
| <b>UNIT IV</b>  |                                                                                                                                                                                                                       |   |             |
|                 | Central Processing Unit – General Register Organization –Addressingmode – Data Transfer and manipulation –                                                                                                            | 4 | Black Board |
|                 | Program Control.                                                                                                                                                                                                      |   |             |
|                 | Stack Organization – Instruction formals –                                                                                                                                                                            | 4 | Black Board |

|        |                                                                          |   |             |
|--------|--------------------------------------------------------------------------|---|-------------|
|        | Addressing mode – Data Transfer and manipulation – Program Control.      | 4 | Black Board |
| UNIT V |                                                                          |   |             |
|        | Input-Output organization – Input-Output Interface – Priority Interrupt– | 4 | Black Board |
|        | DMA – IOP. – Memory Organisation –                                       | 4 | PPT         |
|        | Memory Hierarchy – Associative memory – Cache memory –Virtual memory.    | 4 | Black Board |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.3                |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 4     | 2     | 3.7                |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 4                                  | 4     | 2     | 4     | 5     | 4     | 1     | 3.5                |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 5     | 2     | 3.6                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.7                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.36               |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications .

**Programme: M.C.A**  
**Semester : II**  
**Sub.Code : CL3**

**PartIII: Practical**  
**Hours : 5 P/W 75 Hrs.P/S**  
**Credits: 3**

**TITLE OF THE PAPER: CLIENT SERVER LAB**

| Pedagogy | Hours | PracticalLab | TUTORIAL | ICT |
|----------|-------|--------------|----------|-----|
|          | 5     | 4<br>-       | 1        | -   |

**PREAMBLE:**

- ❖ To promote programming knowledge on the Client Server Concepts (VB as frontend, ORACLE asbackend).
- ❖ To develop applications to suit real time requirement withreports.

**COURSE OUTCOME**

At the end of the Semester, the Students will be able to

CO1 : able to develop a client server applications

CO 2 : Able to develop a system functions

CO 3 : understand to develop a front end and back end applications.

**LAB CYCLE:**

1. Library Management System (3tables).
2. Inventory Control System (3tables).
3. Gas Booking and Delivery System (2tables).
4. Banking System (2tables).
5. Electricity Billing System (2tables).
6. Student Mark Processing System (2tables).
7. Airline – ticket Reservation System (2tables).

**Programme: M.C.A**

**PartIII: Practical**

**Semester : II**

**Hours : 5 P/W 75 HrsP/S**

**Sub.Code : CL4**

**Credits:3**

**TITLE OF THE PAPER: NETWORKING AND SECURITY LAB**

| Pedagogy | Hours | PracticalLab | TUTORIAL | ICT |
|----------|-------|--------------|----------|-----|
|          | 5     | 4            | 1        | -   |

**PREAMBLE:**

To develop programming skills on RMI, Networking (TCP/IP, UDP), COM and, Security Concepts.

**COURSE OUTCOME**

At the end of the Semester, the Students will be able to

CO1 : understand the concepts of RMI with client and server machine

CO 2 : able to code program with COM technologies

CO3 : Able to develop an application with TCP and UDP protocols

CO4 : able to develop an application with Database connectivity

**LAB CYCLE:**

1. Write a RMI program to print Fibonacci series.
2. Write a RMI program to check the Prime Number.
3. Write a RMI program to print arithmetic operations.
4. Write a RMI program to find the factorial value of the given number.
5. Write a COM coding for basic Arithmetic Operations.
6. Write a COM Coding to handle Prime Number.
7. Write a COM program to check Odd or Even Number.
8. Find the IP Address of LocalHost.
9. Send and receive a packet using TCP.
10. Send and receive a packet using UDP.
11. Factorial Calculation using TCP /UDP.
12. Prime Number Checking using TCP /UDP.
13. Implement the lowercase to uppercase conversion.
14. Send the password as a packet from client and receive the related data from the server.
15. Send the filename from the client and receive a content of the file from the server using URL.
16. Send the filename from the client and receive a content of the file from the server using FileInputStream.
17. Implement Chatting.
18. Date and Time display using TCP.
19. Implement JDBC (BackEnd – Oracle).
20. Implement JDBC (BackEnd – Oracle) – DDL Command.
21. Implement JDBC (BackEnd – Oracle) – DML Command.

22. Implement Basic Ceaser Cipher Encryption and Decryption algorithm.
23. Implement Key based Ceaser Cipher Encryption and Decryption algorithm.
24. Implement Transposition based encryption and Decryption algorithm.
25. Implement Symmetric key based Encryption and Decryption algorithm.
26. Implement the following: Check the Status of Notepad, Connect with Google Server, Test for Host Reachability.
27. Implement PlayFair Algorithm for encryption and Decryption.

**Programme: M.C.A**  
**Semester : III**  
**Sub.Code : CC1**

**PartIII : Core**  
**Hours : 5 P/W 60 Hrs P/S**  
**Credits :4**

**TITLE OF THE PAPER: ENTERPRISE WEB APPLICATIONS**

| Pedagogy                                                                                                                                                                                                                                                                                                                                                                    | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT  |         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|---------------|--------------------|------|---------|
|                                                                                                                                                                                                                                                                                                                                                                             | 5     | 4       | -             | 1                  | -    |         |
| <b>PREAMBLE:</b>                                                                                                                                                                                                                                                                                                                                                            |       |         |               |                    |      |         |
| <ul style="list-style-type: none"> <li>• To focus Web Database Applications with PHP andMYSQL.</li> <li>• To learn the validating and state management support of ASP.NET in websitcreation</li> <li>• To learn about the various data binding concepts (including XML) ofASP.NET</li> <li>• To create the web services using ASP.NET and using it at clientside</li> </ul> |       |         |               |                    |      |         |
| <b>COURSE OUTCOME</b>                                                                                                                                                                                                                                                                                                                                                       |       |         |               |                    | Unit | Hrs P/S |
| At the end of the Semester, the Students will be able to                                                                                                                                                                                                                                                                                                                    |       |         |               |                    |      |         |
| <b>UNIT1CO1:</b> Understand the development of a server-side n-tierenterprise web system including its capabilities andlimitations.                                                                                                                                                                                                                                         |       |         |               |                    | 1    | 12      |
| <b>UNIT 2 CO2:</b> Knowledge over arrays , abstraction, inheritance and polymorphism exception handling and the benefit of developing reusable business objectclasses.                                                                                                                                                                                                      |       |         |               |                    | 2    | 12      |
| <b>UNIT 3 CO3:</b> Usage of RDBMS functionality to protect the data in the database. And also SQL functions.                                                                                                                                                                                                                                                                |       |         |               |                    | 3    | 12      |
| <b>UNIT 4 CO4:</b> Understand XML and describe its role in an n-tier database-driven application.                                                                                                                                                                                                                                                                           |       |         |               |                    | 4    | 12      |
| <b>UNIT 5 CO5:</b> Identify which parts of an application project utilize XML markup and edit existing XML and also its protocols.                                                                                                                                                                                                                                          |       |         |               |                    | 5    | 12      |
| <b>SYLLABUS</b>                                                                                                                                                                                                                                                                                                                                                             |       |         |               |                    |      |         |
| <b>UNIT - I</b>                                                                                                                                                                                                                                                                                                                                                             |       |         |               |                    |      |         |
| Database applications and the Web – The Web – Three tier Architecture – PHP Scripting language – Introducing PHP – Condition and Branches – Loops.                                                                                                                                                                                                                          |       |         |               |                    |      |         |
| <b>UNIT - II</b>                                                                                                                                                                                                                                                                                                                                                            |       |         |               |                    |      |         |
| Functions – Types – User defined functions – Example: Arrays, Strings and Advanced Data Manipulation in PHP – Regular Expression, Dates and Times, Integers and Floats - Introduction to Object Oriented Programming with PHP – Classes and Objects, Inheritance, Throwing and Catching Exceptions.                                                                         |       |         |               |                    |      |         |
| <b>UNIT - III</b>                                                                                                                                                                                                                                                                                                                                                           |       |         |               |                    |      |         |
| SQL and Mysql – Database Basics, MySQL Command Interpreter, Managing Databases and Tables, Inserting, Updating, and Deleting Data, Querying with SQL SELECT, Join Queries – Querying with Databases- Querying a MYSQL Database Using PHP, Processing User Input – Pear – Validation and rich controls. The calendar control – formatting the calendar – restricting         |       |         |               |                    |      |         |

the dates – Validation – the validation controls – the validation process – the validator classes – Understanding regular expressions – literals and metacharacters – State management – The problem of state – Viewstate – Transferring Information – Custom cookies – Session State – Session stateconfiguration.

**UNIT-IV**

ADO.Net data access – about the ADO.NET examples, SQL Basics - accessing data - creating connection - using a command with data reader - updating data - accessing disconnected data - selecting multiple tables - modifying disconnected data - updating disconnected data. data binding – Introducing data binding – single value data binding – repeated value data binding – data binding with databases. Using XML - XML hidden role in .NET - XML explained - XML classes - XML validation - XML display and transforms - XML inADO.Net.

**UNIT-V**

Web services architecture - WSDL - SOAP - Web service discovery & UDDI - Creating web services – web service Basics - stock quote web service - documenting web service – Testing - Web services data types - ASP.Net intrinsic objects - other web service options - Using web services –consuming a web service-using a proxy class - example with terra service - windowsclients.

**TEXT BOOKS**

Web Database Applications with PHP and MySQL.By Hugh. E. Williams & David Lane, II-Edition, SPD-Oreilly.

2. The Complete Reference - ASP.Net, Mathew MacDonald - Tata McGraw Hill, 2008.

UNIT I – Text Book 1 - Chapter 1, 2.1 to 2.3

UNIT II – Text Book 1 – Chapter 2.4 to 2.8, Chapters 3, 4

UNIT–III– Text Book 1 – Chapter 5, 6,7  
Text Book 2 - Chapter 9, 10.

UNIT – IV – Text Book 2 - Chapter 13, 14,17.

UNIT –V– Text Book 2 - Chapter 18, 19,20.

