E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.
(*An Autonomous Institution – Affiliated to Madurai Kamaraj University*)
Re-accredited (**3rd Cycle**) with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF COMPUTER APPLICATIONS

CBCS with OBE

MASTER OF COMPUTER APPLICATIONS

PROGRAMME CODE - OMC

COURSE STRUCTURE

(w.e.f. 2022 – 2023 Batch onwards)

Annexure - 3

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI-14.

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CBCS with OBE

DEPARTMENT OF COMPUTER APPLICATIONS - PG

(w.e.f. 2022-2023 Batch onwards)

VISION

To achieve brilliance in Professional Education. To make students as Software Professionals with strong understanding in essentials andshine in latest technologies

MISSION

- To develop innovative ideas, talents, problem solving skills, leadership quality among thestudents.
- To create industrial interaction to improve the entrepreneurship skills.
- To teach the students with latest trends, tools and technologies.
- To strengthening the attitudes and soft skills of the students and encourage resource based projects to the students.

Programme Educational Objectives (PEOs) : M.C.A

PEO	On Completion of the Programme , the student will be able to
PEO1	Utilizing strong technical aptitude and domain knowledge to develop smart software solutions for the upliftment of society.
PEO2	To equip the students to meet the requirement of Corporate world and Industry standard .
PEO3	Showing continuous improvement in their professional career through life-long learning, appreciating human values and ethics.
PEO4	To engage in professional development and to pursue post graduate education in the fields of Information Technology and Computer Applications.
PEO5	To provide the students about computing principles and business practices in software solutions, outsourcing services, public and private sectors
PEO6	Create Software systems that meet specified Design and Execution requirements

Annexure - 3

Programme Outcomes (POs) with Graduate Attributes

PO	Graduate Attributes	On Completion of the Programme , the students will be able to
PO1	**Knowledge Base**	Identify and analyze the computing requirements of a problem and to solve those using computing principles.
PO2	**Problem Analysis & Investigation**	Use suitable architecture or platform on design and implementation with respect to performance.
PO3	**Communication Skills & Design.**	Programme is designed in such a way that students are able to code the programs themselves , think logically and execute it.
PO4	**Individual and Team Work**	Apply the management principles with computing knowledge to manage the projects in multidisciplinary environments.
PO5	**Professionalism, Ethics and equity**	Identify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.
PO6	**Life Long Learning**	Expertise in developing application with required domain knowledge

Programme Specific Outcomes (PSOs) with Graduate Attributes

PSO	Graduate Attributes	On Completion of the Programme, the student will be able to
PSO 1	**Knowledge Base**	Develop the skill to apply knowledge of mathematics, computer science and management in practice.
PSO 2	**Problem Analysis & Investigation**	An ability to enhance not only comprehensive understanding of the theory but its application too in diverse field.
PSO 3	**Communication Skills & Design.**	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.
PSO 4	**Individual and Team Work**	Acquire specific Knowledge on various software learned during the course and to develop projects in multidisciplinary environment
PSO 5	**Professionalism, Ethics and equity**	Learn to design a computing system to meet desire needs within realistic constraints in multidisciplinary teams with positive attitude.
PSO 6	**Life Long Learning**	Appreciate the importance of goal setting and to recognize the need for life-long learning .

Annexure - 3

Eligibility for Admission

Qualifying Exam : Candidates should have Bachelor's Degree of three-year duration from any recognized college.

Eligibility : Candidates must have Mathematics at 10+2 or graduation level.

Duration of the Course

The students shall undergo prescribed course of study for the period of two academic years under **CBCS** semester pattern with **O**utcome **B**ased **E**ducation.

Medium of Instruction : English

System : **C**hoice **B**ased **C**redit **S**ystem with **O**utcome **B**ased **E**ducation

Courses of Study with Credit Distribution

Category	No. of Courses	No. of Credits
Core	20	64
Elective	4	16
Inter Disciplinary Course	2	4
Project	1	6
Total	**27**	**90**

Nature of the Course

Courses are classified according to the following nature

1. Knowledge & Skill
2. Employability Oriented
3. Entrepreneurship Oriented

Outcome Based Education (OBE) & Assessment

Students understanding must be built on and assessed for wide range of learning activities, which includes different approaches and are classified along several bases, such as

1. **Based on purpose:**
   - Continuous Internal Assessment - **CIA** (Internal tests, Assignment, Seminar, Quiz, Documentation, ICT based Assignment, Mini Projects administered during the learning process)
   - Summative (Evaluation of students learning at the end of instructional unit)

2. **Based on Domain knowledge: (Post Graduate Up to K5 Levels)**
   - Assessment through K1, K2, K3 , K4 & K5

Evaluation (Theory)

Continuous Internal Assessment Test (CIA)	:	25 Marks
Summative Examination	:	75 Marks
Total	:	100 Marks

Annexure - 3

CIA - Continuous Internal Assessment : 25 Marks

Components	Marks
Test (Average of three tests) (I Assessment Conducted for 30 Marks , II and III Assessments for 60 Marks each and 150 Marks is converted into 15 Marks)	**15**
Assignment	**5**
Seminar	**5**
Total	**25**

- ✓ Centralized system of Internal Assessment Tests
- ✓ There will be three Internal Assessment tests
- ✓ Duration of I Internal Assessment test is 1 hours 30 Minutes and for II and III Assessments will be2 hours 30 Minutes
- ✓ Students shall write retest on the genuine grounds if they are absent in either Test I or Test II or Test III with the approval of Head of the Department

Question Paper Pattern for Continuous Internal Assessment Test I

Section	Marks
A - Multiple Choice Questions (4 x 1 Mark)	4
B - Short Answer (3 x 2 Marks)	6
C - Either Or type (2/4 x 5 Marks)	10
D - Open Choice type (1/ 2 x10 Marks)	10
Total	**30**

Question Paper Pattern for Continuous Internal Assessment Test II and Test III

Section	Marks
A – Multiple Choice Questions (8 x 1Mark)	8
B – Short Answer (6 x 2 Marks)	12
C – Either Or type (4/8 x 5 Marks)	20
D – Open Choice type (2/4 x 10 Marks)	20
Total	**60**

Conducted for 150 Marks and converted into 15 Marks

Question Paper Pattern for Summative Examination:

Section	Marks
A- Multiple Choice Questions type (10 x 1 Mark)	10
B- Short Answer type without choice (5 x 2 Marks)	10
C- Either Or type (5/10 x 5 Marks)	25
D- Open Choice type (3 out of 5 x 10 Marks)	30
Total	**75**

Annexure - 3

Evaluation (Practical)

Internal	:	40 Marks
External (Summative)	:	60 Marks
Total	:	100 Marks

Question Paper Pattern for Internal Practical Examination : 40 Marks and
External Practical Examination : 60 Marks

Internal	
Components	**Marks**
Major Question	20
Minor Question	10
Record Work	5
Program Explanation / VIVA	5
Total	**40**

External	
Components	**Marks**
Major Question	30
Minor Question	20
Record Work	5
Program Explanation / VIVA	5
Total	**60**

- In respect of Summative Examinations passing minimum is **45%** for Post Graduate.
- Latest amendments and revisions as per **UGC** and **TANSCHE** norms are taken into Consideration in Curriculum Preparation.

Annexure - 3

Distribution of Marks in % with K levels CIA I, II, III & External Assessment

Blooms Taxonomy	Internal Assessment			External Assessment
	I	II	III	
Knowledge(K1)	8%	8%	8%	5%
Understanding(K2)	28%	12%	8%	14%
Apply(K3)	44%	40%	24%	27%
Analyze(K4)	20%	40%	40%	27%
Evaluate(K5)	-	-	20%	27%

BLUE PRINT FOR INTERNAL ASSESSMENT - I

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open Choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Up to K 4	2 2	K1 K2	1 1 1	K1 K2 K3	2 (K2) 2(K3) (Each set of questions must be in the same level)	1(K3) 1(K4)	
No. of Questions to be asked			4		3		4	2	13
No. of Questions to be answered			4		3		2	1	10
Marks for each question			1		2		5	10	
Total Marks for each section			4		6		20	20	50

Annexure - 3

BLUE PRINT FOR INTERNAL ASSESSMENT – II

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open Choice)	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 2	Up to K 4	2 2	K1 K2	1 2	K1 K2	2(K3) 2(K4)	1(K3) 1(K4)	
2	CLO 3	Up to K 4	2 2	K1 K2	1 2	K1 K2	2(K3) 2(K4) (Each set of questions must be in the same level)	1(K3) 1(K4)	
No. of Questions to be asked			8		6		8	4	26
No. of Questions to be answered			8		6		4	2	20
Marks for each question			1		2		5	10	
Total Marks for each section			8		12		40	40	100

Annexure - 3

BLUE PRINT FOR INTERNAL ASSESSMENT – III

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No Choice)		Short Answers (No Choice)		(Either or Type)	(Open Choice)	
			No. of Questions	K- Level	No. of Questions	K- Level			
1	CLO 4	Up to K5	2 2	K1 K2	1 1 1	K1 K2 K3	2(K3) 2(K4)	1(K4) 1(K5)	
2	CLO 5	Up to K5	2 2	K1 K2	1 1 1	K1 K2 K3	2(K3) 2(K4)	1(K4) 1(K5)	
No. of Questions to be asked			8		6		8	4	26
No. of Questions to be answered			8		6		4	2	20
Marks for each question			1		2		5	10	
Total Marks for each section			8		12		40	40	100

Annexure - 3

Distribution of Marks with choice K Levels CIA I, CIA II and CIA III

CIA	K Levels	Section- A MCQ (No choice)	Section -B Short Answer (No choice)	Section- C (Either or Type)	Section-D (Open Choice)	Total Marks	% of Marks
I	K1	2	2			4	**8**
	K2	2	2	10	-	14	**28**
	K3		2	10	10	22	**44**
	K4				10	10	**20**
	Marks	**4**	**6**	**20**	**20**	**50**	**100**
II	K1	4	4			8	**8**
	K2	4	8			12	**12**
	K3			20	20	40	**40**
	K4			20	20	40	**40**
	Marks	**8**	**12**	**40**	**40**	**100**	**100**
III	K1	4	4			8	**8**
	K2	4	4			8	**8**
	K3		4	20		24	**24**
	K4			20	20	40	**40**
	K5				20	20	**20**
	Marks	**8**	**12**	**40**	**40**	**100**	**100**

Annexure - 3

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for Internal Assessment (IDC)

Sl. No	CLOs	K- Level	Section A		Section B		Section C	Section D	Total
			MCQs (No choice)		Short Answers (No choice)		(Either/or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Up to K4	2	K1			2(K3&K3)	1(K3)	
2	CLO 2	Up to K4	2	K1			2(K3&K3)	1(K4)	
3	CLO 3	Up to K4			2	K2	2(K4&K4)	1(K4)	
4	CLO 4	Up to K5			2	K2	2(K5&K5)	1(K5)	
5	CLO 5	Up to K5			2	K2		1(K5)	
No. of Questions to be asked			4		3		8	5	20
No. of Questions to be answered			4		3		4	2	13
Marks for each question			1		2		5	10	
Total Marks for each section			4		6		20	20	50 (Marks)

Distribution of Section-wise Marks with K Levels for Internal Assessment (IDC)

K Levels	Section A (MCQ'S) (No choice)	Section B (Short Answer) (No choice)	Section C (Either or Type)	Section D (Open Choice)	Total Marks	% of Marks
K1	4				**4**	**4**
K2		6			**6**	**6**
K3			20	10	**30**	**30**
K4			10	20	**30**	**30**
K5			10	20	**30**	**30**
Total Marks	**4**	**6**	**40**	**50**	**100**	

K1- Remembering and recalling facts with specific answers.
K2- Basic understanding of facts and stating main ideas with general answers.
K3- Application oriented- Solving Problems, Justifying the statement and deriving Inferences.
K4- Examining, analyzing, presentation and make inferences with evidences.
K5- Evaluating, making Judgments based on criteria.

Annexure - 3

Articulation Mapping - K Levels with Course Learning Outcomes (CLOs) for External Assessment

Sl. No	CLOs	K-Level	Section A		Section B		Section C	Section D	Total
			MCQs (No choice)		Short Answers (No choice)		(Either/or Type)	(Open choice)	
			No. of Questions	K-Level	No. of Questions	K-Level			
1	CLO 1	Up to K4	2	K1&K2	1	K1	2 (K2& K2)	1(K3)	
2	CLO 2	Up to K4	2	K1&K2	1	K2	2(K3& K3)	1(K4)	
3	CLO 3	Up to K4	2	K1&K2	1	K3	2 (K3 &K3)	1(K4)	
4	CLO 4	Up to K5	2	K1&K2	1	K4	2 (K4 & K4)	1(K5)	
5	CLO 5	Up to K5	2	K1&K2	1	K5	2 (K5 & K5)	1(K5)	
No. of Questions to beasked			10		5		10	5	30
No. of Questions to be answered			10		5		5	3	23
Marks for each question			1		2		5	10	
Total Marks for each section			10		10		25	30	75 (Marks)

Distribution of Section-wise Marks with K Levels for External Assessment

K Levels	Section A (MCQ'S) (No choice)	Section B (Short Answer) (No choice)	Section C (Either or Type)	Section D (Open Choice)	Total Marks	% of Marks
K1	5	2	-	-	**7**	**5**
K2	5	2	10	-	**17**	**14**
K3	-	2	20	10	**32**	**27**
K4	-	2	10	20	**32**	**27**
K5	-	2	10	20	**32**	**27**
Total Marks	**10**	**10**	**50**	**50**	**120**	**100**

K1- Remembering and recalling facts with specific answers.
K2- Basic understanding of facts and stating main ideas with general answers.
K3- Application oriented- Solving Problems, Justifying the statement and deriving Inferences.
K4- Examining, analyzing, presentation and make inferences with evidences.
K5- Evaluate , making Judgments based on criteria.

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CBCS with OBE

DEPARTMENT OF COMPUTER APPLICATIONS - PG

(w.e.f. 2022-2023 Batch onwards)

COURSE STRUCTURE - SEMESTER WISE

Sem	Category	Course Code	Title of the Course	Teaching Hours / Week	Duration of Exam (hrs)	Marks Allotted			Credits
						CIA	SE	Total	
I	Core	22OPCA11	Mathematical Foundation of Computer Applications	5	3	25	75	100	4
	Core	22OPCA12	Object Oriented Programming using C++	4	3	25	75	100	4
	Core	22OPCA13	Relational Database Management Systems	5	3	25	75	100	4
	Core	22OPCA14	Data Structures and Algorithms	5	3	25	75	100	4
			DSEC - I	5	3	25	75	100	4
	Core	22OPCA11P	Data Structures and Algorithms using C ++Lab	5	3	40	60	100	2
	Core	22OPCA12P	RDBMS Lab	5	3	40	60	100	2
	IDC	22OPCAID1	Front End Web Development	2	3	25	75	100	2
II	Core	22OPCA21	Open Source Technology	5	3	25	75	100	4
	Core	22OPCA22	Advanced Java Programming	5	3	25	75	100	4
	Core	22OPCA23	Software Engineering	4	3	25	75	100	4
			DSEC - II	5	3	25	75	100	4
	Core	22OPCA21P	Open Source Technology Lab	5	3	40	60	100	2
	Core	22OPCA22P	Advanced Java Programming Lab	5	3	40	60	100	2
	IDC	22OPCAID2	E-Commerce	2	3	25	75	100	2
III	Core	22OPCA31	Web Technologies	5	3	25	75	100	4
	Core	22OPCA32	Python Programming	5	3	25	75	100	4
	Core	22OPCA33	Data Communications andNetworking	4	3	25	75	100	4
			DSEC - III	5	3	25	75	100	4

Annexure - 3

	Core	22OPCA31P	Web Technologies Lab	5	3	40	60	100	2
	Core	22OPCA32P	Python Programming Lab	5	3	40	60	100	2
	Core	22OPCA41	Big Data Analytics	4	3	25	75	100	4

Annexure - 3

IV	Core	22OPCA42	Mobile Computing	5	3	25	75	100	4
			DSEC - IV	5	3	25	75	100	4
	Core	22OPCA41P	Dot Net Programming Lab	5	3	40	60	100	2
	Core	22OPCA42P	Networking Lab	5	3	40	60	100	2
	Project	22OPCAPR4	Project - Viva Voce			20	80	100	6
Total				**120**					**90**

DSEC – Discipline Specific Course
IDC - Inter Disciplinary Course

DSEC: Discipline Specific Elective Courses:

Semester I

DSEC – I (Choose any One)

1. Operating Systems - 22OPCADSE1A
2. Enterprise Resource Planning - 22OPCADSE1B

Semester II

DSEC –II (Choose any One)

1. Data Mining and Data Warehousing - 22OPCADSE2A
2. Artificial Intelligence - 22OPCADSE2B

Semester III

DSEC – III (Choose any One)

1. Cryptography and Network Security - 22OPCADSE3A
2. Internet Of Things - 22OPCADSE3B

Semester IV

DSEC – IV (Choose any One)

1. Machine Learning - 22OPCADSE4A
2. Cloud Computing - 22OPCADSE4B

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
I	Core	22OPCA11	Mathematical Foundation of Computer Applications	4	5	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√		

Course Objectives:

1. To learn set theory and Notation.
2. To understand mathematical logic
3. To apply mathematic logic in real world problem
4. To ability to solve problem using probability
5. Graph Theory fundamental applications of those tools in IT industry

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	Set Theory: Introduction – Sets – Notation and Description of sets- Subsets-Venn- Euler Diagram- Operations on Sets, Properties of Set Operations- Verification of the Basic Laws of Algebra by Venn Diagrams- The Principle of Duality.	15	Up to K4	CLO1
II	Mathematical Logic: Introduction – TF Statements- Connectives- Atomic and Compound Statements- Well Formed (statement) Formulae - Truth Table of a Formula- Tautology- Tautological Implications and Equivalence of Formulae- Replacement Process- Functionally Complete Sets of Connectives and Duality Law.	15	Up to K4	CLO2
III	Lattices and Boolean Algebra: Lattices – Some Properties of Lattices – New Lattices- Modular and Distributive Lattices – Boolean Algebras - Boolean Polynomials.	15	Up to K4	CLO3
IV	Random Variables: Probability Function- Discrete and Continuous Random Variable- Probability density			

	Function- Cumulative Distribution Function- Properties of cdf F(x)- Special Distributions- Discrete and Continuous Distributions- Two Dimensional Random Variables-Joint Probability Density Function- Cumulative Distribution Function -Marginal Probability Distribution -Conditional Probability Distribution.	15	Up to K5	CLO4
V	Graph Theory: Basic Concepts Matrix Representation of Graphs – Trees- Spanning Trees- Shortest Path Problem, Directed Trees- Binary Trees- Cut-sets and Cut-vertices Eulerian and Hamiltonian Graphs.	15	Up to K5	CLO5

Books for Study:

1. Discrete Mathematics- M.K. Venkataraman, N.Sridharan, N.Chandrasekaran
2. Probability, Statistics and Random Processes- T.Veerarajan

Chapters :

Unit-I: Chapter I: 1.1 to 1.24

Unit-II: Chapter IX: 9.1 to 9.40

Unit-III: Chapter X: 10.1 to 10.42

Unit-IV: Page No: 33 to 57 (Text Book 2)

Unit-V: Chapter XI: 11.1 to 11.102

Books for Reference:

1) Dr.B.S.Vatsa,Introduction to Real AnalysisCBS publishers&Distributions First Edition ,2002.
2) Russell A.Gordon. Real Analysis, Pearson Pvt Ltd, Second Edition ,2002.
3) S.C.Malik,Principles of Real Analysis, New Age Rnter National (p) ltd Publishers Second Edition ,2008.
4) Shanti Narayan,M.D.Raisnghania, Elements of Real Analysis, (Revised Edition) S.Chand & Company Ltd(An ISO 9001:2000 Company) RAMNAGAR, New Delhi-110 055
5) H.L.Royden,P.M.Fitzpatrick ,Real Analysis,Fourth Edition ,PHI Learning Private Limited, New Delhi, 2011.

Web Resources :

1. https://nptel.ac.in/courses/111/106/11110 053/#053/#
2. https://www.jirka.org
3. https://s2pnd-matematika.fkip.unpatti.ac.id

e-b ooks :

1. http://himsonepat.org/him/wp-content/uploads/2013/06/MCA-SYLLABUS.pdf
2. https://mrcet.com/downloads/digital_notes/IT/MATHEMATICAL%20FOUNDATIONS%20OF%20(R17A0503).pdf
3. http://rgmcet.edu.in/assets/img/departments/CSE/materials/R19/2-1/MFCS.pdf

Pedagogy :

Chalk and Talk, Group Discussion, Student Seminar, Spot Test, Assignments, Quiz.

Rationale for Nature of the Course :

1. To prove a knowledge of set relation and operations
2. Apply logic in real life problem

Activities to be Given :

- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLOs):
On successful Completion of the course Students will be able to

CLO	Course Learning Outcomes	Knowledge Level(According to Bloom's Taxonomy)
CLO1	Understand the basic principles of sets and operation	**Up to K4**
CLO2	Verify the connectness of argument using logical connectives	**Up to K4**
CLO3	To understand lattices an algebraic structure. Perform minimization of Boolean functions	**Up to K4**
CLO4	Demonstrate the ability to solve problems using discrete probability	**Up to K5**
CLO5	Use graphs and trees as tools to visualize and simplify situations	**Up to K5**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

Unit	Description	Hours		Mode of Teaching
I	▪ Introduction – Sets	5	15	Chalk & Talk
	▪ Notation and Description of sets- Subsets-Venn-Euler Diagram- Operations on Sets, Properties of Set Operations.	5		Chalk & Talk Spot Test
	▪ Verification of the Basic Laws of Algebra by Venn Diagrams- The Principle of Duality.	5		Chalk & Talk
II	▪ Introduction – TF Statements- Connectives	5	15	Chalk & Talk
	▪ Atomic and Compound Statements -Well Formed (statement) Formulae – Truth Table of a Formula-Tautology	5		Chalk & Talk, Spot Test
	▪ Tautological Implications and Equivalence of Formulae- Replacement Process- Functionally Complete Sets of Connectives and Duality Law	5		Chalk & Talk
III	▪ Lattices	5	15	Chalk & Talk
	▪ Some Properties of Lattices	5		Chalk & Talk
	▪ New Lattices- Modular and Distributive Lattices – Boolean Algebras - Boolean Polynomials.	5		PowerPoint Presentation
IV	▪ Probability Function- Discrete and Continuous Random Variable- Probability density Function-	5	15	PowerPoint Presentation
	▪ Cumulative Distribution Function- Properties of cdf F(x)- Special Distributions- Discrete and Continuous Distributions	5		PowerPoint Presentation
	▪ Two Dimensional Random Variables-Joint Probability Density Function-Cumulative Distribution Function -Marginal Probability Distribution -Conditional Probability Distribution.	5		Chalk & Talk, Assignment
V	▪ Basic Concepts Matrix Representation of Graphs	5	15	Chalk & Talk
	▪ Trees- Spanning Trees-Shortest Path Problem, Directed Trees	5		PowerPoint Presentation
	▪ Binary Trees- Cut-sets and Cut-vertices Eulerian and Hamiltonian Graphs.	5		Chalk & Talk, Students Seminar

Course Designer
Miss.A.Manikavalli

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
I	Core	22OPCA12	Object Oriented Programming using C++	4	4	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1. The core of the pure object-oriented programming is to create an object, in code, that has certain properties and methods.
2. To learn the fundamental programming concepts and methodologies which are essential to building good C++ programs.
3. To practice the fundamental programming methodologies in the C++ programming language via laboratory experiences.
4. To code, document, test, and implement a well-structured, robust computer program using the C++ programming language.
5. To write reusable modules (collections of functions).