**REFERENCE BOOKS:**

1. ASP.Net VB.Net Web Programming, Matt.J.Crouch - PearsonEducation.

2. ASP.Net for Developers - Michael Amundsen PaulLitwin

| UNITS  | TOPIC                               | LECTURE HOURS | MODE OF TEACHING |
|--------|-------------------------------------|---------------|------------------|
| UNIT 1 |                                     |               |                  |
|        | Database applications and the Web – | 4             | Black Board      |
|        | The Web – Three tier                | 4             | Black Board      |

|          |                                                                                                                                                                                                                                                                   |   |             |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|          | Architecture – PHP Scripting language –                                                                                                                                                                                                                           |   |             |
|          | Introducing PHP – Condition and Branches – Loops.                                                                                                                                                                                                                 | 4 | Black Board |
| UNIT 11  |                                                                                                                                                                                                                                                                   |   |             |
|          | Functions – Types – User defined functions – Example: Arrays, Strings and Advanced DataManipulation in PHP –                                                                                                                                                      | 4 | Black Board |
|          | Regular Expression, Dates and Times, Integers and Floats -                                                                                                                                                                                                        | 4 | PPT         |
|          | Introduction to Object Oriented Programming with PHP – Classes and Objects, Inheritance, Throwing and Catching Exceptions.                                                                                                                                        | 4 | Black Board |
| UNIT III |                                                                                                                                                                                                                                                                   |   |             |
|          | SQL and Mysql – Database Basics, MySQL Command Interpreter, Managing Databases and Tables, Inserting, Updating, and Deleting Data, Querying with SQL SELECT, Join Queries – Querying with Databases- Querying a MYSQL Database Using PHP, Processing User Input – | 4 | Black Board |
|          | Pear – Validation and rich controls. The calendar control – formatting the calendar – restricting the dates – Validation – the validation controls – the validation process – the validator classes – U                                                           | 4 | Black Board |
|          | Understanding regular expressions – literals and metacharacters – State management – The problem of state – Viewstate – Transferring Information – Custom cookies – Session State – Session state configuration.                                                  | 4 | Black Board |
| UNIT IV  |                                                                                                                                                                                                                                                                   |   |             |
|          | ADO.Net data access – about the ADO.NET examples, SQL                                                                                                                                                                                                             | 4 | Black Board |

|               |                                                                                                                                                                                                                                                                                                        |   |             |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|               | Basics - accessing data - creating connection - using a command with data reader - updating data - accessing disconnected data -data binding with databases. Using XML - XML hidden role in .NET<br>- XML explained - XML classes<br>- XMLvalidation<br>- XML display and transforms - XML in ADO.Net. |   |             |
|               | selecting multiple tables - modifying disconnected data - updating disconnected data. data binding – Introducing data binding – single valuedata binding – repeated value data binding –                                                                                                               | 4 | PPT         |
|               | data binding with databases. Using XML - XML hidden role in .NET - XML explained - XML classes - XMLvalidation<br>- XML display and transforms - XML in ADO.Net.                                                                                                                                       | 4 | Black Board |
| <b>UNIT V</b> |                                                                                                                                                                                                                                                                                                        |   |             |
|               | Web services architecture - WSDL - SOAP - Web service discovery & UDDI - Creating web services – web service Basics - stock quote web service - documenting web service                                                                                                                                | 4 | Black Board |
|               | Testing - Web services data types - ASP.Net intrinsicobjects<br>- other web service options - Using web services–                                                                                                                                                                                      | 4 | Black Board |
|               | consuming a web service - using a proxy class - example with terra service - windowsclients.                                                                                                                                                                                                           | 4 | PPT         |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.3                |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 4     | 2     | 3.7                |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 4                                  | 4     | 2     | 4     | 5     | 4     | 1     | 3.4                |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 5     | 2     | 3.5                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.6                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.6                |

| Mapping                                                                           | 1-20%     | 21-40%  | 41-60%                                                                                   | 61-80%  | 81-100%   |
|-----------------------------------------------------------------------------------|-----------|---------|------------------------------------------------------------------------------------------|---------|-----------|
| Scale                                                                             | 1         | 2       | 3                                                                                        | 4       | 5         |
| Relation                                                                          | 0.0-1.0   | 1.1-2.0 | 2.1-3.0                                                                                  | 3.1-4.0 | 4.1-5.0   |
| Quality                                                                           | Very Poor | Poor    | Moderate                                                                                 | High    | Very High |
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ |           |         | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |         |           |

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications.

**Programme: M.C.A**  
**Semester : III**  
**Sub.Code : CC2**

**PartIII: Core**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits : 4**

**TITLE OF THE PAPER: PYTHON PROGRAMMING**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 4       | -             | 1                  | -   |

**PREAMBLE:**

To enable the students to learn the basic functions, principles and concepts of Python Programming.

| <b>COURSE OUTCOME</b>                                                                                                                | Unit | Hrs P/S |
|--------------------------------------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                                                             |      |         |
| <b>UNIT 1 CO1:</b> To design and develop simple Python programs.                                                                     | 1    | 12      |
| <b>UNIT 2 CO2:</b> Understand object oriented programming                                                                            | 2    | 12      |
| <b>UNIT 3 CO3:</b> Understand principles of Python                                                                                   | 3    | 12      |
| <b>UNIT4CO4:</b> learn the concepts of LISTs Understand the pros and cons on scripting languages vs. classical programming languages | 4    | 12      |
| <b>UNIT 5 CO5:</b> using file concepts Understand how Python can be used for application development as well as quick programming    | 5    | 12      |

**SYLLABUS**

**UNIT-I:**

**Introduction:** Getting started with Python –Elementary programming: Writing a simple Program –Reading Input from the Console- Identifiers –Variables, Assignment and Expressions – Simultaneous Assignments –Named Constants –Numeric Data Types and operators – Evaluating Expressions and operator precedence –Type conversions and Rounding.

**UNIT-II:**

**Functions, Strings and objects :**Common Python functions –Strings and Characters – Introduction to Objects and strings –**Selections:** Boolean Types ,values and Expressions – If statements –Two way if-else statements –Nested If and Multi-way if-elif-else statements- Logical operators –conditional expressions.

**UNIT-III:**

**Loops:** while loop – for loop –nested loop – Minimizing numerical errors –Functions:

Defining function –calling function – functions with/without return values **Objects and Classes**  
: Defining classes for objects – Immutable objects vs. Mutable objects –Hiding data fields –class abstraction and encapsulation.

**UNIT-IV:**

**Lists:** List basics – copying lists – passing Lists to Functions –Returning a List from a function- Inheritance and polymorphism: Super classes and sub classes – overriding methods – object class- polymorphism and dynamic binding.

**UNIT-V:**

**Files and Exception Handling:** Text input and output – File Dialogs- Exception Handling.

**TEXT BOOKS**

Y. Daniel Liang, “Introduction to Programming using Python”, PHI Publications 2013.

**REF. BOOK(S):**

1. David Beazley, Brian K Jones “Python CookBook”, O’Reily 2013
2. Michael Dawson, “Python programming for the absolute beginners”, Cengage Learning 2010.

**E-LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/106/106106145/>

| UNITS   | TOPIC                                                                                                                             | LECTURE HOURS | MODE OF TEACHING |
|---------|-----------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT 1  |                                                                                                                                   |               |                  |
|         | <b>Introduction:</b> Getting started with Python –Elementary programming: Writing a simple Program                                | 4             | Black Board      |
|         | Reading Input from the Console- Identifiers –Variables, Assignment and Expressions – Simultaneous Assignments – Named Constants – | 4             | Black Board      |
|         | Numeric Data Types and operators –Evaluating Expressions and operator precedence –Type conversions and Rounding.                  | 4             | PPT              |
| UNIT 11 |                                                                                                                                   |               |                  |

|                 |                                                                                                                                                                                                                       |   |             |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|                 | <b>Functions, Strings and objects :</b><br>Common Python functions –<br>Strings and Characters                                                                                                                        | 4 | Black Board |
|                 | Introduction to Objects and<br>strings                                                                                                                                                                                | 4 | PPT         |
|                 | <b>Selections:</b> Boolean Types<br>,values and Expressions – If<br>statements –Two way if-else<br>statements –Nested If and Multi-<br>way if-elif-else statements-<br>Logical operators –conditional<br>expressions. | 4 | Black Board |
| <b>UNIT III</b> |                                                                                                                                                                                                                       |   |             |
|                 | <b>Loops:</b> while loop – for loop –<br>nested loop – Minimizing<br>numerical errors                                                                                                                                 | 4 | Black Board |
|                 | Functions: Defining function –<br>calling function – functions<br>with/without return values                                                                                                                          | 4 | Black Board |
|                 | <b>Objects and Classes :</b> Defining<br>classes for objects – Immutable<br>objects vs. Mutable objects –<br>Hiding data fields –class<br>abstraction and encapsulation.                                              | 4 | PPT         |
| <b>UNIT IV</b>  |                                                                                                                                                                                                                       |   |             |
|                 | <b>Lists:</b> List basics – copying lists –<br>passing Lists to Functions –<br>Returning a List from a function-                                                                                                      | 4 | Black Board |
|                 | Inheritance and polymorphism:<br>Super classes and sub classes                                                                                                                                                        | 4 | Black Board |
|                 | – overriding methods –object<br>class- polymorphism and<br>dynamicbinding.                                                                                                                                            | 4 | Black Board |
| <b>UNIT V</b>   |                                                                                                                                                                                                                       |   |             |
|                 | <b>Files and ExceptionHandling:</b><br>Text input and output                                                                                                                                                          | 4 | Black Board |
|                 | <b>Files and Exception Handling:–</b><br>File Dialogs                                                                                                                                                                 | 4 | Black Board |
|                 | <b>Files and ExceptionHandling:</b><br>Exception Handling.                                                                                                                                                            | 4 | Black Board |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 5    | 4    | 2    | 4                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.3                |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 5     | 2     | 3.8                |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 4                                  | 4     | 3     | 4     | 5     | 4     | 1     | 3.5                |
| CO4                   | 4                        | 3    | 4    | 4    | 2    | 5                                  | 4     | 2     | 4     | 4     | 4     | 2     | 3.3                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 4     | 2     | 3.6                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.52               |

| Mapping                                                                           | 1-20%     | 21-40%  | 41-60%                                                                                   | 61-80%  | 81-100%   |
|-----------------------------------------------------------------------------------|-----------|---------|------------------------------------------------------------------------------------------|---------|-----------|
| Scale                                                                             | 1         | 2       | 3                                                                                        | 4       | 5         |
| Relation                                                                          | 0.0-1.0   | 1.1-2.0 | 2.1-3.0                                                                                  | 3.1-4.0 | 4.1-5.0   |
| Quality                                                                           | Very Poor | Poor    | Moderate                                                                                 | High    | Very High |
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ |           |         | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |         |           |

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications

**Programme: M.C.A**  
**Semester : III**  
**Sub.Code : CC3**

**PartIII: Core**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits :4**

**TITLE OF THE PAPER: DIGITAL IMAGE PROCESSING**

| Pedagogy                                                                                                                                                                                                                                                                                               | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT  |         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|---------------|--------------------|------|---------|
|                                                                                                                                                                                                                                                                                                        | 5     | 4       | -             | 1                  | -    |         |
| <b>PREAMBLE:</b>                                                                                                                                                                                                                                                                                       |       |         |               |                    |      |         |
| <ul style="list-style-type: none"> <li>• . To learn the image formation model and various representations of animage.</li> <li>• To inculcate the processing techniques on the image and featureextraction.</li> <li>• To learn the image segmentation and various analysismethodologies.</li> </ul>   |       |         |               |                    |      |         |
| <b>COURSE OUTCOME</b>                                                                                                                                                                                                                                                                                  |       |         |               |                    | Unit | Hrs P/S |
| At the end of the Semester, the Students will be able to                                                                                                                                                                                                                                               |       |         |               |                    |      |         |
| <b>UNIT 1 CO1:</b> Review the fundamental concepts of a digital image processing system.                                                                                                                                                                                                               |       |         |               |                    | 1    | 12      |
| <b>UNIT 2 CO2:</b> Analyze images in the frequency domain using various transforms.                                                                                                                                                                                                                    |       |         |               |                    | 2    | 12      |
| <b>UNIT 3 CO3:</b> Evaluate the techniques for image enhancement and image restoration in color image processing.                                                                                                                                                                                      |       |         |               |                    | 3    | 12      |
| <b>UNIT 4 CO4:</b> Understand the wavelet and Morphological operations and its applications                                                                                                                                                                                                            |       |         |               |                    | 4    | 12      |
| <b>UNIT 5 CO5:</b> Image segmentation and pattern class identifications for high level processing.                                                                                                                                                                                                     |       |         |               |                    | 5    | 12      |
| <b>SYLLABUS</b>                                                                                                                                                                                                                                                                                        |       |         |               |                    |      |         |
| <b>UNIT-I Introduction:</b>                                                                                                                                                                                                                                                                            |       |         |               |                    |      |         |
| Digital Image Processing- Simple image formation - Image Sampling and Quantization- Basic relationships between pixels - Histogram processing.                                                                                                                                                         |       |         |               |                    |      |         |
| <b>UNIT-II Filtering, Restoration and Reconstruction:</b>                                                                                                                                                                                                                                              |       |         |               |                    |      |         |
| Sampling and the Fourier transform of sampled functions: Sampling- Fourier transform of sampled functions. Filtering in the frequency domain - Image Smoothing and Image Sharpening using frequency domain filters – Restoration in Noise – Spatial Filtering - Image Reconstruction from projections. |       |         |               |                    |      |         |
| <b>UNIT-III Color Image Processing:</b>                                                                                                                                                                                                                                                                |       |         |               |                    |      |         |
| Color fundamentals - Color models - Pseudo color image processing - Full color image processing - Color transformations - Smoothing and Sharpening- Image Segmentation based on Color.                                                                                                                 |       |         |               |                    |      |         |
| <b>UNIT-IV Wavelets and Morphological Image Processing:</b>                                                                                                                                                                                                                                            |       |         |               |                    |      |         |
| Wavelet transforms in one dimension and two dimensions - The Fast Wavelet Transform - Erosion and Dilation - Opening and Closing - Hit or Miss transformation - Basic Morphological algorithm - Gray ScaleMorphology.                                                                                  |       |         |               |                    |      |         |
| <b>UNIT-V Segmentation and Object Recognition:</b>                                                                                                                                                                                                                                                     |       |         |               |                    |      |         |
| Fundamentals - Point, Line and Edge detection – Thresholding - Region based Segmentation - Segmentation using Morphological Watersheds- Motion in Segmentation -                                                                                                                                       |       |         |               |                    |      |         |

Patterns and Pattern classes - Recognition based on decision theoretic methods.

**TEXT BOOKS**

Rafael C.Gonzalez, Richard E.Woods, “Digital Image Processing”, Prentice Hall 3<sup>rd</sup> Edition, 2008.

UNIT 1: 1.1, 2.3.4, 2.4, 2.5, 3.3

UNIT 2: 4.3: 4.3.1, 4.3.2, 4.7.3, 4.8, 4.9, 5.3, 5.11

UNIT 3: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7

UNIT 4: 7.3, 7.4, 7.5, 9.2, 9.3, 9.4, 9.5, 9.6

UNIT 5: 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 12.1, 12.2

**REFERENCES BOOK(S):**

1. Rafael C.Gonzalez, Richard E.Woods, Steven L.Eddins, “Digital Image Processing Using MATLAB”, Prentice Hall, 2004.
2. Bernd Jahne, “Digital Image Processing”, Springer, 5<sup>th</sup> revised edition.
3. [Jayaraman S](#), [Veerakumar T](#), [Esakkirajan S](#), DIGITAL IMAGE PROCESSING, McGraw Hill, 2009.
4. [Poonam Yadav](#), [Abhishek Yadav](#), Digital Image Processing, University Science Press, 2010.
5. Wilhelm Burger, Mark J Burge, Digital Image Processing, Springer, 2008.

**E-LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/105/106105032/>

| UNITS   | TOPIC                                                                                                                                          | LECTURE HOURS | MODE OF TEACHING |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT 1  |                                                                                                                                                |               |                  |
|         | Digital Image Processing- Simple image formation - Image Sampling and Quantization- - Histogram processing.                                    | 4             | Black Board      |
|         | Basic relationships between pixels                                                                                                             | 4             | Black Board      |
|         | Histogram processing.                                                                                                                          | 4             | PPT              |
| UNIT 11 |                                                                                                                                                |               |                  |
|         | Sampling and the Fourier transform of sampled functions: Sampling- Fourier transform of sampled functions. Filtering in the frequency domain - | 4             | Black Board      |
|         | Image Smoothing and Image Sharpening using frequency domain filters –                                                                          | 4             | Black Board      |
|         | Restoration in Noise – Spatial Filtering - Image Reconstruction from projections.                                                              | 4             | PPT              |

| UNIT III |                                                                                                                                              |   |                   |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------|---|-------------------|
|          | Color fundamentals - Color models - Pseudo color image processing                                                                            | 4 | Black Board       |
|          | Full color image processing - Color transformations - Smoothing and Sharpening                                                               | 4 | PPT               |
|          | Image Segmentation based on Color.                                                                                                           | 4 | Black Board       |
| UNIT IV  |                                                                                                                                              |   |                   |
|          | Wavelet transforms in one dimension and two dimensions - The Fast Wavelet Transform - Basic Morphological algorithm - Gray Scale Morphology. | 4 | Black Board       |
|          | Erosion and Dilatation - Opening and Closing - Hit or Miss transformation -                                                                  | 4 | PPT               |
|          | Basic Morphological algorithm - Gray Scale Morphology.                                                                                       | 4 | Black Board       |
| UNIT V   |                                                                                                                                              |   |                   |
|          | Fundamentals - Point, Line and Edge detection – Thresholding - Region based Segmentation -                                                   | 4 | Black Board       |
|          | Segmentation using Morphological Watersheds - Motion in Segmentation -                                                                       | 4 | Black Board       |
|          | Patterns and Pattern classes - Recognition based on decision theoretic methods.                                                              | 4 | PPT web materials |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 3    | 5                                  | 4     | 2     | 5     | 3     | 4     | 2     | 3.5                |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 4     | 2     | 3.7                |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 4                                  | 4     | 2     | 5     | 5     | 4     | 3     | 3.8                |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 5     | 2     | 3.6                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.7                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.7                |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications .

**Programme: M.C.A**  
**Semester : III**  
**Sub.Code : ECC1**

**PartIII: Elective**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits: 5**

**TITLE OF THE PAPER: HUMAN RESOURCE MANAGEMENT**

| Pedagogy                                                                                                                                                                                                                                                                                       | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT  |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|---------|---------------|--------------------|------|---------|
|                                                                                                                                                                                                                                                                                                | 5     | 4       | -             | 1                  | -    |         |
| <b>PREAMBLE:</b>                                                                                                                                                                                                                                                                               |       |         |               |                    |      |         |
| To develop skills on Human Resource Management Activities.                                                                                                                                                                                                                                     |       |         |               |                    |      |         |
| <b>COURSE OUTCOME</b>                                                                                                                                                                                                                                                                          |       |         |               |                    | Unit | Hrs P/S |
| At the end of the Semester, the Students will be able to                                                                                                                                                                                                                                       |       |         |               |                    |      |         |
| <b>UNIT 1 CO1:</b> Contribute to the development, implementation, and evaluation of employee recruitment, selection, and retention plans and processes.                                                                                                                                        |       |         |               |                    | 1    | 12      |
| <b>UNIT 2 CO2:</b> Manage own professional development and provide leadership to others in the achievement of ongoing competence in human resources professional practice.                                                                                                                     |       |         |               |                    | 2    | 12      |
| <b>UNIT 3 CO3:</b> Develop, implement, and evaluate employee orientation, training, and development programs.                                                                                                                                                                                  |       |         |               |                    | 3    | 12      |
| <b>UNIT 4 CO4:</b> Develop, implement, and evaluate organizational development strategies aimed at promoting organizational effectiveness.                                                                                                                                                     |       |         |               |                    | 4    | 12      |
| <b>UNIT 5 CO5:</b> Manage own professional development and provide leadership to others in the achievement of ongoing competence in human resources professional practice.                                                                                                                     |       |         |               |                    | 5    | 12      |
| <b>SYLLABUS</b>                                                                                                                                                                                                                                                                                |       |         |               |                    |      |         |
| <b>UNIT I</b>                                                                                                                                                                                                                                                                                  |       |         |               |                    |      |         |
| Introduction – importance of HRM – functions – qualities of HR manager – evolution and growth of HRM – trends and opportunities – HRM in global environment – legal and ethical context – laws for discriminatory practices – equal opportunity employment.                                    |       |         |               |                    |      |         |
| <b>UNIT II</b>                                                                                                                                                                                                                                                                                 |       |         |               |                    |      |         |
| HR policies – need, type and scope – human resource planning – job analysis – recruiting goals – recruiting sources – global perspective – selection process – pre-employment testing – interviews – job offers – hiring mistakes – key element for successfulpredicators.                     |       |         |               |                    |      |         |
| <b>UNIT III</b>                                                                                                                                                                                                                                                                                |       |         |               |                    |      |         |
| Socialization – new employee orientation, training, development – organizational development – methods – evaluating training – international training and development issues – career development – value for organization and individual – mentoring and coaching – traditional careerstages. |       |         |               |                    |      |         |
| <b>UNIT IV</b>                                                                                                                                                                                                                                                                                 |       |         |               |                    |      |         |
| Appraisal process – methods – factors distort appraisal – team appraisal – international                                                                                                                                                                                                       |       |         |               |                    |      |         |

appraisal – rewards – Theories of motivation – compensation administration – job evaluation and a pay structure – special cases of compensation – executive compensation programs – employee benefits.

**UNIT V**

Occupational safety and health act – issues – stress – assistance program – labor management – employee unions – labor legislation. Promotion, demotion, transfer and separation – employee grievances – redressal methods.

**TEXT BOOKS**

1. Decenzo and Robbins, Human Resource Management, Wilsey, 10<sup>th</sup> edition, 2012.
2. Mamorica C.B. and Mamoria.S., Personnel Management, Himalaya Publishing Company, 1997.

**REFERENCE BOOK(S)**

1. Mirza S. Saiyadain Human Resource Management, Tata McGraw Hill, 4<sup>th</sup> edition 2009
2. Euence Mckenna and Nic Beach Human Resource Management, Pearson Education Limited, 2002.