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	Introduction to C++ : Evolution of C++ - The ANSI Standard - Preface to Object-Oriented Programming – Key Concepts of Object-Oriented Programming – Advantages of OOP – Object Oriented Languages – Structure of C++ Program . Input and Output in C++ : Pre-Defined Streams – Stream Classes – Formatted and Unformatted Data – Unformatted Console I/O Operations – Formatted Console I/O Operations — Manipulators – User -Defined Manipulators . C++ Declarations : Tokens – Variable Declaration and Initialization – Data Types in C++ - Scope Access Operator – Memory Management Operators – Comma Operator	12	Up to K4	CLO1
II	Functions in C++ : Introduction - Parts of Function – Passing Arguments – Return by Reference – Default Arguments – Const Arguments – Inline Functions – Function Overloading – Principles of Function Overloading – Recursion .Classes and Objects: Introduction – Structures in C++ - Classes in C++ - Declaring Objects – The Public, Private, Protected Keywords – Defining Member Functions and its Characteristics- Outside	12	Up to K4	CLO2

	Member Function as Inline – Rules for Inline functions – Data Hiding or Encapsulation – Classes, Objects and Memory – Static Member Variables and Functions – Static Object – Objects as Function Arguments – Friend Functions – Overloading Member Functions			
III	Constructors and Destructors : Introduction – Constructors and Destructors and its Characteristics – Constructors with Arguments – Overloading Constructors – Constructors with Default Arguments – Copy Constructors – Destructors – Calling Constructors and Destructors – Local Versus Global Object. Operator Overloading and Type Conversion : Introduction – The Keyword Operator – Overloading Unary Operators – Overloading with friend Function – Type Conversion – Rules for Overloading Operators	12	Up to K4	CLO3
IV	Inheritance: Introduction – Access Specifiers and Simple Inheritance – Protected Data with Private Inheritance – Types of Inheritances – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Multipath Inheritance – Virtual Base Classes – Constructors, Destructors and Inheritance - Abstract Classes – Constructors in Derived Class. Binding, Polymorphism and Virtual Functions : Introduction – Binding in C++ - Pointer to Base and Derived Class Objects – Virtual Functions – Rules for Virtual Functions – Array of Pointers – Pure Virtual Functions – Abstract Classes – Working of Virtual Functions – Virtual Functions in Derived Classes– Constructors and Virtual Functions – Virtual Destructors – Destructors and Virtual Functions	12	Up to K5	CLO4
V	Application with Files : Introduction – File Stream Classes – Steps of File Operations – Checking for Errors – Finding End of a File – File Opening Modes – File Pointers and Manipulators – Sequential Access Files – Random Access Operation – Command Line Arguments. Exception Handling : Introduction – Principles of Exception Handling – The Keywords try, throw and catch – Guidelines for Exception Handling – Multiple Catch Statements – Catching Multiple Exceptions – Rethrowing Exception – Exceptions in Constructors and Destructors – Exception and Operator Overloading – Exception and Inheritance – Class Template with Exception Handling	12	Up to K5	CLO5

Book for Study :

Ashok N Kamthane, *Programming in C++*, Pearson Education, 2nd Edition, 2017.

Chapters :

Unit - I : 1.2 , 1.3 , 1.7 to 1.10 , 2.6 , 3.3 , 3.5 to 3.7 , 3.10 , 3.13 , 3.14 , 4.2 to 4.4 , 4.6 , 4.8 , 4.10

Unit - II : 7.1 to 7.3 , 7.5 ,7.7 , 7.8 , 7.10 to 7.12 , 7.14 , 8.1,8.3 to 8.18 , 8.20 , 8.21 , 8.29

Unit - III : 9.1 to 9.3 , 9.5 , 9.6 , 9.8 , 9.9 , 9.11 , 9.12 , 9.22 , 10.1 to 10.3 , 10.7 , 10.9 , 10.10

Unit - IV : 11.1 to 11.13 , 11.15 , 11.17 , 15.1 to 15.4 , 15.6 to 15.10 , 15.12 to 15.14

Unit - V : 16.1 to 16.7 , 16.9 , 16.11 , 16.13 , 19.1 to 19.7 , 19.9 , 19.11 to 19.13

Books for Reference:

1. Balaguruswamy, Object Oriented Programming with C++, 7th Edition, Tata McGraw-Hill, New Delhi ,2017.
2. Reema Thareja , Object Oriented Programming with C++ , Oxford University Press , Revised First Edition ,2018
3. Yashwant Kanetkar, Let us C++, BPB Publications, Eleventh edition, 2019.
4. Rohit Khurana , Object Oriented Programming with C++ , Vikas Publishing House , 2nd Edition , 2014
5. Jana Debasish , C++ and Object Oriented Programming Paradigm , PHI , 3rd Edition , 2014

Web Resources :

1. https://www.cet.edu.in/
2. http://wavelino.coffeecup.com
3. https://fac.ksu.edu.sa/sites

e-books :

1. https://books.goalkicker.com/CPlusPlusBook/
2. https://www.computer-pdf.com/getfile
3. https://people.cs.vt.edu/~shaffer/Book/C++3e20120102.pdf

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Practical Labs , Assignments , Quiz.

Rationale for Nature of the Course :

The purpose of the C++ class construct is to provide the programmer with a tool for creatingnew types that can be used as conveniently as the built-in types.

Activities on Knowledge and Skill

- Practice to code programs
- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLO):
On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand to Examine the Basic Concepts of C++ language	**Up to K4**
CLO2	Identify how Functions ,Classes and Objects used in C++	**Up to K4**
CLO3	Apply the Knowledge to Develop C++ Programs by implementing Constructor , Destructor and Overloading Concepts	**Up to K4**
CLO4	Apply Knowledge to Construct C++ Programs using Inheritance, Polymorphism and Virtual Functions	**Up to K5**
CLO5	Analyze the concept of Files and Exception Handling	**Up to K5**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	▪ **Introduction to C++ :** Evolution of C++ ANSI Standard – Preface to Object-Oriented Programming Key Concepts of Object-Oriented Programming - Advantages of OOP – Object –Oriented Languages – Structure of a C++ Program .	4		Chalk & Talk ,
	▪ **Input and Output in C++ :** Pre-Defined Streams – Stream Classes Formatted and Unformatted Data – Unformatted Console I/O Operations Formatted Console I/O Operations — Manipulators – User-Defined Manipulators .	4	12	Chalk & Talk , Spot Test ,
	▪ **C++ Declarations :** Tokens – Variable Declaration and Initialization -/ Data Types in C++ - Scope Access Operator - Memory Management Operators – Comma Operator.	4		Chalk & Talk ,
II	▪ **Functions in C++ :** Introduction - Parts of Function – Passing Arguments Return by Reference – Default Arguments – Const Arguments Inline Functions – Function Overloading – Principles of Function Overloading – Recursion.	4		Chalk & Talk ,
	▪ **Classes and Objects:** Introduction – Structures in C++ - Classes in C++ Declaring Objects – The Public, Private, Protected Keywords - Defining Member Functions and its Characteristics- Outside Member Function as Inline – Rules for Inline functions	4	12	Chalk & Talk, Spot Test ,
	▪ Data Hiding or Encapsulation – Classes, Objects and Memory – Static Member Variables and Functions – Static Object - Objects as Function Arguments – Friend Functions – Overloading Member Functions .	4		Chalk & Talk
III	▪ **Constructors and Destructors** : Introduction – Constructors and Destructors and its Characteristics - Constructors with Arguments – Overloading Constructors – Constructors with Default Arguments	4		Chalk & Talk, Spot Test ,
	• Copy Constructors – Destructors – Calling Constructors and Destructors – Local Versus Global Object.	4	12	Chalk & Talk
	▪ **Operator Overloading and Type Conversion :** Introduction – The Keyword Operator – Overloading Unary Operators - Overloading with friend Function – Type Conversion – Rules for Overloading Operators.	4		Chalk & Talk , Group Discussion

IV	▪ **Inheritance:** Introduction – Access Specifiers and Simple Inheritance – Protected Data with Private Inheritance – Types of Inheritances – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance Hybrid Inheritance – Multipath Inheritance – Virtual Base Classes Constructors, Destructors and Inheritance - Abstract Classes – Constructors in Derived Class. ▪ **Binding, Polymorphism and Virtual Functions :** Introduction – Binding in C++ - Pointer to Base and Derived Class Objects Virtual Functions – Rules for Virtual Functions – Array of Pointers ▪ Pure Virtual Functions – Abstract Classes – Working of Virtual Functions - Virtual Functions in Derived Classes– Constructors and Virtual Functions Virtual Destructors – Destructors and Virtual Functions.	4 4 4	12	Chalk & Talk Chalk & Talk, Spot Test, PowerPoint Presentation Chalk & Talk, Assignment,
V	▪ **Application with Files :** Introduction – File Stream Classes – Steps of File Operations Checking for Errors – Finding End of a File – File Opening Modes – File Pointers and Manipulators - Sequential Access Files – Random Access Operation – Command Line Arguments. ▪ **Exception Handling :** Introduction – Principles of Exception Handling – The Keywords *try*, *throw* and *catch* – Guidelines for Exception Handling - Multiple Catch Statements – Catching Multiple Exceptions – Re-throwing Exception – Exceptions in Constructors and Destructors ▪ Exception and Operator Overloading – Exception and Inheritance – Class Template with Exception Handling.	4 4 4	12	Chalk & Talk , Spot Test Chalk & Talk, PowerPoint Presentation Chalk & Talk, PowerPoint Presentation Students Seminar

Course Designer
Mrs.M.Murugeswari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
I	Core	22OPCA13	Relational Database Management Systems	4	5	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1. To primarily concerned with the purpose and view of data that have relational query and operation capabilities.
2. To learn the fundamental Structure of SQL Queries , Procedure and Triggers
3. To practice the fundamental ER Model , Database design, and functional dependencies Using relational queries and operations.
4. To code, document, test, and implement a well-structured file system using RDBMS
5. To write reusable modules of RDBMS transactions and Recovery systems

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	**Introduction** : Database System Applications – Purpose of Database Systems –View of Data – Database Languages – Relational databases - Database Design –Data storage and querying – Transaction Management - Database Architecture – Database Users and Administrators - History of Database Systems. **Relational Databases:** Introduction to the Relational Model : Structure of Relational Databases – Database Schema – Keys – Schema Diagrams Relational Query Languages – The Relational Operations.	15	Up to K4	CLO1
II	**Introduction to SQL**: SQL Data Definition – Basic Structure of SQL Queries- Additional Basic Operations - Set Operations – Null Values - Aggregate functions. **Advanced SQL**: Accessing SQL From a Programming Language – Functions and Procedures – Triggers - Recursive Queries – Advanced Aggregation Features.	15	Up to K4	CLO2

III	**Database Design and the E-R Model :** Overview of the Design Process – The Entity–Relationship Model - Constraints - Removing Redundant Attributes in Entity Sets- Entity - Relationship Diagrams – Reduction to Relational Schemas- Entity Relationship Design Issues - **Relationship Database Design** : Decomposition using Functional Dependencies – Functional Dependency Theory – Decomposition using Multivalued Dependencies- More Normal Forms.	15	Up to K4	CLO3
IV	**Data Storage and File Structure :** File Organization – Organization of Records in Files – Data-Dictionary Storage . **Indexing and Hashing :** Basic Concepts -Ordered Indices – B+-Tree Index Files – B+-Tree Extensions – Multiple-key Access - Static Hashing - Dynamic Hashing – **Query Optimization** : Transformation of Relational Expressions – Estimating Statistics of Expression Results – Choice of Evaluation Plans.	15	Up to K5	CLO4
V	**Transactions :** Transaction concept –A Simple Transaction Model –Storage Structure – Transaction Atomicity and Durability – Transaction Isolation – Serializability- **Concurrency Control :** Lock-based Protocols – Deadlock Handling -Time stamp-Based Protocols – . **Recovery System:** Failure Classification - Storage – Recovery and Atomicity – Recovery Algorithm – Buffer Management- Failure with Loss of Nonvolatile Storage.	15	Up to K5	CLO5

Book for Study :

AbrahamSilberschatz, HenryzF.Korth,, S.Sudarshan *Database System Concepts* , Mc Graw Hill International Edition, ,6th Edition ,2011

Chapters :

Unit - I **:** 1.1 to 1.9, 1.12,1.13, ,2.1 to 2.6
Unit - II **:** 3.2 to 3.7 , 5.1 to 5.5
Unit - III **:** 7.1 to 7.7 , 8.3,8.4,8.6,8.7
Unit - IV **:** 10.5 to 10.7, 11.1 to 11.7 , 13.2 to 13.4
Unit - V **:** 14.1 to 14.6, 15.1,15.2 ,15.4, 16.1 to 16.5,16.6

Books for Reference :

1. Sharad Maheswari and Ruchin Jain, "Introduction to SQL and PL/SQL", Firewall Media, 2016.
2. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, *Database System Concepts*, McGraw Hill, 6th Edition, 2010.
3. R.Pannerselvam, *Database Management Systems*, PHI Learning, 2nd Edition, 2015.
4. R.Elmasri and S.B.Navathe, *Database Systems Models, Languages, Design and Application Programming*, Pearson Education, 6th Edition, 2013.
5. Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 7th Edition, Pearson Education, 2017

Web Resources :

1. https://nptel.ac.in/courses/106/105/106105175/
2. https://www.db-book.com/db6/slide-dir/index.html
3. https://beginnersbook.com/2015/04/dbms-tutorial/

e-books :

1 .https://books.goalkicker.com/CPlusPlusBook/
2. https://www.computer-pdf.com/getfile
3. https://people.cs.vt.edu/~shaffer/Book/C++3e20120102.pdf

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Practical Labs , Assignments , Quiz.