**E-LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/122/105/122105020/>

| UNITS   | TOPIC                                                                                                                                                                               | LECTURE HOURS | MODE OF TEACHING |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT 1  |                                                                                                                                                                                     |               |                  |
|         | Introduction – importance of HRM – functions – qualities of HR manager – evolution and growth of HRM.                                                                               | 4             | Black Board      |
|         | – trends and opportunities – HRM in global environment – legal and ethical context                                                                                                  | 4             | Black Board      |
|         | laws for discriminatory practices – equal opportunity employment.                                                                                                                   | 4             | Black Board      |
| UNIT 11 |                                                                                                                                                                                     |               |                  |
|         | HR policies – need, type and scope – human resource planning – job analysis – recruiting goals – interviews – job offers – hiring mistakes – key element for successful predictors. | 4             | PPT              |
|         | recruiting sources – global perspective – selection process – pre-employment testing –                                                                                              | 4             | Black Board      |
|         | interviews – job offers – hiring                                                                                                                                                    | 4             | Black Board      |

|          |                                                                                                                                                                                                    |   |             |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|          | mistakes – key element for successfulpredicators.                                                                                                                                                  |   |             |
| UNIT III |                                                                                                                                                                                                    |   |             |
|          | Socialization – new employee orientation, training, development – organizational development – methods .                                                                                           | 4 | Black Board |
|          | evaluating training – international training and development issues – career development                                                                                                           | 4 | PPT         |
|          | value for organization and individual – mentoring and coaching – traditional career stages.                                                                                                        | 4 | Black Board |
| UNIT IV  |                                                                                                                                                                                                    |   |             |
|          | Appraisal process – methods – factors distort appraisal – team appraisal – internationalappraisal – rewards — special cases of compensation – executive compensation programs – employee benefits. | 4 | Black Board |
|          | Theories of motivation – compensation administration – job evaluation and a paystructure                                                                                                           | 4 | PPT         |
|          | special cases of compensation – executive compensation programs – employee benefits.                                                                                                               | 4 | Black Board |
| UNIT V   |                                                                                                                                                                                                    |   |             |
|          | Occupational safety and health act – issues – stress – assistance program                                                                                                                          | 4 | PPT         |
|          | labor management – employee unions – labor legislation. Promotion, demotion, transfer and separation                                                                                               | 4 | Black Board |
|          | employee grievances – redressal methods.                                                                                                                                                           | 4 | Black Board |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 2                        | 4    | 2    | 4    | 3    | 5                                  | 4     | 2     | 2     | 3     | 4     | 4     | 3.3                |
| CO2                   | 2                        | 5    | 2    | 4    | 4    | 4                                  | 5     | 3     | 2     | 2     | 4     | 3     | 3.4                |
| CO3                   | 2                        | 5    | 2    | 5    | 4    | 4                                  | 4     | 2     | 2     | 3     | 4     | 4     | 3.46               |
| CO4                   | 2                        | 3    | 2    | 5    | 3    | 5                                  | 4     | 2     | 2     | 2     | 5     | 5     | 3.4                |
| CO5                   | 1                        | 5    | 2    | 5    | 4    | 5                                  | 4     | 3     | 2     | 2     | 4     | 4     | 3.46               |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       | 3.41  |                    |

| Mapping                                                                           | 1-20%     | 21-40%  | 41-60%                                                                                   | 61-80%  | 81-100%   |
|-----------------------------------------------------------------------------------|-----------|---------|------------------------------------------------------------------------------------------|---------|-----------|
| Scale                                                                             | 1         | 2       | 3                                                                                        | 4       | 5         |
| Relation                                                                          | 0.0-1.0   | 1.1-2.0 | 2.1-3.0                                                                                  | 3.1-4.0 | 4.1-5.0   |
| Quality                                                                           | Very Poor | Poor    | Moderate                                                                                 | High    | Very High |
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ |           |         | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |         |           |

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications

**Programme: M.C.A**  
**Semester : III**  
**Sub.Code : ECC2**

**PartIII: Elective**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits: 5**

**TITLE OF THE PAPER: ARTIFICIAL INTELLIGENCE**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 4     |         |               |                    |     |

**PREAMBLE:**

To Introduce the basic principles, techniques, and applications of Artificial Intelligence. To address difficulties by utilising Artificial Intelligence technologies. To provide an overview of the ideas of Styles of Learning and Planning.

**COURSE OUTCOME**

At the end of the Semester, the Students will be able to

| Unit | Hrs P/S |
|------|---------|
|      |         |
|      |         |
|      |         |
|      |         |
|      |         |
|      |         |

**UNIT 1 CO1:** Analyze the Fundamentals of Artificial Intelligence

**UNIT 2 CO2:** Learns about Predictive Calculus and Knowledge Representation.

**UNIT 3 CO3:** Becomes acquainted with Depth searches and Problem Backtracking.

**UNIT 4 CO4:** Recognizes the importance of knowledge inference.

**UNIT 5 CO5:** Learns the fundamentals of planning and the many styles of learning.

**SYLLABUS**

**UNIT - I:**

**Introduction:** Introduction to Artificial Intelligence, Intelligence Problems and AI techniques, Solving problems by searching, Problem Formulation. Intelligent Agents: Structure of Intelligent agents, Types of Agents, Agent Environments PEAS representation for an Agent. Un informed Search Techniques: DFS. BFS, Uniform cost search.

**UNIT – II:**

Depth Limited Search, iterative Deepening, Bidirectional search, Comparing Different Techniques. Informed Search Methods; Heuristic functions, Hill Climbing, Simulated Annealing, Best First Search, A\*, IDA\*, SMA\*, Crypto Arithmetic Problem, Backtracking for CSP, Performance Evaluation. 6 Adversarial Search: Game Playing, Min-Max Search, Alpha Beta Pruning.

**UNIT - III:**

**Knowledge and Reasoning:** A Knowledge Based Agent, WUMPUS 08 WORLD Environment, Propositional Logic, First Order Predicate Logic, Forward and Backward Chaining, Resolution. , Introduction to PROLOG.

**UNIT - IV:**

**Planning:** Introduction to Planning, Planning with State Space Search, Partial Ordered planning. Hierarchical Planning, Conditional Planning, Planning with Operators. Uncertain Knowledge and Reasoning: Uncertainty, Representing Knowledge in an Uncertain Domain, Conditional Probability, Joint Probability, Bays theorem, Belief Networks, Simple Inference in Belief Networks.

**UNIT - V:**

**Learning:** Learning from Observation, General Model of Learning Agents, Inductive Learning, Learning Decision Trees, Rote Learning, Learning by Advice, Learning in Problem Solving, Explanation based Learning. Expert Systems: Representing and using Domain Knowledge, Expert System-shell, Explanation, Knowledge Acquisition.

**Reference Books:**

1. Elaine Rich, Kevin Knight, Shivshankar B Nair, Artificial Intelligence, McGraw Hill, 3rd Edition.
2. Elaine Rich, Kevin Knight, Artificial intelligence, Tata McGraw Hill, 2nd Edition. University of Mumbai, Information Technology).
3. George Luger, .AI-Structures and Strategies for Complex Problem. Solving., 4/e, 2002, Pearson Education.
4. Nils J, Nilsson, Principles of Artificial Intelligence, Narosa Publication.  
Patrick H. Winston, Artificial Intelligence. 3rd edition, Pearson Education,
5. Deepak Khemani, A First Course in Artificial Intelligence, McGraw Hill Publication.

**E-RESOURCES**

1. <https://www.ibm.com/in-en/cloud/learn/what-is-artificial-intelligence>
2. <https://www.javatpoint.com/artificial-intelligence-tutorial>
3. <https://www.javatpoint.com/knowledge-representation-in-ai>
4. <https://www.javatpoint.com/search-algorithms-in-ai>
5. [https://en.wikipedia.org/wiki/Partial-order\\_planning](https://en.wikipedia.org/wiki/Partial-order_planning)
6. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-fall-2010/tutorials>.

**Programme: M.C.A**  
**Semester : III**  
**Sub.Code : ECC3**

**PartIII: Elective**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits: 5**

**TITLE OF THE PAPER: SOFT COMPUTING**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDEOS/TUTORIAL | ICT |
|          | 5     | 4       | -             | 1                  | -   |

**PREAMBLE:**

- To focus on the major components of soft computing components–Neural Networks, Fuzzy Logic, and Genetic Algorithms.
- Detailed explanation of Soft computing concepts
- To study on various Artificial Neural Network architectures
- Description on Fuzzy Logic techniques and Genetic Algorithms

| <b>COURSE OUTCOME</b>                                                                                                                       |  | Unit | Hrs P/S |
|---------------------------------------------------------------------------------------------------------------------------------------------|--|------|---------|
| At the end of the Semester, the Students will be able to                                                                                    |  |      |         |
| <b>UNIT 1 CO1:</b> Evaluate various techniques of soft computing to defend the best working solutions.                                      |  | 1    | 12      |
| <b>UNIT 2 CO2:</b> Understand the basic construction of ANN and its different types of network structure.                                   |  | 2    | 12      |
| <b>UNIT 3 CO3:</b> Apply Soft computing techniques to solve character recognition, pattern classification, regression and similar problems. |  | 3    | 12      |
| <b>UNIT 4 CO4:</b> Understand the application development in fuzzy systems                                                                  |  | 4    | 12      |
| <b>UNIT 5 CO5:</b> Understand the application development using Genetic Algorithms .                                                        |  | 5    | 12      |

**SYLLABUS**

**UNIT-I**

Neural Networks: Introduction: Neural Networks – Application Scope of Neural Networks - Fuzzy Logic - Genetic Algorithm - Hybrid Systems - Soft Computing.

Artificial Neural Network: An Introduction - Fundamental Concept - Evolution of Neural Networks - Basic Models of Artificial Neural Network - Important Terminologies of ANNs - McCulloch-Pitts Neuron.

**UNIT-II**

Neural Networks : Supervised Learning Neural Network: Perception networks – Adaline - Back Propagation Network – Radial basis function network - Bidirectional Associative Memory Network, Kohonen Self-Organizing Feature Map

**UNIT-III**

Fuzzy Logic : Introductions to Fuzzy Logic, Classical Sets, and Fuzzy Sets: Introduction to Fuzzy logic - Classical Sets – Operations on Classical sets, Properties of Classical Sets, Function Mapping of Classical Sets, Fuzzy Sets – Fuzzy Set Operations, Properties of Fuzzy Sets. Classical Relations and Fuzzy Relations: Fuzzy Relations - Tolerance and Equivalence Relations Membership Functions: Introduction -Features of the

Membership Functions –Fuzzification -Methods of Membership Value Assignments.

**UNIT-IV**

Fuzzy Logic : Defuzzification: Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Defuzzification Methods – Max-Membership Principle, Centroid Method, Weighted Average Method, Mean-Max Membership, Center of Sums, Center of Largest Area, First of Maxima (Last of Maxima) Genetic Algorithm: Introduction, Genetic Algorithm and Search Space – Search Space, Genetic Algorithms World, Evolution and Optimization, Evolution and Genetic Algorithms Basic definitions and terminology, Set theoretic operations, Fuzzy sets, Fuzzy relations, tolerance and equivalence relations, membership functions, defuzzification Fuzzy, decisionmaking.