Rationale for Nature of the Course :

To learn about data storage techniques and query processing ,Students will gain knowledge of PL/SQL systems by doing so.

Activities to be Given :

- Practice to code programs
- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLO):
On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand to Examine the Basic Concepts Database design and relational database	**Up to K4**
CLO2	Discover how Functions ,Procedures ,Trigger and Recursive Queries used in SQL	**Up to K4**
CLO3	Apply the Knowledge to Develop RDBMS by implementing Entity relationship design and decomposition using functional dependencies	**Up to K4**
CLO4	Apply Knowledge to Construct RDBMS Programs using Indexing, hashing and Query Optimization	**Up to K5**
CLO5	Analyze the concept of Transaction and Recovery System	**Up to K5**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3– Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	▪ Introduction : Database System Applications – Purpose of Database Systems –View of Data – Database Languages	5	15	Chalk & Talk ,
	▪ Relational databases - Database Design –Data storage and querying – Transaction Management - Database Architecture – Database Users and Administrators - History of Database Systems.	5		Chalk & Talk , Spot Test
	▪ Relational Databases: Introduction to the Relational Model : Structure of Relational Databases – Database Schema – Keys – Schema Diagrams Relational Query Languages – The Relational Operations.	5		Chalk & Talk
II	▪ **Introduction to SQL:** SQL Data Definition – Basic Structure of SQL Queries Additional Basic Operations –	5	15	Chalk & Talk
	▪ Set Operations – Null Values - Aggregate functions**. Advanced SQL:** Accessing SQL From a Programming Language	5		Chalk & Talk, Spot Test
	▪ Functions and Procedures - Triggers - Recursive Queries – Advanced Aggregation Features.	5		Chalk & Talk
III	▪ **Database Design and the E-R Model :** Overview of the Design Process – The Entity–Relationship Model - Constraints	5	15	Chalk & Talk, Spot Test
	▪ Removing Redundant Attributes in Entity Sets- Entity - Relationship Diagrams – Reduction to Relational Schemas- Entity Relationship Design Issues	5		Chalk & Talk
	▪ **Relationship Database Design :** Decomposition using Functional Dependencies **–** Functional Dependency Theory – Decomposition using Multivalued Dependencies- More Normal Forms.	5		Chalk & Talk , Group Discussion PowerPoint Presentation
IV	▪ **Data Storage and File Structure :** File Organization – Organization of Records in Files – Data-Dictionary Storage .	5	15	Chalk & Talk
	▪ **Indexing and Hashing :** Basic Concepts -Ordered Indices – B+-Tree Index Files – B+-Tree Extensions – Multiple-key Access - Static Hashing - Dynamic Hashing	5		Chalk & Talk, Spot Test, PowerPoint Presentation

Annexure - 3

	▪ **Query Optimization :** Transformation of Relational Expressions – Estimating Statistics of Expression Results – Choice of Evaluation Plans. Virtual Functions Virtual Destructors – Destructors and Virtual Functions.	5		Chalk & Talk, Assignment
V	▪ Transactions : Transaction concept –A Simple Transaction Model –Storage Structure – Transaction Atomicity and Durability – Transaction Isolation – Serializability	5	15	Chalk & Talk , Spot Test
	▪ Concurrency Control : Lock-based Protocols – Deadlock Handling -Time stamp-Based Protocols	5		Chalk & Talk, PowerPoint Presentation
	▪ Recovery System: Failure Classification - Storage – Recovery and Atomicity – Recovery Algorithm – Buffer Management- Failure with Loss of Nonvolatile Storage.	5		Chalk & Talk, Students Seminar

Course Designer
Mrs.J.Chinna

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
I	Core	22OPCA14	Data Structures and Algorithms	4	5	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives:

1. To impart the knowledge on fundamental ADTs.
2. To study the organized structures of Trees and Hashing.
3. To understand the concepts of updatable Priority Queues and Sorting
4. To apply the Graph Algorithms on related applications.
5. To design optimized algorithms with efficacy.

Course Content :

Unit	Course Contents	Hours	K Level	CLO
I	Algorithm Analysis: Mathematical Background – Model – What to Analyze – Running –Time Calculations. Lists, Stacks, & Queues: Abstract Data Types – The List ADT – The Stack ADT – The Queue ADT..	15	Up to K4	CLO1
II	Trees: Preliminaries – Binary Trees – The Search Tree ADT - Binary Search Trees – AVL Trees – Tree Traversals – B-Trees – Hashing: General Idea – Hash Function – Separate Chaining – Hash Tables without Linked Lists – Rehashing – Universal Hashing – Extendible Hashing.	15	Up to K4	CLO2
III	Priority Queues (Heaps):Model – Simple Implementation – Binary Heap – Applications of Priority Queues – d-Heaps – Leftist Heaps – Skew Heaps . Sorting: Preliminaries - Insertion Sort – A Lower Bound for Simple Sorting Algorithms – Shell Sort – Heap Sort – Merge Sort – Quick Sort – External Sorting .	15	Up to K4	CLO3
IV	Graph Algorithms : Definitions – Topological Sort – Shortest Path Algorithms –Network Flow Problems - Minimum Spanning Tree – Applications of Depth First Search – Introduction to NP-Completeness.	15	Up to K5	CLO4
V	Algorithms Design Techniques: Greedy Algorithms – Divide and Conquer—Running time of Divide and Conquer Algorithm- Closest-Points Problem- The Selection Problem – Dynamic Programming- – Randomized Algorithms- Random Number Generators- Skip Lists – Backtracking Algorithms-The Turnpike Reconstruction Problem	15	Up to K5	CLO5

Book for Study:

Mark Allen Weiss, Data Structures and Algorithm Analysis in C++ Pearson Publications., 4th edition,2014

Chapters

Unit I	**:** 2, 3.1, 3.2, 3.5 – 3.7
Unit II	**:** 4.1 – 4.4, 4.6, 4.7, 5.1 – 5.5, 5.8, 5.9
Unit III	**:** 6.1 - 6.8, 7.1 – 7.7, 7.12
Unit IV	**:** 9
Unit V	**:**10

Books for Reference:

1. Seymour Lipschutz , *Data Structures* ,McGraw Hill Education , Revised First Edition , 2017
2. Mark , Allen Weiss ,*Data Structures and Algorithms Analysis in C++* , Pearson Education , 3rd Edition , 2014
3. G.A.V.Pai , *Data Structures and Algorithms: Concepts - Techniques and Applications,* Tata McGraw-Hill Education , 2017
4. Michael T.Goodrich ,Roberto Tamassia , David M.Mount ,*Data Structures and Algorithms in C++* , 2nd Edition , 2011
5. Adam Drozdek , *Data Structures and Algorithms in C++* , Cengage Publications , 4th Edition , 2013.

Web Resources :

1.http.://freecodecamp.org
2.http://www.dzone.com
3.https://lecturenotes.in

e-Books:

1. https://drive.google.com/file/d/1Ucm4EJuNKx33Isj4lfJWX0AzEngcBUS1/view?usp=sharing
2. https://drive.google.com/file/d/1p2Z83ugC6crlsNHkE6zqp7Pa3l6sLwnz/view?usp=sharing
3. https://drive.google.com/file/d/15YLy9cFD-aqskDJOw3-1GmvE4Mq6wJyd/view?usp=sharing

Pedagogy:

Chalk and Talk, Power Point Presentation, Group Discussion, Student Seminar, Spot Test, Quiz, Assignments

Rationale for Nature of the Course:

The methods and techniques of data structure are widely used in programming .It helps to develop logic and structured programming.

Activities on Knowledge and Skill

- Practice to code programs
- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes (CLO):

On Successful completion of the course, the learners should be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Analyze the problem statements and various ADTs such as List, Stack and Queue.	**Up to K4**
CLO2	Collect knowledge of non linear data structure like trees and hash which can be applied to solve problems.	**Up to K4**
CLO3	Describe the computational efficiency of various sorting techniques	**Up to K4**
CLO4	Design and implement the various graph operations and its application.	**Up to K5**
CLO5	Analyze the complexity of different algorithms to solve real life problems	**Up to K5**

K1 - Remembering and recalling facts with specific answers
K2 – Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – solving problems
K4- Examining, analyzing, presentation and make inference with evidences.
K5 – Evaluate , making Judgments based on criteria

Course Learning Outcomes:
Mapping of Course Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	3	3	2	1
CLO2	3	3	3	3	2	1
CLO3	3	3	3	2	2	2
CLO4	3	3	3	3	2	2
CLO5	3	3	3	3	2	1

1. Basic level **2. Intermediate level** **3. Advanced level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	• Algorithm Analysis • Lists • Stacks • Queues	4 3 4 4	15	Chalk and Talk Chalk and Talk Chalk and Talk Chalk and Talk
II	• Trees • AVL Tree • Hashing, Rehashing • Universal Hashing , Extendible Hashing.	3 4 4 4	15	Chalk and Talk PPT Chalk and Talk Chalk and Talk
III	• Model , Simple Implementation , Binary Heap • Applications of Priority Queues – d-Heaps – Leftist Heaps • Skew Heaps , Binomial Queues • Preliminaries,-Insertion Sort , A Lower Bound for Simple Sorting Algorithms • Shell Sort , Heap Sort • Merge Sort , Quick Sort, External Sorting .	3 2 3 3 2 2	15	Chalk and Talk Chalk and Talk Chalk and Talk PPT Chalk and Talk & Seminar PPT
IV	• Definitions , Topological Sort , Shortest Path Algorithms. • Network Flow Problems , Minimum Spanning Tree • Applications of Depth First Search, Introduction to NP-Completeness	5 5 5	15	Chalk and Talk Chalk and Talk &Seminar Chalk and Talk & Group Discussion
V	• Greedy Algorithms , Divide and Conquer • Dynamic Programming , Randomized Algorithms • Backtracking Algorithms	5 5 5	15	PPT Chalk and Talk & Seminar PPT & Seminar

Course Designer
Dr.(Mrs.)S.Vijayasankari

Annexure - 3

Department of Computer Applications				Class: I MCA				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
I	Elective	22OPCADSE1A	Operating Systems	4	5	25	75	100

Nature of the course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√		

Course Objectives:

1. To be aware of the evolution and fundamental principles of Operating System.
2. To understanding the various Operating System components such as Process management and scheduling.
3. To solve the principles of concurrency scheduling algorithms and deadlocks.
4. To move process around in memory without it affecting its execution.
5. To provide the process of manipulating files in operating system.

Course Content :

Unit	Course Contents	Hours	K –Level	CLO
I	**Introduction:** What Operating Systems Do – Computer System Organization -Computer System Architecture – Operating System Structure – Operating System Operations – Open Source Operating Systems – **Operating System Structures:** Operating System Services – User Operating System Interface – System Calls – Types of System Calls – System Programs.	15	Up to K4	CLO1
II	**Processes Management:** Process Concept – Process Scheduling – Operation on Process. **Process Scheduling:** Basic Concepts - Scheduling Criteria – Scheduling Algorithms - Thread Scheduling- Multiple Processors Scheduling	15	Up to K4	CLO2
III	**Synchronization:** Background - The Critical Section Problem - Peterson's Solution –Synchronization Hardware – Semaphores – Classic Problems – Monitors –Synchronization Examples- **Deadlocks:** System Model -Deadlock Characterization -Methods for Handling Deadlocks- Deadlock Prevention-Deadlock Avoidance-Deadlock Detection-Recovery from Deadlock.	15	Up to K4	CLO3
IV	**Main Memory:** Background- Swapping- Contiguous Memory allocation - Segmentation - Paging-Structure of the Page Table- **Virtual Memory :** Background –Demand Paging-Copy on Write – Page Replacement - Allocation of Frames - Thrashing	15	Up to K5	CLO4
V	**File System :** File concepts – Access methods – **File System Implementation :** File System Structure – Allocation Methods - Free Space Management - **Mass-Storage Structure :** Overview of Mass Storage Structure – Disk Structure – Disk Scheduling – Disk Management – Swap Space Management.	15	Up to K5	CLO5

Annexure - 3

Book for Study:-

Abraham Silberchatz, Peter B Galvin, Gerg Gagne, "*Operating System Concepts"*, Wiley Publicattion, 9th Edition, 2018.