**UNIT-V**

Genetic Algorithms: Terminologies - General Genetic Algorithm, Operators in Genetic Algorithm –Encoding, Selection, Crossover, Mutation – Stopping Condition for Genetic Algorithm Flow – Hybrid Genetic Algorithms – Genetic Programming – The Production System, The Bucket Brigade Algorithm, Rule Generation, Genetic Programming – Applications of Genetic Algorithm.

**TEXT BOOKS**

1. Principles of Soft Computing, Second Edition by S. N. Sivanandam, S. N. Deepa, Wiley India Publications,2011.

**REFERENCES BOOKS:**

1. Godberg, David E., “Genetic Algorithms in Search, Optimization and Machine Learning”, Addison-Wesley, NewDelhi.
2. Timothy J Ross, “Fuzzy Logic with Engineering Application” Tata McGraw Hill, New Delhi2006.

UNIT I : Chapters 1, 2.1,2.3, 2.4, 2.5

UNIT II: Chapters 3.2, 3.3, 3.5, 3.6, 4.5, 5.3

UNIT III: Chapters 7, 8.4, 8.5, 9

UNIT IV: Chapters 10, 15.1, 15.4

UNIT V: Chapters 15.6, 15.8, 15.9, 15.10, 15.14.3, 15.16, 15.18

**E-LEARNING RESOUCES:**

1. <https://nptel.ac.in/courses/106/105/106105173/>

| UNITS  | TOPIC                                                                                                                  | LECTURE HOURS | MODE OF TEACHING |
|--------|------------------------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT 1 |                                                                                                                        |               |                  |
|        | Neural Networks:<br>Introduction: Neural Networks – Application<br>Scope of Neural Networks -<br>Fuzzy Logic - Genetic | 4             | Black Board      |

|                 |                                                                                                                                                                                                                                                                                                                                    |   |                     |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---------------------|
|                 | Algorithm - Hybrid Systems -                                                                                                                                                                                                                                                                                                       |   |                     |
|                 | Soft Computing.<br>Artificial Neural Network: An Introduction - Fundamental Concept - Evolution of Neural Networks                                                                                                                                                                                                                 | 4 | Black Board         |
|                 | Basic Models of Artificial Neural Network - Important Terminologies of ANNs - McCulloch-Pitts Neuron.                                                                                                                                                                                                                              | 4 | PPT – Web materials |
| <b>UNIT 11</b>  |                                                                                                                                                                                                                                                                                                                                    |   |                     |
|                 | Neural Networks : Supervised Learning Neural Network: Perception networks – Adaline - Bidirectional Associative Memory Network, KohonenSelf-Organizing FeatureMap                                                                                                                                                                  | 4 | Black Board         |
|                 | Back Propagation Network – Radial basis function network -                                                                                                                                                                                                                                                                         | 4 | Black Board         |
|                 | Bidirectional Associative Memory Network, Kohonen Self-Organizing Feature Map                                                                                                                                                                                                                                                      | 4 | Black Board         |
| <b>UNIT III</b> |                                                                                                                                                                                                                                                                                                                                    |   |                     |
|                 | Fuzzy Logic : Introductions to Fuzzy Logic, Classical Sets, and Fuzzy Sets: Introduction to Fuzzy logic - Classical Sets – Operations on Classical sets, Properties of Classical Sets, Relations Membership Functions: Introduction - Features of the Membership Functions –Fuzzification- Methods of Membership ValueAssignments. | 4 | Black Board         |
|                 | Function Mapping of Classical Sets, Fuzzy Sets – Fuzzy Set Operations, Properties of Fuzzy Sets. Classical Relations and Fuzzy Relations: Fuzzy Relations - Tolerance and Equivalence                                                                                                                                              | 4 | PPT                 |
|                 | Relations Membership Functions: Introduction -                                                                                                                                                                                                                                                                                     | 4 | Black Board         |

|         |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |             |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|         | Features of the Membership Functions –Fuzzification - Methods of Membership Value Assignments.                                                                                                                                                                                                                                                                                                                                                      |   |             |
| UNIT IV |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |             |
|         | Fuzzy Logic : Defuzzification: Introduction, Lambda-Cuts for Fuzzy Sets (Alpha-Cuts), Lambda-Cuts for Fuzzy Relations, Defuzzification Methods – Max-Membership Principle, Centroid Method, Weighted Average Method, Mean-Max Membership, Center of Sums, Center of Largest Area, First of Maxima (Last of Maxima) , Fuzzy sets, Fuzzy relations, tolerance and equivalence relations, membership functions, defuzzification Fuzzy, decisionmaking. | 4 | Black Board |
|         | Genetic Algorithm: Introduction, Genetic Algorithm and Search Space – Search Space, Genetic Algorithms World, Evolution and Optimization, Evolution and Genetic Algorithms Basic definitions and terminology, Set theoretic operations                                                                                                                                                                                                              | 4 | PPT         |
|         | , Fuzzy sets, Fuzzy relations, tolerance and equivalence relations, membership functions, defuzzification Fuzzy, decisionmaking.                                                                                                                                                                                                                                                                                                                    | 4 | Black Board |
| UNIT V  |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |   |             |
|         | Genetic Algorithms: Terminologies - General Genetic Algorithm, Operators in Genetic Algorithm –                                                                                                                                                                                                                                                                                                                                                     | 4 | Black Board |
|         | Encoding, Selection, Crossover, Mutation – Stopping Condition for Genetic Algorithm Flow–                                                                                                                                                                                                                                                                                                                                                           | 4 | Black Board |

|  |                                                                                                                                                      |   |     |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|
|  | Hybrid Genetic Algorithms –                                                                                                                          |   |     |
|  | Genetic Programming – The Production System, The Bucket Brigade Algorithm, Rule Generation, Genetic Programming – Applications of Genetic Algorithm. | 4 | PPT |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.33               |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 4     | 2     | 3.7                |
| CO3                   | 4                        | 5    | 4    | 5    | 1    | 4                                  | 4     | 2     | 4     | 5     | 4     | 1     | 3.26               |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 5     | 2     | 5     | 4     | 5     | 2     | 3.66               |
| CO5                   | 4                        | 5    | 4    | 5    | 1    | 5                                  | 4     | 3     | 5     | 4     | 4     | 1     | 3.46               |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.49               |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications .

**Programme: M.C.A**  
**Semester : III**  
**Sub.Code : CL5**

**PartIII: Practical**  
**Hours : 5 P/W 75 HrsP/S**  
**Credits : 3**

**TITLE OF THE PAPER: PYTHON PROGRAMMINGLAB**

| Pedagogy | Hours | PracticalLab | TUTORIAL | ICT |
|----------|-------|--------------|----------|-----|
|          | 5     | 4<br>-       | 1        | -   |

**PREAMBLE:**

The basic aim of this paper is to develop the programming skill to the students to solve the problems using Python .

**COURSE OUTCOME**

At the end of the Semester, the Students will be able to

CO1 : Able to write simple python program with a study of working environment .

CO2 : understanding the concepts of OOPs Implementations

CO3 : develop a application using GUI

**LAB CYCLE:**

1. Write a program that asks the user to enter a series of positive numbers (The user should enter a negative number to signal the end of the series) and the program should display the numbers in order and their sum.
2. Write a program to find the product of twomatrices.
3. Write recursive and non-recursive functions for thefollowing:
  - a. To find GCD of twointegers.
  - b. To find the factorial of positiveinteger
  - c. To print Fibonacci Sequence up to given numbern.
4. Write a program that writes a series of random numbers to a file from 1 to n anddisplay.
5. Write a program to reverse a string word byword.
6. Write a program to create file, write the content and display the contents of the file with each line preceded with a line number (start with 1) followed by acolon.
7. Write a program that opens a specified text file and then displays a list of all the unique words found in the file. (Store each word as an element of aset.)
8. Write a program to implement the Inheritance and DynamicPolymorphism.
9. Write a GUI program that displays your details when a button isclicked.
10. Write a GUI program that converts Celsius temperatures to Fahrenheittemperatures.

**E-LEARNING RESOURCES:**

1. <https://www.studytonight.com/python/>
2. [http://spoken-tutorial.org/tutorial-search/?search\\_foss=Python&search\\_language=English](http://spoken-tutorial.org/tutorial-search/?search_foss=Python&search_language=English)

**Programme: M.C.A**  
**Semester : III**  
**Sub.Code : CL6**

**PartIII: Practical**  
**Hours : 5 P/W 75 HrsP/S**  
**Credits :3**

**TITLE OF THE PAPER: Enterprise WEB APPLICATION LAB**

| Pedagogy | Hours | PracticalLab | TUTORIAL | ICT |
|----------|-------|--------------|----------|-----|
|          | 5     | 4            | 1        | -   |

**PREAMBLE:**

- To enrich knowledge about web database applications and programming skills with PHP and MYSQL.
- To validate the form before submitting it to server using validators.
- To maintain the state of a website using ASP.NET.
- To illustrate data binding concepts
  - (i) connected model
  - (ii) disconnected model
  - (iii) repeated data binding of ASP.NET
- To create and manipulate the XML documents.
- To create the web services using ASP.NET and using it at clientside

**COURSE OUTCOME**

At the end of the Semester, the Students will be able to

CO1 : understand the concepts of PHP programming

CO2 : able to develop a web site

**LAB CYCLE**

**PHP & MYSQL**

1. Write a PHP Coding for:
  - i. Create a TimesTable
  - ii. Use Include File Concept
  
2. Write a PHP Coding to handle:
  - i. Global Variable
  - ii. Static Variable
  
3. Write a PHP Coding for:
  - i. Pass by Reference
  - ii. Handling Default Parameter

4. Write a PHP Coding to handle ArrayFunctions:
  - i. Counting number of elements
  - ii. Finding Min, and Max
  - iii. Explode and Implode
  - iv. Sorting
  - v. Cm to inch calculation for all array element
  
5. Write a PHP Coding to handle StringFunctions:
  - i. Padding
  - ii. Change Case
  - iii. Trimming
  - iv. Finding the Positions of Characters
  - v. Handling Substring
  - vi. Handling String Replace
  
6. Write a PHP Coding for handling Constructor.
7. Write a PHP Coding for handling Destructor
8. Write a PHP Coding for handling Private Member Function.
9. Write a PHP Coding for handling Static Member Variables.
10. Write a PHP Coding for handling Inheritance.
  11. Write a PHP Coding for Exception handling.
  12. Write a PHP Coding to connect PHP with MYSQL using PEAR.
  13. Write a PHP Coding for database connectivity (PHP & MYSQL).
  14. Write a PHP Coding for database connectivity (PHP & MYSQL) with error handling.
  15. Write a PHP Coding for database connectivity (PHP & MYSQL) and format the output.
  16. Write a PHP Coding for database connectivity (PHP & MYSQL) using template concept.
  17. Write a PHP Coding to pass parameter to PHP using HTML forms, Hyperlinks, and Browser.