Chapters:

Unit – I	: Chapter 1 and 2	: 1.1-1.5,1.12 and 2.1-2.5
Unit – II	: Chapter 3 and 5	: 3.1-3.3 and 5.1-5.5
Unit – III	: Chapter 6 and 7	: 6.1-6.9 and 7.1-7.7
Unit – IV	: Chapter 8 and 9	: 8.1 to 8.6 and 9.1-9.6
Unit – V	: Chapter 10,11 and 12	: 10.1,10.2, 11.1,11.4.11.5,12.1-12.3,12.4,12.5

Book for References :

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Principles", Wiley Publication, 7th Edition, 2013.
2. William Stallings, "Operating Systems: Internals and Design Principles", Prentice Hall, 7th Edition, 2011.
3. Madnick&J.Donovan, "Operating Systems", McGraw Hill Publication, 2nd Edition, 2013.
4. H.M.Deitel, "Operating systems", Addison Wesley Publication, 3rd Edition, 2013.
5. William Stallings, "Operating Systems ", Prentice Hall, 7th Edition

Web Resources:

1. http://www2.cs.uic.edu/~jbell/CourseNotes/OperatingSystems
2. http://Williamstallings.com/os/animations
3. https://www.tutorial.com/operating_system/

e-Books:

1. https://drive.google.com/file/d/1FjqPaNAf8iqN_K8I3E0qcCjik8AnYe2i/view?usp=sharing
2. https://drive.google.com/file/d/1t-peoj76iINEp8oMiwdamq47f7yMVNRx/view?usp=sharing
3. https://drive.google.com/file/d/1qN2CUt6fWrFZq4Z2jvfnIivMkFHP1WuG/view?usp=sharig

Pedagogy :

Chalk and Talk, Student Seminar, Assignment, Spot Test, Quiz,Group Discussion, PPT.

Rationale for Nature of the course:

An operating system is a software which learn all the basic tasks like file management, memory management, storage management, process management, handling input and output, and controlling peripheral devices.

Activities to be Given :

- Group Discussion
- Seminar
- Quiz

Annexure - 3

Course Learning Outcomes(CLO):

On the successful completion of the course. Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Remembering the basic concepts of computers and operating system	**Up to K4**
CLO2	Understand the operating system process management and scheduling algorithm	**Up to K4**
CLO3	Learning the synchronization and deadlock concepts	**Up to K4**
CLO4	Identifying the memory management and virtual memory management	**Up to K5**
CLO5	Analyzing the concept of storage management	**Up to K5**

K1- Remembering and recalling facts with specific answers

K2 - Basic understanding of facts and stating main ideas with general answers

K3- Learning and Problem solving

K4- Examining, Understanding, solving, analyzing and make interference with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1.Basic Level **2. Intermediate Level** **3. Advanced Level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	• What Operating Systems Do – Computer System Organization -Computer System Architecture	5	15	Chalk and Talk, Quiz,
	• Operating System Structure – Operating System Operation–Open Source Operating Systems	5		Chalk and Talk
	• Operating System Services – User Operating System Interface-System Calls. Types of System Calls – System Programs.	5		Chalk and Talk, Group Discussion
II	• Processes Management: Process Concept – Process Scheduling – Operation on Process.	5	15	Chalk and Talk, Group Discussion,
	• Process Scheduling: Basic Concepts - Scheduling Criteria – Scheduling Algorithms	5		Chalk and Talk
	• Thread Scheduling-Multiple Processors Scheduling.	5		Chalk and Talk
III	• **Synchronization:** Background - The Critical Section Problem - Peterson's Solution – Synchronization Hardware	5	15	Chalk and Talk, Seminar
	• Semaphores – Classic Problems – Monitors – Synchronization Examples-**Deadlocks:** System Model -Deadlock Characterization.	5		Chalk and Talk,
	• Methods for Handling Deadlocks- Deadlock Prevention-Deadlock Avoidance- Deadlock Detection-Recovery from Deadlock.	5		PowerPoint Presentation Quiz Chalk and Talk,

Annexure - 3

IV	• Main Memory: Background- Swapping- Contiguous Memory allocation - Segmentation • Paging-Structure of the Page Table- Virtual Memory : Background –Demand Paging • Copy on Write – Page Replacement - Allocation of Frames - Thrashing.	5 5 5	15	Chalk and Talk, quiz Chalk and Talk, Chalk and Talk, PowerPoint Presentation
V	• File System : File concepts – Access methods – File System Implementation : File System Structure • Allocation Methods - Free Space Management - Mass-Storage Structure : Overview of Mass Storage Structure • Disk Structure – Disk Scheduling – Disk Management – Swap Space Management.	5 5 5	15	Chalk and Talk, quiz Chalk and Talk, Seminar Chalk and Talk PowerPoint Presentation Assignment

Course Designer
Mrs.P.Indhuja

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**External Exam**	**Total**
I	Elective	22OPCADSE1B	Enterprise Resource Planning	4	5	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	√

Course Objectives:

1. The core of ERP is to planning for justifying ERP investments and to explain the benefits of ERP
2. To learn the fundamental ERP and its Related technologies to building excellent software domain
3. To practice the implementation life cycle to build transaction and package selection.
4. To execute the team members, consultants and to predicts success and failure implementation of ERP
5. To apply the ERP domain in present and future enhancements.

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	**Introduction** : **Introduction:** Introduction to ERP – Basic ERP Concepts – Justifying ERP Investments - Benefits of ERP.	15	Up to K4	CLO1
II	**ERP and Related Technologies:** ERP and Related Technologies - Advanced technology and ERP Security. **ERP Marketplace and Functional Modules:** ERP Marketplace and Marketplace Dynamics – Business Modules of an ERP Package.	15	Up to K4	CLO2
III	**ERP Implementation:** ERP Implementation Lifecycle - ERP Package Selection – ERP Transition Strategies .	15	Up to K4	CLO3
IV	**ERP Implementation:** ERP Implementation	15	Up to K5	CLO4

	Process –ERP Project Teams – Consultants, Vendors and Employees – Success and Failure factors of the ERP Implementation			
V	**ERP – Present and Future:** ERP and E-Business – ERP, The Internet, and WWW-ERP II – Future Directions and Trends in ERP	15	Up to K5	CLO5

Book for Study :

Alexis Leon, ERP Demystified , Tata Mc-Graw Hill , 3nd Edition , 2014.

Chapters:

Unit - I : 3, 4, 5, 7

Unit - II : 8, 9, 10, 11

Unit - III : 13, 14, 15

Unit - IV : 17, 18, 19, 20

Unit - V : 23, 24, 25

Books for Reference :

1. Joseph Brady A., Ellen Monk F., Bret Wagner, *Concepts in Enterprise Resource Planning* , Thompson Course Technology , 1st Edition , 2001.
2. Vinod Kumar Garg and Venkitakrishnan N K, *Enterprise Resource Planning – Concepts and Practice* , PHI , 2nd Edition , 2003
3. Mary Sumner , *Enterprise Resource Planning* , Pearson Education , 9th Edition , 2012
4. Alexis Leon , *Enterprise Resource Planning* , Mc-Graw Hill Education ,2nd Edition , 2014.
5. Jaiswal , *Textbook of Enterprise Resource Planning* , Macmillan Publishers , 1st Edition , 2005.

Web Resources :

1. http://projanco.com/Library/Enhancing%20enterprise%20intelligence%20-leveraging%20ERP,%20CRM,%20SCM,%20PLM,%20BPM,%20and%20BI.pdf
2. https://www.qad.com/what-is-erp
3. https://www.tutorialspoint.com/sap/sap_introduction.htm

e-books:

1. https://cs.calvin.edu/courses/cs/344/kvlinden/resources/AIMA-3rd-edition.pdf
2. https://www.cin.ufpe.br/~tfl2/artificial-intelligence-modern-approach.9780131038059.25368.pdf
3. https://www.oracle.com/webfolder/assets/ebook/complete-guide-to-modern-erp/pdf/modern-erp.pdf

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Assignments , Quiz

Rationale for Nature of the Course :

The practical application packages of ERP is to the create design and building of ERP domain.

Activities on Knowledge and Skill

- Practice to code programs
- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLO):
On Successful Completion of the course students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand to Examine the Basic Concept of contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology	**Up to K4**
CLO2	Identify how ERP is secure the data and to expand the market places	**Up to K4**
CLO3	Apply the ERP package software for various transition strategies	**Up to K4**
CLO4	Apply Knowledge to Construct implementation life cycle of ERP and select best ERP vendors and Consultants	**Up to K5**
CLO5	Explore the present and future trends for ERP business	**Up to K5**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – Solving Problems
K4 –Examining, analyzing, presentation and make inferences with evidences
K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	▪ **Introduction:** Introduction to ERP ▪ Basic ERP Concepts – ▪ Justifying ERP Investments ▪ Benefits of ERP.	4 3 3 5	15	Chalk & Talk, Spot Test Chalk & Talk Chalk & Talk,
II	▪ **ERP and Related Technologies:** ERP and Related Technologies – ▪ Advanced technology and ERP Security. ▪ **ERP Marketplace and Functional Modules:** ERP Marketplace and Marketplace Dynamics ▪ Business Modules of an ERP Package.	4 4 4 3	15	Chalk & Talk, Spot Test Chalk & Talk Chalk & Talk Chalk & Talk Group Discussion ,
III	▪ **ERP Implementation:** ERP Implementation Lifecycle ▪ ERP Package Selection ▪ ERP Transition Strategies	5 5 5	15	Chalk & Talk, Spot Test Chalk & Talk , PowerPoint Presentation Chalk & Talk , Group Discussion ,
IV	▪ **ERP Implementation:** ERP Implementation Process ,ERP Project Teams ▪ Consultants, Vendors and Employees ▪ Success and Failure factors of the ERP Implementation	5 5 5	15	Chalk & Talk, Spot Test Chalk & Talk, PowerPoint Presentation Chalk & Talk,
V	▪ **ERP – Present and Future:** ERP and E-Business ▪ ERP, The Internet, and WWW, ERP II ▪ Future Directions and Trends in ERP	5 5 5	15	Chalk & Talk, Spot Test Chalk & Talk, PowerPoint Presentation Chalk & Talk

Course Designer
Mrs.J.Chinna

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
I	Core	22OPCA11P	Data Structures and Algorithms using C++ Lab	2	5	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1. Create code using Reusability Techniques.
2. Classify different types of Polymorphism.
3. Work out Programs using different Data Structures Concepts.
4. To learn the structures of Trees and Hashing.
5. To understand the concepts of updatable Stack and Queue

Course Content :.

Unit	Content	Hours	K-Level	CLO
I	1.Write a program to find the following in a one dimensional array: i) Find Maximum of N numbers. ii) Find Minimum of N numbers. iii) Find Summation of N numbers. iv) Find Average of N numbers. 2. Write a program for calculating matrices operations: i) Addition ii) Subtraction iii) Multiplication iv) Transpose of matrices v) Row wise, Column wise and Diagonal wise total. vi) Symmetric Checking. 3. Write a program to do the following: i) String copy ii) String concatenation iii) String comparison iv) String reverse v) Find the length of the string vi) String Conversion	15	Up to K4	CLO1

II	4 Write a program for manipulating single linked list. 5. Write a program to manipulate double linked list. 6. Write a program to manipulate circular double linked list. 7. Write a program for demonstrating any application of stack. 8. Write a program for demonstrating any application of queue.	15	Up to K4	CLO2
III	9. Write a program to perform operations on binary tree. 10.Write a Program to perform the basic Operations of a Binary Search Tree. 11. Write a Program to construct an expression Tree for a given Postfix Expression and print the Expression in all three orders. 12. Write a program for sorting by using the concept sorting by Insertion 13. Write a program for sorting by using the concept sorting by Selection 14. Write a program for sorting by using the concept sorting by Merging 15. Write a program for sorting by using the concept sorting by Exchange	15	Up to K4	CLO3
IV	16. Write a program for search by using Linear Search Techniques 17. Write a program for search by using Non-linear Search Techniques	15	Up to K5	CLO4
V	18. Write a Program to read N elements and arrange them in order using Quick sort Technique. 19. Write a Program to read N elements and arrange them in order using Merge sort Technique	15	Up to K5	CLO5

Books for Study :

1. Ashok N Kamthane, *Programming in C++*, Pearson Education, 2nd Edition, 2017.

2. Ellis Horowitz , Sartaj Sahni , Dinesh Mehta , *Fundamentals of Data Structures in C++* ,Universities Press , Second Edition , 2017.

Books for Reference:

1. Reema Thareja , Object Oriented Programming with C++ , Oxford University Press , Revised First Edition 2018
2. Yashwant Kanetkar, *Let us C++*, BPB Publications, Eleventh edition, 2019.
3. Seymour Lipschutz , *Data Structures* ,McGraw Hill Education , Revised First Edition , 2017
4. Mark , Allen Weiss ,*Data Structures and Algorithms Analysis in C++* , Pearson Education , 3rd Edition , 2014
5. G.A.V.Pai , *Data Structures and Algorithms: Concepts - Techniques and Applications,* Tata McGraw-Hill Education , 2017

Web Resources :

1. https://www.cet.edu.in/
2. https://fac.ksu.edu.sa/sites
3. http://freecodecamp.org

e-b ooks :

1. https://books.goalkicker.com/CPlusPlusBook/
2. https://www.computer-pdf.com/getfile
3. https://people.cs.vt.edu/~shaffer/Book/C++3e20120102.pdf

Pedagogy :

Projector Demonstration and Practical sessions.

Rationale for Nature of the course

Developing logic and structured program, organizing data in software development.

Activities to be Given :

- Practice to Code Programs
- Software Development

Annexure - 3

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand to Examine the Basic Concepts of Object Oriented Programming and its features	**Up to K4**
CLO2	Identify how Functions ,Classes and Objects in C++	**Up to K4**
CLO3	Apply the Knowledge to Develop C++ Programs by implementing Constructor , Destructor and Overloading Concepts	**Up to K4**
CLO4	Analyze to Construct C++ Programs using Inheritance, Polymorphism and Virtual Functions	**Up to K5**
CLO5	Analyze the Concept of Files and Exception Handling	**Up to K5**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

UNIT	Programs	Hours	Mode of Teaching
I	Write a program in C++ to perform Programs Using One Dimensional Array , String Operations Write a program in C++ to perform the basic operations of a Circular Queue using Array.	15	Demo & Practical Session
II	Write a program in C++ to perform the basic operations of Sequential List, , Binary Search Tree, and Search technique, Infix, Prefix, Postfix operations..	15	Demo & Practical Session
III	Write a program in C++ to read N elements and arrange them in order using Selection , Insertion and Merging Operations.	15	Demo & Practical Session
IV	Write a program for search by using Linear Search Techniques Write a program for search by using Non-linear Search Techniques	15	Demo & Practical Session
V	Write a program in C++ to read N elements and arrange them in order using Quick sort , Merge sort technique. Write a program in C++ to construct a optimal Binary Search Tree and Print the same.	15	Demo & Practical Session

Course Designer
Mrs.M.Murugeswari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
I	Core	22OPCA12P	RDBMS Lab	2	5	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1. Generate command using DDL & DML Queries.
2. Categorize different types of Conditional, Iterative, and Sequential controls
3. Work out Programs using different Data base connectivity.
4. To learn the structures various types of multiple connection of records.
5. To apply all concepts of RDBMS files to the application programs

Course Content :

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Unit	Content	Hours	K-Level	CLO
I	**Data Definition Language** 1. DDL Commands & Illustration 2. DML Commands & Illustration PL /SQL 3. Program using Conditional control , Iterative control and Sequential Control . 4. Program using Exception Handling 5. Program using Implicit and Explicit Cursors.	15	Up to K4	CLO1
II	**Data Manipulation Language** **6** Program using Pl/SQL tables and record. **7** Program using Database triggers. **8** Program to design procedures using in , out , in out parameter **9** Program to design procedures using recursion.	15	Up to K4	CLO2
III	**Using Select Statement** **10** Program to design database Connection for Insertion of record.	15	Up to K4	CLO3

	11 Program to design procedures using packages. **12** Program to design to Views the queries **13** Program to design database Connection for Deletion of record.			
IV	**Applications of PL/SQL** **14** Program to design database Connection for Updating of record. **15** Program to design database Connection for Multiple record. **16** Given a range of number and the task is to form Floyd's triangle..	15	Up to K5	CLO4
V	**Processing of PL/SQL** **17** Let's assume that following transaction T consisting of T1 and T2. A consists of Rs 600 and B consists of Rs 300. Transfer Rs 100 from account A to account B V **18** Given distance in kilometres and task is to convert it into meters and centimetres. **19** Given a number and task is to convert each digit of the number into words **20** Program to design database for list of buses schedule	15	Up to K5	CLO5

Book for Study :

AbrahamSilberschatz, HenryzF.Korth,, S.Sudarshan *Database System Concepts* , Mc Graw Hill International Edition, ,6th Edition ,2011

Books for Reference :

1. Sharad Maheswari and Ruchin Jain, "Introduction to SQL and PL/SQL", Firewall Media, 2016.
2. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, *Database System Concepts*, McGraw Hill, 6th Edition, 2010.
3. R.Pannerselvam, *Database Management Systems*, PHI Learning, 2nd Edition, 2015.
4. R.Elmasri and S.B.Navathe, *Database Systems Models, Languages, Design and Application Programming*, Pearson Education, 6th Edition, 2013.
5. Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 7 th Edition, Pearson Education, 2017

Web Resources :

1 https://www.oreilly.com/library/view/oracle-plsql-programming/9781449324445/
2 https://www.allroundautomations.com/products/pl-sql-developer/?gclid=Cj0KCQiA47GNBhDrARIsAKfZ2rA0vT1cYmowj3zb4cPbRjSxDEVP91vyLSYjfrfFf508BVLjNxpnro0aAgqZEALw_wcB
3 https://www.java67.com/2018/01/top-4-free-microsoft-sql-server-books.html

e-b ooks :

1 https://www.oreilly.com/library/view/oracle-plsql-programming/0596009771/2. https://datubaze.files.wordpress.com/2015/09/s_feuerstein_oracle-pl_sql-programming_6th-edition_2014.pdf
2 https://dl1.newoutlook.it/book/2020/03/Microsoft-SQL-Server-2019-A-Beginners-Guide.pdf
3 https://www.tutorialspoint.com/ms_sql_server/ms_sql_server_tutorial.pdf

Pedagogy

Projector Demonstration and Practical sessions.

Rationale for Nature of the course

Developing logic and structured program, organizing data in software development.

Activities to be Given :

- Practice to Code Programs
- Practice Lab Exercises

Annexure - 3

Course Learning Outcomes(CLO):
On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge (According to Bloom's Taxonomy)
CLO1	Understand to Examine the Basic Concepts of Object Oriented Programming and its features	**Up to K4**
CLO2	Identify how Functions ,Classes and Objects in C++	**Up to K4**
CLO3	Apply the Knowledge to Develop C++ Programs by implementing Constructor , Destructor and Overloading Concepts	**Up to K4**
CLO4	Analyze to Construct C++ Programs using Inheritance, Polymorphism and Virtual Functions	**Up to K5**
CLO5	Analyze the Concept of Files and Exception Handling	**Up to K5**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5 – Evaluate , making Judgments based on criteria

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

Unit	Content	Hours	Mode of Teaching
I	Write a RDBMS program for DDL and DML using basic queries and table creations. Write a RDBMS program to perform the basic Loop concept	15	Demo & Practical Session
II	Write a program to perform the basic Cursor,Exceptional handling using RDBMS Write a program to perform the tables and records using RDBMS	15	Demo & Practical Session
III	Write a RDBMS program using Database triggers and procedures Write a RDBMS program for Views of table, in ,out , and in out procedures	15	Demo & Practical Session
IV	Write a RDBMS program for packages Write a RDBMS program for Database connectivity using various SQL Commands	15	Demo & Practical Session
V	Write a RDBMS program for insertion and deletion operation Write a program for update and modification Operation	15	Demo & Practical Session

Course Designer
Mrs.J.Chinna

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
I	IDC	22OPCAID1	Front End Web Development	2	2	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
	√	

Course Objectives:

1.To understand the basic concept of HTML.
2.To learn the various styles and design of CSS.
3.To study the JavaScript variables, statements and functions
4.To apply exception handling and cookies on related programs.
5.To evaluate data validation with DHTML.

Course Content :

Unit	Course Contents	Hours	K-Level	CLO
I	Hypertext Markup Language: Basic HTML- The Document Body – Text – Hyperlinks –Adding More Formatting- Lists- Using Color and Images	6	Up to K4	CLO1
II	Cascading Stylesheets: Introduction – Using Styles: Simple Examples- Defining your own styles – Properties and values in Styles – Stylesheets – a Worked Example – Formatting Blocks of Information.	6	Up to K4	CLO2
III	An Introduction to JavaScript – Definition of Dynamic HTML – JavaScript- Javascript: – the basics – Variables – String Manipulation –Mathematical Functions – Statements	6	Up to K4	CLO3
IV	Objects in JavaScript: Data and Objects in JavaScript- Regular Expressions- Exception Handling- Built-in Objects.	6	Up to K5	CLO4
V	Dynamic HTML with JavaScript: Data Validation– Opening a New Window – Messages and Confirmations – The Status Bar– Writing to a Different Frame- Rollover Buttons	6	Up to K5	CLO5

Book for Study:

Chris Bates, Web Programming Building Internet Applications, Wiley Publications., 3rd Edition, 2013

Chapters

Unit I : 2.1 - 2.7
Unit II : 4.1 – 4.7
Unit III : 6.1 - 6.7
Unit IV : 7.1 – 7.4
Unit V : 8.1 – 8.6

Books for Reference

1. Chris Aquino, Todd Gandee , Front-End web Development ,Big Nerd Ranch Guide, First Edition , 2017
2. Laura Lemoy Rafe Colburn , Jennifer kyrnin, Mastering HTML, CSS & JavaScript web publishing, BPB publications , Ist Edition , 2016
3 .Thomos Powell**,** HTML & CSS: The Complete Reference,Tata McGraw-Hill Education , 5th Edition ,2017
4. Alok Ranjan, Abhilasha Sinha, Ranjit Battwod, *JavaScript for Modern Web Development, BPB Publication,* , Ist Edition , 2020
5. Jennifer Robbins, Learning Web Design: A beginners Guide to HTML, CSS, Javascript and Web Graphics, O'Reilly Publications , 5th Edition , 2018.

Web Resources :

1 . https://www.tutorialspoint.com/html/html_javascript.htm
2. https://www.w3schools.com/tags/tag_link.asp
3. https://ilovecoding.org/courses/htmlcss2

e-B ooks:

1. https://drive.google.com/file/d/1JiOYoC8fW0-wI8yAZBPvvSj8ZFsYpl1e/view?usp=sharing
2. https://drive.google.com/file/d/1IJsAO3csW8NRkvYICN_SYFZtUVlzlu2Q/view
3. https://drive.google.com/file/d/15lixDYKcqfNRflnwxjskx5cGHHkTMAKi/view?usp=sharing

Pedagogy:

Chalk and Talk, Problem Solving, Tutorial, Group Discussion, Quiz, Seminar

Rationale for Nature of the course:

Understanding the course helps to analyze the basic concept of HTML, CSS and JavaScript

Activities to be Given

- Presentation Slides
- Group Discussion

Annexure - 3

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Course Learning Outcomes

On the successful completion of the course, students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand the basic concept of HTML and Tables	**Up to K4**
CLO2	Learn and design the various styles of CSS	**Up to K4**
CLO3	Identify the concept of statements, operators and arrays in JavaScript.	**Up to K4**
CLO4	Write a program using built in objects and cookies	**Up to K5**
CLO5	Analyze data validation with DHTML .	**Up to K5**

K1- Remembering and recalling facts with specific answers
K2 – Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – solving problems
K4- Examining, analyzing, presentation and make inference with evidences.
K5- Evaluate , making Judgments based on criteria.