## **ASP.NET LAB CYCLE**

### **WORKING WITH WEB CONTROLS**

1. Creation of online shopping website using label, list, combo, text and table web controls

### **WORKING WITH HOT SPOT**

2. Creating HOT SPOT in image and linking an image with many webpages

### **WORKING WITH DATA BASE**

3. Student Mark list processing
4. Employee Pay roll processing
5. Working with disconnected data model

### **DATA BINDING CONCEPT**

6. Working with repeated data binding concept

### **WORKING WITH FILES**

6. Working with file & directory supporting concepts

### **WORKING WITH XML**

6. Creation of XML, Searching for a tag & binding XML data in data grid

### **WEB SERVICES**

6. Arithmetic operations
7. Temperature conversion

### **WORKING WITH AJAX AND ADROTATOR CONTOL**

6. Illustrate the use of AJAX in showing advertisements in repeated way based on weightage assigned to each advertisement.

### **WORKING WITH VALIDATOR CONTROLS**

6. Validating values entered by the user in bio-data form

### **WORKING WITH STATE MANAGEMENT SUPPORT OF .NET**

6. Creation and using cookies in banking application
7. Transferring information and preparing ticket in flight reservation system.
8. Creating session for every user and maintains his state information.

**Programme: M.C.A**  
**Semester : IV**  
**Sub.Code : CD1**

**Part III: Core**  
**Hours : 5 P/W 60 Hrs P/S**  
**Credits : 4**

**TITLE OF THE PAPER: DATA WAREHOUSING AND MINING**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 4       | -             | 1                  | -   |

**PREAMBLE:**

To enable the students to understand the essence of data warehousing and mining and explore the various underlying techniques.

| <b>COURSE OUTCOME</b>                                                                                                               | Unit | Hrs P/S |
|-------------------------------------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                                                            |      |         |
| <b>UNIT 1 CO1:</b> Understand the functionality of the various data mining and data warehousing component Knowledge                 | 1    | 12      |
| <b>UNIT 2 CO2:</b> Identify the scope and necessity of <b>Data Mining &amp; Warehousing</b> for the society and real time problems. | 2    | 12      |
| <b>UNIT 3 CO3:</b> To develop ability to design various algorithms based on <b>data mining tools</b> .                              | 3    | 12      |
| <b>UNIT 4 CO4:</b> able to describe different methodologies used in data mining and data ware housing pattern and classifications.  | 4    | 12      |
| <b>UNIT 5 CO5:</b> Learn and apply different methods of cluster analysis.                                                           | 5    | 12      |

**SYLLABUS**

**UNIT I**

Introduction: What Is Data Mining? – What Kind of Data can be mined? - What Kind of Patterns can be mined? – Which Technologies are used? – Major Issues in Data Mining. Getting to know your data: Data Objects and Attribute Types – Basic Statistical Description of Data.

**UNIT II**

Data Preprocessing: An Overview – Data Cleaning – Data Integration – Data Reduction – Data Transformation and Data Discretization.

Data Warehousing and Online Analytical Processing: Basic Concepts – Data Warehouse Modeling: Data Cube and OLAP - Data Warehouse Implementation – Data Generalization by Attribute-Oriented Induction.

Data Cube Technology: Data Cube Computation: Preliminary Concepts – Data Cube Computation Methods.

**UNIT III**

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and methods: Basic Concepts – Frequent Item set Mining Methods – Which Patterns Are Interesting? – Pattern Evaluation Methods.

Advanced Pattern Mining: Pattern Mining: A Road Map – Pattern Mining in Multilevel, Multidimensional Space – Constraint-Based Frequent Pattern Mining.

**UNIT IV**

Classification: Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule-Based Classification – Model Evaluation and Selection – Techniques to Improve Classification Accuracy.

Classification: Advanced Methods: Bayesian Belief Networks – Classification by Back

Propagation – Support Vector Machines – Classification Using Frequent Patterns – Lazy Learners (or Learning From Your Neighbors) – Other Classification Methods – Additional Topics Regarding Classification.

**UNIT V**

Cluster Analysis: Basic Concepts and Methods: Cluster Analysis – Partitioning Methods – Hierarchical Methods – Density-Based Methods – Grid-Based Methods – Evaluation of Clustering.

Outlier Detection: Outliers And Outlier Analysis – Outlier Detection Methods – Statistical Approaches – Proximity-Based Approaches – Clustering Based Approaches – Classification Based Approaches.

**TEXT BOOKS**

1. Data Mining Concepts and Techniques – Jiawei Han, MichelineKamber& Jain Pei, Morgan Kaufmann Publishers, Third edition 2012.  
Chapters: 1.2 – 1.7, 2.1, 2.2, 3.1- 3.5, 4.1, 4.2, 4.4, 4.5, 5.1, 5.2, 6.1 – 6.3, 7.1 – 7.3, 8.1 – 8.6, 9.1 – 9.7, 10.1 – 10.6, 12.1 – 12.6.

**REFERENCE BOOKS:**

1. Usama M. Farrad, GeogoryPiatetsky – Shapiro, padhrai Smyth and RamasamyUthurusamy, “Advances in Knowledge Discovery and Data Mining”, The M.I.T.press.
2. Ralph Kimball, “The Data Warehouse Life Cycle Toolhit”, John Wiley & Sons Inc.
3. Sean Kelly, “Data warehousing in Action”, John Wiley & Sons Inc.
4. K.P. Soman, “ShyamDiwakar, V. Ajay “Insights into data Mining”, Theory and Practice, PHI Publications Eastern Economy Edition 6<sup>th</sup> Printing, 2012.

**E-LEARNING RESOUCES:**

1. <https://nptel.ac.in/courses/106/105/106105174/>

| UNITS   | TOPIC                                                                                                                                    | LECTURE HOURS | MODE OF TEACHING |
|---------|------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT 1  |                                                                                                                                          |               |                  |
|         | Introduction: What Is Data Mining? – What Kind of Data can be mined? - What Kind of Patterns can be mined? –Which Technologies are used? | 4             | Black Board      |
|         | – Major Issues in Data Mining. Getting to know your data: Data Objects and Attribute Types                                               | 4             | PPT              |
|         | Basic Statistical Description of Data.                                                                                                   | 4             | Black Board      |
| UNIT 11 |                                                                                                                                          |               |                  |
|         | Data Preprocessing: AnOverview – Data Cleaning – Data Integration – Data Reduction – Data Transformation and Data                        | 4             | Black Board      |

|          |                                                                                                                                                                                                        |   |             |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|          | Discretization.                                                                                                                                                                                        |   |             |
|          | Data Warehousing and Online Analytical Processing: Basic Concepts – Data Warehouse Modeling: Data Cube and OLAP - Data Warehouse Implementation – Data Generalization by Attribute-Oriented Induction. | 4 | Black Board |
|          | Data Cube Technology: Data Cube Computation: Preliminary Concepts – Data Cube Computation Methods.                                                                                                     | 4 | Black Board |
| UNIT III |                                                                                                                                                                                                        |   |             |
|          | Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and methods: Basic Concepts – Frequent Item set Mining Methods                                                                | 4 | Black Board |
|          | Which Patterns Are Interesting? – Pattern Evaluation Methods.                                                                                                                                          | 4 | PPT         |
|          | Advanced Pattern Mining: Pattern Mining: A Road Map – Pattern Mining in Multilevel, Multidimensional Space – Constraint-Based Frequent Pattern Mining.                                                 | 4 | Black Board |
| UNIT IV  |                                                                                                                                                                                                        |   |             |
|          | Classification: Basic Concepts – Decision Tree Induction – Bayes Classification Methods – Rule-Based Classification – Model Evaluation and Selection – Techniques to Improve Classification Accuracy.  | 4 | Black Board |
|          | Classification: Advanced Methods: Bayesian Belief Networks – Classification by Back Propagation – Support Vector Machines                                                                              | 4 | Black Board |
|          | Classification Using Frequent Patterns – Lazy Learners (or Learning From Your Neighbors) – Other Classification Methods – Additional Topics Regarding Classification.                                  | 4 | PPT         |

|        |                                                                                                                                                                                       |   |             |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
| UNIT V |                                                                                                                                                                                       |   |             |
|        | Cluster Analysis: Basic Concepts and Methods: Cluster Analysis – Partitioning Methods – Hierarchical Methods – Density-Based Methods – Grid-Based Methods – Evaluation of Clustering. | 4 | Black Board |
|        | Outlier Detection: Outliers And Outlier Analysis – Outlier Detection Methods – Statistical Approaches                                                                                 | 4 | PPT         |
|        | – Proximity-Based Approaches – Clustering Based Approaches – Classification Based Approaches.                                                                                         | 4 | Black Board |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 5                        | 4    | 5    | 4    | 2    | 5                                  | 4     | 2     | 5     | 4     | 4     | 1     | 3.5                |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 2     | 4     | 5     | 4     | 2     | 3.6                |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 4                                  | 4     | 3     | 4     | 5     | 4     | 1     | 3.6                |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 5     | 2     | 5     | 4     | 5     | 2     | 3.6                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.6                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.6                |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications .

**Programme: M.C.A**  
**Semester : IV**  
**Sub.Code : ECD1**

**PartIII: Elective**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits : 5**

**TITLE OF THE PAPER: MOBILE COMPUTING**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 4       | -             | 1                  | -   |

**PREAMBLE:**

To enrich knowledge about Mobile Communications Concepts of:

- Several Media Access Schemes
- Different Wireless Communication Systems
- Mobile IP, the extension of the Internet Protocol into Mobile domain, Ad-hoc networks with these requirements for specific routing protocols.
- Transmission Control Protocol
- WAP standard that enables Wireless and Mobile devices to use parts of the WWW from today's Fixed Internet

| <b>COURSE OUTCOME</b>                                                                                                              | Unit | Hrs P/S |
|------------------------------------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                                                           |      |         |
| <b>UNIT 1 CO1:</b> To understand the concept of cellular communication                                                             | 1    | 12      |
| <b>UNIT 2 CO2:</b> Knowledge of GSM mobile communication standard, its architecture, logical channels, advantages and limitations. | 2    | 12      |
| <b>UNIT 3 CO3:</b> To understand the basics of universal wireless communication standards .                                        | 3    | 12      |
| <b>UNIT 4 CO4:</b> Understand the mobile network layer with IP addressing                                                          | 4    | 12      |
| <b>UNIT 5 CO5:</b> Understand the Mobile communication transport layer structure for application programming.                      | 5    | 12      |

**SYLLABUS**

**UNIT - I**

INTRODUCTION: Medium access control – Motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA, Satellite systems – History, Basics – GEO, LEO, MEO – Routing – Localization – Handover – Examples..

**UNIT - II**

Telecommunication Systems: GSM – Mobile services, System architecture, Radio Interface, Protocols, Localization and calling, Handover, Security, New data services, DECT – System architecture, Protocol architecture, TETRA.

**UNIT - III**

STANDARDS: Wireless LAN: Infra red Vs radio transmission, Infrastructure and ad-hoc network - IEEE 802.11 – System architecture, Protocol architecture, Physical Layer, Medium

Access Control Layer, MAC management, 802.11b, 802.11a.