Mapping of Course Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	1	3	2	3	3
CLO2	1	2	3	2	1	3
CLO3	1	1	3	2	2	3
CLO4	2	2	3	2	3	3
CLO5	2	2	3	2	3	3

1. Basic level 2. Intermediate level 3. Advanced level

Annexure - 3

LESSON PLAN

Unit	Description	Hours		Mode of Teaching
I	• Basic HTML, The Document Body, Text ,Hyperlinks. • Adding More Formatting- Lists, Using Color and Images	3 3	6	Chalk and Talk PPT
II	• Using Styles: Simple Examples, Defining your own styles , Properties and values in Styles • Stylesheets , a Worked example , Formatting Blocks of Information	3 3	6	Chalk and Talk PPT
III	• Definition of Dynamic HTML , JavaScript, JavaScript ,the basics • Variables, String Manipulation, Mathematical Functions, Statements	3 3	6	Chalk and Talk PPT
IV	• Data and Objects in JavaScript- Regular Expressions • Exception Handling- Built-in objects	3 3	6	Chalk and Talk PPT
V	• Opening a New Window , Messages and Confirmation • Writing to a Different Frame, Rollover Buttons	3 3	6	Chalk and Talk PPT

Course Designer
Dr.(Mrs.)S.Vijayasankari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**Ext**	**Total**
II	Core	22OPCA21	Open Source Technology	4	5	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	-	-

Course Objectives:

1. To be aware of the evolution and fundamental concepts of Data types and variables
2. To classify various Functions and String Manipulation
3. To practice the fundamental programming methodologies in the PHP programming Language via laboratory experiences.
4. To code, document, test, and implement a well-structured, robust computer program using the PHP language.
5. To performing database queries and building Form Submission to a Database

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	What is PHP – What is MySQL – Deciding on a Web Application Platform .Server-Side Scripting Overview : Static HTML – Client-Side Technologies – Server-Side Scripting . Learning PHP Syntax and Variables : PHP Syntax – Comments – Variables – Types in PHP – The Simple Types – Doubles – Booleans – NULL – Strings – Output .	15	Up to K4	CLO1
II	PHP Control Structures and Functions : Boolean Expressions – Branching – Looping – Using Functions – Function Documentation – Own Functions – Functions and variable Scope – Function Scope . PHP String Handling : Strings in PHP , String Functions – Passing Information with PHP – HTTP Is Stateless – GET Arguments – A Better Use forget Style URLs – POST Arguments – Formatting Form Variables – PHP – Superr global Arrays.	15	Up to K4	CLO2

III	Learning Arrays : Uses of Arrays – Creating Arrays – Retrieving Values – Multidimensional Arrays – Inspecting Arrays – Deleting from Arrays – Iteration . PHP Number Handling : Numerical Types – Mathematical Operators – Mathematical Functions .	15	Up to K4	CLO3
IV	Introducing Databases And MySQL : What is a Database – Why a Database - PHP-Supported Databases . Structured Query Language (SQL) : Relational Databases and SQL – SQL Standards – SQL – Database Design – Privileges Security. Database Administration and Design : MySQL Client Commands – MySQL User Administration – Backups – Replication – Recovery .	15	Up to K5	CLO4
V	Performing Database Queries : HTML Tables and Database Tables – Complex Mappings – Creating sample Tables . Integrating Web Forms and Databases : HTML Forms – Basic Form Submission to a Database – Editing Data with an HTML Form . Improving Database Efficiency : Connections – Indexing and Table Design	15	Up to K5	CLO5

Book for Study :

Steve Suehring , Tim Converse and Joyce Park , PHP6 and MySQL , Wiley Publishers , 3rd Edition , 2014 .

Chapters :

Unit - I : 1 , 2 , 4

Unit - II : 5 , 6, 7

Unit - III : 8 , 9

Unit - IV : 11 , 13 , 14

Unit - V : 16 , 17 , 18

Books for Reference:

1. Tom Butler , Kevin Yank , PHP & MySQL Novice to Ninja, Sitepoint , 6th Edition , 2017
2. Luke Welling , Laura Thomson , PHP and My SQL Web Development , Addison-Wesley , 5th Edition 2017
3. Robin Nixon , Learning PHP, MySQL & JavaScript with j Query, CSS & HTML5, O Reilly , 4th Edition, 2015.
4. Apache , Beginning PHP6 MySQL Web Development , Wiley , 2nd Edition , 2014.
5 . Joel Murach, Ray Harris , Murach's PHP & MySQL , Mike Murach & Associates Inc., 2nd Edition ,2014

Web Resources :

1.http://www.gov.pe.ca
2.https://www.esri.com
3.https://www.redhat.com/

e-b ooks :

1. https://drive.google.com/file/d/15lixDYKcqfNRflnwxjskx5cGHHkTMAKi/view?usp=sharing
2. http://cs.petrsu.ru/~musen/php/2015/Books/PHP6%20and%20MySQL%20Bible%20by%20Steve%20Suehring.pdf
3. https://www.programmer-books.com/wp-content/uploads/2018/06/PHP,%20MySQL,%20&%20JavaScript%20All-in-One%20For%20Dummies.pdf

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Practical Labs , Assignments , Quiz.

Rationale for Nature of the Course :

The Open source is source code that is made freely available for possible modification and redistribution. A main principle of open-source software development is peer production, with products such as source code and documentation freely available to the public.

Activities to be given :

- Practice to code programs
- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLO):
On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Explain the Basic Data types and variables of PHP	**Up to K4**
CLO2	Classify various Functions and String Manipulation	**Up to K4**
CLO3	Construct Array concept and Numerical Functions	**Up to K4**
CLO4	Apply SQL Database design ,Replication and Recovery	**Up to K5**
CLO5	Build Form Submission to a Database	**Up to K5**

K1- Remembering and recalling facts with specific answers

K2- Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 –Examining, analyzing, presentation and make inferences with evidences

K5- Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	▪ What is PHP – What is MySQL – Deciding on a Web Application Platform .Server.	5	15	Chalk & Talk
	▪ Side Scripting Overview : Static HTML – Client-Side Technologies – Server-Side Scripting	5		Chalk & Talk , Spot Test
	▪ Learning PHP Syntax and Variables : PHP Syntax – Comments – Variables – Types in PHP – The Simple Types – Doubles – Booleans – NULL – Strings – Output .	5		Chalk & Talk , PowerPoint Presentation
II	▪ PHP Control Structures and Functions : Boolean Expressions – Branching – Looping	4	15	Chalk & Talk
	▪ Using Functions – Function Documentation – Own Functions – Functions and variable Scope – Function Scope	4		Chalk & Talk , PowerPoint Presentation
	▪ PHP String Handling : Strings in PHP , String Functions	4		Chalk & Talk, Spot Test
	▪ Passing Information with PHP – HTTP Is Stateless – GET Arguments – A Better Use forget Style URLs – POST Arguments – Formatting Form Variables – PHP – Super global Arrays.	3		Chalk & Talk, PowerPoint Presentation
III	▪ Learning Arrays : Uses of Arrays – Creating Arrays – Retrieving Values	5	15	Chalk & Talk, Spot Test , PowerPoint Presentation
	▪ Multidimensional Arrays – Inspecting Arrays – Deleting from Arrays – Iteration .	5		Chalk & Talk

Annexure - 3

	▪ PHP Number Handling : Numerical Types – Mathematical Operators – Mathematical Functions .	5		Chalk & Talk , Group Discussion ,
IV	▪ Introducing Databases And MySQL : What is a Database – Why a Database - PHP-Supported Databases . ▪ Structured Query Language (SQL) : Relational Databases and SQL – SQL Standards – SQL – Database Design – Privileges Security. ▪ Database Administration and Design : MySQL Client Commands – MySQL User Administration – Backups – Replication – Recovery .	5 5 5	15	Chalk & Talk Chalk & Talk, Spot Test, Chalk & Talk, Assignment,
V	▪ Performing Database Queries : HTML Tables and Database Tables – Complex Mappings – Creating sample Tables ▪ Integrating Web Forms and Databases : HTML Forms – Basic Form Submission to a Database – Editing Data with an HTML Form ▪ Editing Data with an HTML Form . Improving Database Efficiency : Connections – Indexing and Table Design .	5 5 5	15	Chalk & Talk , Spot Test Chalk & Talk, PowerPoint Presentation Chalk & Talk, Students Seminar

Course Designer
Mrs.J.Chinna

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
II	Core	22OPCA22	Advanced Java Programming	4	5	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√		

Course Objectives :

1. To understand the basic Java programming constructs
2. To handle Packages, Exception and Multithread Programming
3. To create String Handling and Networking Concepts.
4. To Develop Event Handling, AWT
5. To Design event driven GUI and Java Beans

Course Content :

Unit	Course Content	Hours	K –Level	CLO
I	Data Types, Variables and Arrays: Integers - Floating-Point Types –Characters – Booleans - Variables. Operators: Arithmetic Operators - The Bitwise Operators - Relational Operators - Boolean Logical Operators. Control Statements: Java's Selection Statements - Iteration Statements - Jump Statements. Introducing Classes: Class Fundamentals - Declaring Objects - Introducing Methods - Constructors.	15	Up to K4	CLO1
II	Packages and Interfaces: Packages - Access Protection - Importing Packages - Interfaces. Exception Handling: Exception Handling Fundamentals - Exception Types - Uncaught Exceptions - Using try And catch - Multiple catch Clauses - Nested try Statements. Multithreaded Programming: The Java Thread Model – The Main Thread – Creating a Thread – Creating Multiple Threads - Thread Priorities – Synchronization – Inter thread Communication.	15	Up to K4	CLO2

III	String Handling: The String Constructor – String Length – Special String Operations – Character Extraction – String Comparison – Searching Strings – Modifying Strings. Networking: Networking Basics - The Networking Classes and Interfaces - InetAddress - Inet4Address and Inet6Address - TCP/IP Client Sockets - URL - URL Connection. The Applet Class: Applet Basics - Applet Architecture - An Applet Skeleton - Simple Applet Display Methods - The HTML APPLET Tag.	15	Up to K4	CLO3
IV	Event Handling: The Delegation Event Model – Event Classes – Sources of Events – Event Listener Interfaces . Introducing the AWT : Working With Windows , Graphics and Text : AWT Classes - Window Fundamentals – Introducing Graphics - Working with Color . Using AWT Controls, Layout Managers and Menus : Labels - Using Buttons – Applying Check Boxes - Using Lists - Using a TextField - Using a TextArea – Understanding Layout Managers.	15	Up to K5	CLO4
V	Introducing GUI Programming with Swing: Introducing Swing: Components and Containers - The Swing Packages - A Simple Swing Application. Java Beans: What Is a Java Beans – Advantage of Java Beans – The Java Beans API. Introducing Servlets: The Life Cycle of a Servlet – Servlet Development Options - A Simple Servlets – The Servlets APL.	15	Up to K5	CLO5

Book for Study :

Herbert Schildt , *The Complete Reference - Java™* , Tata McGraw Hill , 9th Edition , 2014.

Chapters:

Unit - I : 3, 4, 5, 6

Unit - II : 9, 10, 11

Unit - III : 16, 22, 23

Unit – IV : 24, 25, 26

Unit - V : 31, 37, 38

Books for References:

1. Raoul Gabriee Urma, *Introducing java 8*, O Reilly Mrdia, 1st Edition, 2015.
2. James Gosling, Bill Joy, Guy Steele, Gilad Bracha, Alex Bukley, *The Java Language Specification Java SE*, 7th Edition, 2013.
3. Joshua Bloch, *Effective Java* , Pearson Addison – Wesley , 3rd Edition , 2018
4. E.Balagurusamy, *Progamming with Java A Primer*, Tata MC Graw Hill, 6th Edition, 2019.
5. Hari Mohan Pandey , *Java Programming* , Pearson , 1st Edition , 2012.

Web Resources:

1. **https://www.javatpoint.com/java-tutorial**
2. **https://www.w3schools.com/java/java_intro.asp**
3. **https://en.wikipedia.org/wiki/Java_(programming_language)**

e-Books:

1. **https://drive.google.com/file/d/1Q9O88t6PGPPDWV6Natiz7bYtSBHtxCTi/view?usp=sharing**
2. **https://drive.google.com/file/d/1byNF-YhQCGUBQuotuXxCgdIfppm3iwFD/view?usp=sharing**
3. **https://drive.google.com/file/d/1mP1Zg7B5RDwl0faub5833Ly8TQPVcdaN/view?usp=sharing**

Pedagogy :

Chalk and Talk , PowerPoint Presentation , Group Discussion , Student Seminar ,Spot Test , Practical Labs , Assignments , Quiz

Rationale for Nature of the Course:

Java is designed to enable development of portable, high-performance applications its includes concepts such as Data Types, Variables and Array, Packages and Exception Handling, String Handling and Swing and Java Beans etc.