**UNIT – IV**

Mobile Network Layer: Mobile IP – Goals, assumptions and requirements, Entities and terminology, IP packet delivery, Agent Discovery, Registration, Tunneling and Encapsulation, Optimizations, Reverse Tunneling, IPv6, IP micro-mobility support, Dynamic Host Configuration Protocol – Mobile Ad-Hoc networks – Routing, Destination sequence distance vector, Dynamic source routing, alternative metrics, overview of ad-hoc routing protocols.

**UNIT - V**

Mobile Transport Layer: Traditional TCP – Classical TCP Improvements – Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit / Fast Recovery, Transmission / Time – out freezing, Selective retransmission, Transaction-oriented TCP

Wireless Application Protocol: Architecture, Wireless Datagram Protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment.

**TEXT BOOKS**

1. Jochen Schiller, Mobile Communications, Second Edition, Addison Wesley, 2003 (Eleventh Impression, 2013)

UNIT I: Chapters 3,5      UNIT II: Chapters 4.1 –4.3

UNIT III: Chapters 7.1 - 7.3    UNIT IV: Chapters 8    UNIT V: Chapters 9.1,9.2, 10.3.1-10.3.6

**REF. BOOK**

1. William C.Y.Lee, Mobile Communication Design Fundamentals, John Wiley.

**E-LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/106/106106147/>

| UNITS   | TOPIC                                                                                                             | LECTURE HOURS | MODE OF TEACHING |
|---------|-------------------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT I  |                                                                                                                   |               |                  |
|         | INTRODUCTION: Medium access control – Motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA, Satellite systems | 4             | Black Board      |
|         | History, Basics – GEO, LEO, MEO – Routing –                                                                       | 4             | Black Board      |
|         | Localization – Handover – Examples..                                                                              | 4             | PPT              |
| UNIT II |                                                                                                                   |               |                  |
|         | Telecommunication Systems: GSM – Mobile services, System architecture, Radio Interface,                           | 4             | Black Board      |

|          |                                                                                                                                                                                                               |   |             |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|          | Protocols, Localization and calling, Handover, Security, New data services, DECT –                                                                                                                            | 4 | Black Board |
|          | System architecture, Protocol architecture, TETRA.                                                                                                                                                            | 4 | Black Board |
| UNIT III |                                                                                                                                                                                                               |   |             |
|          | STANDARDS: Wireless LAN: Infra red Vs radio transmission, Infrastructure and ad-hoc network,                                                                                                                  | 4 | Black Board |
|          | IEEE 802.11 – System architecture, Protocol architecture, Physical Layer,                                                                                                                                     | 4 | PPT         |
|          | Medium Access Control Layer, MAC management, 802.11b, 802.11a.                                                                                                                                                | 4 | Black Board |
| UNIT IV  |                                                                                                                                                                                                               |   |             |
|          | Mobile Network Layer: Mobile IP – Goals, assumptions and requirements, Entities and terminology, IP packet delivery, Agent Discovery, Registration, –                                                         | 4 | Black Board |
|          | Tunneling and Encapsulation, Optimizations, Reverse Tunneling, IPv6, IPmicro-mobility support, Dynamic Host Configuration Protocol                                                                            | 4 | Black Board |
|          | Mobile Ad-Hoc networks – Routing, Destination sequence distance vector, Dynamic source routing, alternative metrics, overview of ad-hoc routing protocols.                                                    | 4 | Black Board |
| UNIT V   |                                                                                                                                                                                                               |   |             |
|          | Mobile Transport Layer: Traditional TCP – Classical TCP Improvements – Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit / Fast Recovery, Transmission / Time – out freezing, Selective retransmission, | 4 | Black Board |
|          | Transaction-oriented TCP Wireless Application Protocol: Architecture, Wireless Datagram                                                                                                                       | 4 | Black Board |

|  |                                                                                             |   |     |
|--|---------------------------------------------------------------------------------------------|---|-----|
|  | Protocol, Wireless transport layer security,                                                |   |     |
|  | Wireless transaction protocol, Wireless session protocol, Wireless application environment. | 4 | PPT |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.3                |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 4     | 2     | 3,7                |
| CO3                   | 4                        | 5    | 4    | 5    | 2    | 4                                  | 4     | 2     | 4     | 5     | 4     | 1     | 3.5                |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 5     | 2     | 3.6                |
| CO5                   | 4                        | 5    | 5    | 5    | 2    | 5                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.7                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.6                |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of Cos}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer

**Programme: M.C.A**  
**Semester : IV**  
**Sub.Code : ECD2**

**Part III: Elective**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits :5**

**TITLE OF THE PAPER: PRINCIPLES OF COMPILER DESIGN**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 4       | -             | -                  | 1   |

**PREAMBLE:**

- To learn about basics of Translators, and Programming Language concepts.
- To understand the concepts of various phases of compilers: Lexical Analysis, Syntax Analysis, Semantic Analysis, Intermediate Code generation, Code Optimization, Code generation, Book keeping and Error detection and correction methods.

| <b>COURSE OUTCOME</b>                                                                                                              | Unit | Hrs P/S |
|------------------------------------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                                                           |      |         |
| <b>UNIT 1 CO1:</b> To study the The design aspects of a typical Compiler .                                                         | 1    | 12      |
| <b>UNIT 2 CO2:</b> Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.                    | 2    | 12      |
| <b>UNIT 3 CO3:</b> Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars.                | 3    | 12      |
| <b>UNIT 4 CO4:</b> Design different types of Push down Automata as Simple Parser. And Design different types of Turing Machine     | 4    | 12      |
| <b>UNIT5CO5:</b> Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars with symboltable. | 5    | 12      |

**SYLLABUS**

**UNIT - I**

Introduction to Compilers: Compilers and Translators – Why do we need translators – The structure of a compiler – Lexical Analysis – Syntax Analysis – Intermediate code generation – Optimization – Code generation – Book keeping – Error handling - Programming Languages: High-level programming languages – definitions of programming languages – The lexical and syntactic structure of a language – Data elements – Data structures – Operators – Assignment – Statements – Program units – Data environments – Parameter transmission – Storage management.

**UNIT - II**

Finite Automata and Lexical Analysis: The role of the lexical analyzer – A simple approach to the design of lexical analyzers – Regular expressions – Finite automata – From regular expressions to finite automata – Minimizing the number of states of a DFA – A language for specifying lexical analyzers.

**UNIT - III**

The Syntactic specification of Programming Languages: Context-free grammars – Derivations and parse trees – Capabilities of context-free grammars - Basic Parsing Techniques: Parsers –

Shift-reduce parsing – Operator-precedence parsing – Top-down parsing – Predictive parsers.

**UNIT - IV**

Syntax-Directed Translation: Syntax-directed translation schemes – Implementation of syntax-directed translators – Intermediate code – Postfix notation – Parse trees and syntax trees – Three-address code, quadruples, and triples – Translation of assignment statements – Boolean expressions – Statements that alter the flow of control – Postfix translations – Translation with top-down parser.

**UNIT - V**

Symbol Tables: The contents of a symbol table – Data structures for symbol tables – Representing scope information - Introduction to Code Optimization: The principal sources of optimization – Loop optimization – The DAG representation of basic blocks.

**TEXT BOOKS**

Principles of Compiler Design by Alfred V.Aho Jeffrey D.Ullman, Narosa Publishing House, New Delhi, Reprint 2002.

UNIT-I : Chapters: 1.1 - 1.10, 2.1-2.12      UNIT-II : Chapter 3.1to 3.7      UNIT-III: Chapters: 4.1 - 4.3, 5      UNIT IV : Chapter 7      UNIT-V: Chapters: 9, 12.1, 12.2, 12.3.

**REFERENCE BOOKS**

1. Compilers: Principles, Techniques and Tools by Alfred V. Aho, Monica S. Lam, RaviSethi, Jeffrey D. Ullman, Pearson, 2<sup>nd</sup> Edition,2012.
2. Comprehensive Approach to Principles of Compiler Design by A. A. Puntambekar,2012.

**E-LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/105/106105190/>

| UNITS  | TOPIC                                                                                                                                                                                            | LECTURE HOURS | MODE OF TEACHING |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT 1 |                                                                                                                                                                                                  |               |                  |
|        | Introduction to Compilers: Compilers and Translators – Why do we need translators – The structure of a compiler – Lexical Analysis – Syntax Analysis                                             | 4             | Black Board      |
|        | Intermediate code generation – Optimization – Code generation – Book keeping – Error handling - Programming Languages: High-level programming languages – definitions of programming languages – | 4             | Black Board      |
|        | The lexical and syntactic structure of a language – Data elements – Data structures – Operators–                                                                                                 | 4             | Black Board      |

|          |                                                                                                                                                                                |   |                 |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------------|
|          | Assignment – Statements – Program units – Data environments – Parameter transmission – Storage management.                                                                     |   |                 |
| UNIT 11  |                                                                                                                                                                                |   |                 |
|          | Finite Automata and Lexical Analysis: The role of the lexical analyzer –Minimizing the number of states of a DFA – A language for specifying lexical analyzers.                | 4 | Black Board     |
|          | A simple approach to the design of lexical analyzers – Regular expressions – Finite automata – From regular expressions to finite automata –                                   | 4 | ICT – Web notes |
|          | Minimizing the number of states of a DFA – A language for specifying lexical analyzers.                                                                                        | 4 | Black Board     |
| UNIT III |                                                                                                                                                                                |   |                 |
|          | The Syntactic specification of Programming Languages: Context-freegrammars                                                                                                     | 4 | Black Board     |
|          | Derivations and parse trees – Capabilities of context-free grammars -                                                                                                          | 4 | Black Board     |
|          | Basic Parsing Techniques: Parsers – Shift-reduce parsing – Operator-precedence parsing – Top-down parsing – Predictive parsers.                                                | 4 | ICT – Web notes |
| UNIT IV  |                                                                                                                                                                                |   |                 |
|          | Syntax-Directed Translation: Syntax-directed translation schemes – Implementation of syntax-directed translators –                                                             | 4 | Black Board     |
|          | Intermediate code – Postfix notation – Parse trees and syntax trees – Three-address code, quadruples, and triples – Translation of assignment statements – Boolean expressions | 4 | Black Board     |

|        |                                                                                                      |   |                 |
|--------|------------------------------------------------------------------------------------------------------|---|-----------------|
|        | Statements that alter the flow of control – Postfix translations – Translation with top-down parser. | 4 | Black Board     |
| UNIT V |                                                                                                      |   |                 |
|        | Symbol Tables: The contents of a symbol table – Data structures for symbol tables                    | 4 | Black Board     |
|        | Representing scope information - Introduction to Code Optimization:                                  | 4 | Black Board     |
|        | –The principal sources of optimization – Loop optimization – The DAG representation of basic blocks. | 4 | ICT – Web Notes |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 5    | 4    | 4    | 2    | 5                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.4                |
| CO2                   | 5                        | 4    | 5    | 4    | 2    | 4                                  | 5     | 3     | 4     | 5     | 5     | 2     | 3.73               |
| CO3                   | 4                        | 5    | 5    | 5    | 2    | 4                                  | 5     | 2     | 4     | 5     | 4     | 1     | 3.6                |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 4     | 3     | 5     | 4     | 5     | 2     | 3.66               |
| CO5                   | 4                        | 5    | 4    | 5    | 2    | 5                                  | 5     | 2     | 5     | 4     | 4     | 2     | 3.6                |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       |       | 3.6                |

|          |           |         |          |         |           |
|----------|-----------|---------|----------|---------|-----------|
| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications .

**Programme: M.C.A**  
**Semester : IV**  
**Sub.Code : ECD3**

**PartIII: Elective**  
**Hours : 5 P/W 60 HrsP/S**  
**Credits : 5**

**TITLE OF THE PAPER: SOFTWARE ENGINEERING**

|          |       |         |               |                    |     |
|----------|-------|---------|---------------|--------------------|-----|
| Pedagogy | Hours | Lecture | Peer Teaching | GD/VIDOES/TUTORIAL | ICT |
|          | 5     | 4       | -             | 1                  | -   |

**PREAMBLE:**

. To train the students to analyze, estimate, design and implement a new computerized system.

| <b>COURSE OUTCOME</b>                                                                                  | Unit | Hrs P/S |
|--------------------------------------------------------------------------------------------------------|------|---------|
| At the end of the Semester, the Students will be able to                                               |      |         |
| <b>UNIT 1 CO1:</b> Able to understand the problem domain to choose process models and to develop SRS   | 1    | 12      |
| <b>UNIT 2 CO2:</b> Able to measure the product and process performance using various metrics           | 2    | 12      |
| <b>UNIT 3 CO3:</b> Able to analyze, design, verify, validate, implement, and maintain software systems | 3    | 12      |
| <b>UNIT 4 CO4:</b> Able to model software projects using appropriate design notations                  | 4    | 12      |
| <b>UNIT 5 CO5:</b> Able to evaluate the system with various testing techniques and strategies          | 5    | 12      |

**SYLLABUS**

**UNIT - I**

Software and Software Engineering : Software - Characteristics - applications - Software Engineering – A Layered Technology – Linear Sequential Model, The Prototyping Model – The RAD Model – Evolutionary Software Process Models – The Incremental Model – The Spiral model.

**UNIT - II**

Project Management: The Management spectrum – The People – The Product – The Process – The Project. Software Metrics: Measures, Metrics and Indicators – Software measurement – Metrics for Software Quality. Software Project Planning – Project Planning Objectives – Resources software project estimation – Top down estimation – Bottom Up estimation – Automated estimation tools. Risk Analysis and Management : Software Risks – Risk Identification. Project scheduling and Tracking : Basic concepts - Scheduling – Earned valueanalysis.

**UNIT - III**

Software Quality Assurance: Software Quality concepts - Software Quality Assurance – Software Reviews - Formal Technical reviews - Software reliability. System Engineering: The System Engineering Hierarchy – Product Engineering - Requirements Engineering – Analysis concepts and Principles - Requirements Analysis - Analysis principles -Specification

Principles. Analysis Modeling: The elements of the Analysis Model - Data modeling – Data Flow Diagram - Behavioural Modeling – The mechanics of structured Analysis.

#### **UNIT - IV**

Design Concepts and Principles: Software design and Software Engineering – Design concepts - Effective Modular design. Architectural Design: Data Design - Architectural Styles – Component level design – Structured programming - Comparison of design Notations.

#### **UNIT - V**

Software Testing Techniques : White Box Testing - Basis path testing - Control structure testing - Black Box testing. Software Testing Strategies: Unit Testing - Integration Testing - validation testing - System testing.

### **TEXT BOOKS**

1. Software Engineering ( A Practioner's Approach) - Roger. S.Presman. McGraw Hill Publication, International Edition, V-Edn. 2001.

Chapters:

- 1 - 1.2.1, 1.2.2
- 2 - 2.1, 2.4, 2.5, 2.6, 2.7 – 2.7.1, 2.7.2
- 3 - 3.1, 3.2, 3.3, 3.4, 3.5
- 4 – 4.1, 4.3, 4.5
- 5 - 5.2, 5.4, 5.5
- 6 - 6.2, 6.3
- 7 - 7.7, 7.8
- 8 – 8.1, 8.3, 8.4, 8.5, 8.8
- 10 - 10.2, 10.4, 10.5
- 11 - 11.1, 11.3, 11.5.1
- 12 – 12.2, 12.3, 12.4.1, 12.5, 12.6
- 13 - 13.1, 13.4, 13.5
- 14 - 14.2, 14.3
- 16 - 16.1, 16.2
- 17 - 17.3, 17.4, 17.5, 17.6
- 18 - 18.3, 18.4, 18.5, 18.6

2. Software Engineering Concepts – Richard E. Fairley, TATA MCGraw Hill Publication (2001).

Chapters: 3 - 3.2

### **REF. BOOK**

- Software Engineering - Ian Sommerville Addison Wesley Publishing company (1992)

### **E-RESOURCES:**

1. [https://www.tutorialspoint.com/software\\_engineering/index.htm](https://www.tutorialspoint.com/software_engineering/index.htm)
2. <https://www.javatpoint.com/software-engineering-tutorial>
3. <https://www.guru99.com/software-engineering-tutorial.html>
4. <https://www.geeksforgeeks.org/software-engineering>
5. <https://www.tutorialride.com/software-engineering/software-engineering-tutorial.htm>

| UNITS    | TOPIC                                                                                                                                                                                                                                                                                           | LECTURE HOURS | MODE OF TEACHING |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------|
| UNIT I   |                                                                                                                                                                                                                                                                                                 |               |                  |
|          | Software and Software Engineering : Software - Characteristics - applications -                                                                                                                                                                                                                 | 4             | Black Board      |
|          | Software Engineering – A Layered Technology – Linear Sequential Model, The Prototyping Model                                                                                                                                                                                                    | 4             | Black Board      |
|          | The RAD Model – Evolutionary Software Process Models – The Incremental Model – The Spiral model.                                                                                                                                                                                                | 4             | PPT              |
| UNIT II  |                                                                                                                                                                                                                                                                                                 |               |                  |
|          | Project Management: The Management spectrum – The People – The Product – The Process                                                                                                                                                                                                            | 4             | Black Board      |
|          | The Project. Software Metrics: Measures, Metrics and Indicators – Software measurement – Metrics for Software Quality. Software Project Planning – Project Planning Objectives –                                                                                                                | 4             | PPT              |
|          | Resources software project estimation – Top down estimation – Bottom Up estimation – Automated estimation tools. Risk Analysis and Management : Software Risks – Risk Identification. Project scheduling and Tracking : Basic concepts - Scheduling – Earned value analysis.                    | 4             | Black Board      |
| UNIT III |                                                                                                                                                                                                                                                                                                 |               |                  |
|          | Software Quality Assurance: Software Quality concepts - Software Quality Assurance – Software Reviews - Analysis concepts and Principles - Requirements Analysis - Analysis principles - Specification Principles. Analysis Modeling: The elements of the Analysis Model - Data modeling – Data | 4             | Black Board      |

|         |                                                                                                                                                                                                                                                                    |   |             |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-------------|
|         | Flow Diagram - Behavioural Modeling – The mechanics of structured Analysis.                                                                                                                                                                                        |   |             |
|         | Formal Technical reviews - Software reliability. System Engineering: The System Engineering Hierarchy – Product Engineering - Requirements Engineering –                                                                                                           | 4 | Black Board |
|         | Analysis concepts and Principles - Requirements Analysis - Analysis principles - Specification Principles. Analysis Modeling: The elements of the Analysis Model - Data modeling – Data Flow Diagram- Behavioural Modeling – The mechanics of structured Analysis. | 4 | PPT         |
| UNIT IV |                                                                                                                                                                                                                                                                    |   |             |
|         | Design Concepts and Principles: Software design and Software Engineering – Design concepts - Structured programming - Comparison of design Notations.                                                                                                              | 4 | Black Board |
|         | Effective Modular design. Architectural Design: Data Design - Architectural Styles – Component level design–                                                                                                                                                       | 4 | Black Board |
|         | Structured programming - Comparison of design Notations.                                                                                                                                                                                                           | 4 | PPT         |
| UNIT V  |                                                                                                                                                                                                                                                                    |   |             |
|         | Software Testing Techniques : White Box Testing - Basis path testing                                                                                                                                                                                               | 4 | Black Board |
|         | Control structure testing - Black Box testing. Software Testing Strategies: Unit Testing -                                                                                                                                                                         | 4 | Black Board |
|         | Integration Testing - validation testing - System testing.                                                                                                                                                                                                         | 4 | PPT         |

| Course Outcomes (Cos) | Programme Outcomes (Pos) |      |      |      |      | Programme Specific Outcomes (PSOs) |       |       |       |       |       |       | Mean scores of Cos |
|-----------------------|--------------------------|------|------|------|------|------------------------------------|-------|-------|-------|-------|-------|-------|--------------------|
|                       | PO 1                     | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1                              | PSO 2 | PSO 3 | PSO 4 | PSO 5 | PSO 6 | PSO 7 |                    |
| CO1                   | 4                        | 4    | 4    | 4    | 2    | 4                                  | 4     | 2     | 5     | 3     | 4     | 1     | 3.13               |
| CO2                   | 5                        | 5    | 5    | 4    | 2    | 4                                  | 5     | 3     | 4     | 4     | 4     | 2     | 3.6                |
| CO3                   | 4                        | 5    | 4    | 4    | 2    | 4                                  | 4     | 2     | 4     | 5     | 4     | 1     | 3.4                |
| CO4                   | 4                        | 3    | 5    | 5    | 2    | 5                                  | 4     | 2     | 5     | 4     | 5     | 2     | 3.6                |
| CO5                   | 4                        | 4    | 5    | 4    | 2    | 4                                  | 4     | 3     | 5     | 4     | 4     | 2     | 3.46               |
| Mean Overall Score    |                          |      |      |      |      |                                    |       |       |       |       |       | 3.45  |                    |

| Mapping  | 1-20%     | 21-40%  | 41-60%   | 61-80%  | 81-100%   |
|----------|-----------|---------|----------|---------|-----------|
| Scale    | 1         | 2       | 3        | 4       | 5         |
| Relation | 0.0-1.0   | 1.1-2.0 | 2.1-3.0  | 3.1-4.0 | 4.1-5.0   |
| Quality  | Very Poor | Poor    | Moderate | High    | Very High |

|                                                                                   |                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Mean Score of COs = $\frac{\text{Total of Value}}{\text{Total No. of Pos\&PSOs}}$ | Mean Overall Score of COs = $\frac{\text{Total of Mean Score}}{\text{Total No. of COs}}$ |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|

| BLOOM'S TAXANOMY | INTERNAL | EXTERNAL |
|------------------|----------|----------|
| KNOWLEDGE        | 50%      | 50%      |
| UNDERSTANDING    | 30%      | 30%      |
| APPLY            | 20%      | 20%      |

Course Designer: Department of Computer Applications .



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