Activities to be Given :

- Students Seminar
- Practice to Code Programs
- Group Discussion

Annexure - 3

Course Learning Outcomes(CLO):
On Successful completion of the course, he learners should be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	To Understand the basic concepts of Data Types, Variables and Array and Classes in Java	**Up to K4**
CLO2	To identify Packages and Exception Handling in Java	**Up to K4**
CLO3	To Apply the Concepts of String Handling concepts and Networking	**Up to K4**
CLO4	To develop Event Handling and AWT Controls in Java	**Up to K5**
CLO5	Analyze the Swing and Java Beans in Java	**Up to K5**

K1- Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – learning and solving scheduling concepts and deadlocks.

K4 - Understanding, solving, analyzing, Presenting concepts and deadlocks.

K5 – Evaluate , making Judgments based on criteria

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN:

Units	Description	Hours		Mode of Teaching
I	▪ Data Types, Variables and Arrays: Integers - Floating-Point Types –Characters – Booleans – Variables	4	15	Chalk & Talk
	▪ Operators : Arithmetic Operators - The Bitwise Operators - Relational Operators - Boolean Logical Operators.	4		Chalk & Talk , Spot Test
	▪ Control Statements: Java's Selection Statements - Iteration Statements - Jump Statements.	3		Chalk & Talk,
	▪ .Introducing Classes: Class Fundamentals - Declaring Objects - Introducing Methods - Constructors.	4		Chalk & Talk
II	▪ Packages and Interfaces: Packages - Access Protection - Importing Packages - Interfaces.	5	15	Chalk & Talk
	▪ Exception Handling: Exception Handling Fundamentals - Exception Types - Uncaught Exceptions - Using try And catch - Multiple catch Clauses - Nested try Statements.	5		Chalk & Talk
	▪ Multithreaded Programming: The Java Thread Model – The Main Thread – Creating a Thread – Creating Multiple Threads - Thread Priorities – Synchronization – Inter thread Communication.	5		Chalk & Talk, Spot Test
	▪ String Handling: The String Constructor – String Length – Special String Operations – Character Extraction – String			Chalk & Talk, Spot Test,

III	Comparison – Searching Strings – Modifying Strings. ▪ Networking: Networking Basics - The Networking Classes and Interfaces - InetAddress - Inet4Address and Inet6Address - TCP/IP Client Sockets - URL - URL Connection. ▪ The Applet Class: Applet Basics - Applet Architecture - An Applet Skeleton - Simple Applet Display Methods - The HTML APPLET Tag.	**5** **5** **5**	**15**	Chalk & Talk, Chalk & Talk ,
IV	▪ Event Handling: The Delegation Event Model – Event Classes – Sources of Events – Event Listener Interfaces . ▪ Introducing the AWT: Working With Windows, Graphics and Text : AWT Classes - Window Fundamentals – Introducing Graphics - Working with Color . ▪ Using AWT Controls, Layout Managers and Menus : Labels - Using Buttons – Applying Check Boxes - Using Lists - Using a TextField - Using a TextArea – Understanding Layout Managers	**5** **5** **5**	**15**	Chalk & Talk, PowerPoint Presentation Chalk & Talk, Assignment Chalk & Talk
V	▪ Introducing GUI Programming with Swing: Introducing Swing: Components and Containers - The Swing Packages - A Simple Swing Application. ▪ Java Beans: What Is a Java Beans – Advantage of Java Beans – The Java Beans API. ▪ Introducing Servlets: The Life Cycle of a Servlet – Servlet Development Options - A Simple Servlets – The Servlets APL.	**5** **5** **5**	**15**	Chalk & Talk, Spot Test Chalk & Talk, Chalk & Talk, Students Seminar PowerPoint Presentation

Course Designer
Mrs.K.Krishnaveni

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**External Exam**	**Total**
II	Core	22OPCA23	Software Engineering	4	4	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√		

Course Objectives:

1. The core of Software engineering is to create a Model and agility that has certain design and patterns
2. To learn the fundamental software engineering concepts of estimation, scheduling and risk management which are essential to building excellent software
3. To practice the deep Architectural design and requirement engineering to build good software
4. To implement good Software testing strategies and conventional testing applications can improve internal and external testing software
5. To engrave reusable Quality and good configuration for improve the software Accessibility

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	**Software Engineering:** Software Engineering – A Layered Technology- **A Process Models** -A Generic Process Model – Process Assessment and Improvement - Prescriptive Process Models - Specialized Process Models – The Unifies Process Model- Personal and Team Process Models – Process Technology- Product and Process –**Agile Development –** What is Agility? –Agility and the cost of change- What is an Agile Process? - Extreme programming (XP) – Other Agile Process Models .	12	Up to K4	CLO1
II	**Estimation**: Observation on Estimation - Empirical Estimation Models. **Project Scheduling:** Basic Concepts – Project Scheduling. **Risk Management**: Reactive Vs. Proactive Risk Strategies - Software Risks – Risk	12	Up to K4	CLO2

	Identification – Risk Projection – Risk Refinement. **Principles that Guide Practice –** Software engineering Knowledge - Core Principles – Principles That Guide Each Framework Activity			
III	**Understanding Requirements:** Requirements Engineering – Establishing the Ground work – Eliciting Requirements – Developing Use Cases – Building the Requirements Model. – Negotiating Requirements- Validating Requirements - **Design Concepts :** Design within the Context Of Software Engineering - Design Concepts – The Design Model - **Architectural Design:** Software Architecture- Architectural Genres – Architectural Styles- Architectural Design – Assessing Alternative Architectural Design – Architectural Mapping Using Data Flow.	12	Up to K4	CLO3
IV	**Software Testing Strategies:** A Strategic Approach To Software Testing – Strategic Issues - Test Strategies For Conventional Software - Test Strategies for Object-Oriented Software –Test Strategies for Web Apps - Validation Testing - System Testing - **Testing Conventional Applications:** Software Testing Fundamentals - Internal and External Views of Testing - White Box Testing - Basis Path Testing - Control Structure Testing - Black Box Testing – Model Based Testing.	12	Up to K5	CLO4
V	**Quality Concepts-** What is Quality – Software Quality - **Software Quality Assurance** – Background Issues – Elements of Software Quality Assurance - SQA Tasks , Goals and Metrics - Formal Approach To SQA - Statistical Software Quality Assurance – Software Reliability – **Software Configuration Management** - Software Configuration Management- The SCM Repository - The SCM Process.	12	Up to K5	CLO5

Book for Study :

Roger S. Pressman., *Software Engineering : A Practitioner's Approach* , McGraw Hill (India) Edition , 7th Edition (Alternate edition), 2014

Chapters:

Unit - I	:1.3, 2.1 to 2.8, 3.1 to 3.5
Unit - II	: 26.1, 26.7, 27.1, 27.2, 28.1 to 28.5, 4.1, 4.2, 4.3.
Unit - III	: 5.1- 5.7, 8.1 ,8.3, 8.4, 9.1 to 9.6
Unit - IV	: 17.1 to 17.7, 18.1 to 18.7
Unit - V	: 14.1 to 14.2 , 16.1 to 16.6, 22.1 to 22.3

Books for Reference :

1. Aggarwal K K & Yogesh Singh , *Software Engineering, New Age International*, New Delhi, 2nd Edition, 2005.
2. Ian Sommerville, *Software Engineering*, Pearson Education , 6th Edition , 2000.
3. James Peters F & Witold Pedryez , *Software Engineering – An Engineering Approach*, John Wiley and Sons , 2nd Edition , 2000.
4. Pankaj Jalote, *An Integrated Approach to Software Engineering* , Springer Verlag, 3rd Edition, reprint 2005.
5. Rajib Mall, Fundamentals of Software Engineering –PHI Learning private limited, 5th Edition,2014

Web Resources :

1.https://www.javatpoint.co
2.https://www.tutorialspoint.com/software_engineering/index.htm
3.https://www.guru99.com/what-is-software-engineering.html

e-Books :

1.https://books.goalkicker.com/CPlusPlusBook/
2. https://www.computer-pdf.com/getfile
3. https://people.cs.vt.edu/~shaffer/Book/C++3e20120102.pdf

Pedagogy :

Chalk and Talk , PowerPoint Presentation , Group Discussion , Student Seminar ,Spot Test , Practical Labs , Assignments , Quiz

Rationale for Nature of the Course :

The practical application of scientific knowledge to the creative design and building of computer programs. It also includes associated documentation needed for developing, operating, and maintaining them

Activities on Knowledge and Skill

- Practice to code programs
- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLO):
On Successful Completion of the course students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand to Examine the Basic Concepts Software engineering	**Up to K4**
CLO2	Identify how estimation, scheduling and risk is to used in Software engineering	**Up to K4**
CLO3	Apply the Knowledge to Develop software by implementing requirement and design engineering principles	**Up to K4**
CLO4	Apply Knowledge to Construct software using Testing strategies and conventional applications	**Up to K5**
CLO5	Analyze the concept of software quality improvements and SCM process	**Up to K5**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – Solving Problems
K4 –Examining, analyzing, presentation and make inferences with evidences
K5-Evaluate , making Judgments based on criteria

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(Pos)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advance Level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	• **Software Engineering:** Software Engineering – A Layered Technology- • **A Process Models** -A Generic Process Model – Process Assessment and Improvement - Prescriptive Process Models - Specialized Process Models – The Unifies Process Model- Personal and Team Process Models – Process Technology- Product and Process • **Agile Development –** What is Agility? –Agility and the cost of change- What is an Agile Process? - Extreme programming (XP) – Other Agile Process Models .	4 4 4	12	Chalk & Talk, Spot Test Chalk & Talk Chalk & Talk , Group Discussion ,
II	▪ **Estimation**: Observation on Estimation - Empirical Estimation Models. ▪ **Project Scheduling:** Basic Concepts – Project Scheduling. **Risk Management**: Reactive Vs. Proactive Risk Strategies - Software Risks – Risk Identification – Risk Projection – Risk Refinement. ▪ **Principles that Guide Practice –** Software engineering Knowledge - Core Principles – Principles That Guide Each Framework Activity.	3 3 3	12	Chalk & Talk, Spot Test Chalk & Talk Chalk & Talk Chalk & Talk , Group Discussion
III	• **Understanding Requirements:** Requirements Engineering – Establishing the Ground work – Eliciting Requirements – Developing Use Cases – Building the Requirements Model. – Negotiating Requirements- Validating Requirements – • **Design Concepts :** Design within the Context Of Software Engineering - Design Concepts – The Design Model • **Architectural Design:** Software Architecture- Architectural Genres – Architectural Styles- Architectural Design – Assessing Alternative Architectural Design – Architectural Mapping Using Data Flow..	4 4 4	12	Chalk & Talk, Spot Test Chalk & Talk Chalk & Talk , Group Discussion ,

Annexure - 3

IV	• **Software Testing Strategies:** A Strategic Approach To Software Testing – Strategic Issues - Test Strategies For Conventional Software –	3	12	Chalk & Talk, Spot Test
	• Test Strategies for Object-Oriented Software –Test Strategies for Web Apps - Validation Testing - System Testing	3		PowerPoint Presentation
	• **Testing Conventional Applications:** Software Testing Fundamentals - Internal and External Views of Testing	3		Chalk & Talk,
	▪ White Box Testing - Basis Path Testing - Control Structure Testing - Black Box Testing – Model Based Testing.	3		PowerPoint Presentation
V	• **Quality Concepts-** What is Quality – Software Quality • **Software Quality Assurance** – Background Issues – Elements of Software Quality Assurance - SQA Tasks , Goals and Metrics - Formal Approach To SQA - Statistical Software Quality Assurance – Software Reliability	4 4	12	Chalk & Talk, Spot Test PowerPoint Presentation
	• **Software Configuration Management** - Software Configuration Management- The SCM Repository - The SCM Process.	4		Chalk & Talk

Course Designer
Mrs.J.Chinna

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
II	Elective	22OPCADSE2A	Data Mining and Data Warehousing	4	5	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√		

Course Objectives:

1. To acquire knowledge about Data Mining and warehousing,
2. To study the various steps in data pre-processing and Association mining.
3. To understand the basic and advanced concept of Classification technique.
4. To learn the different methods of Clustering.
5., To analyse the data mining trends and various application of data mining.

Course Content :

Unit	Course Contents	Hours	K Level	CLO
I	Introduction : Why Data Mining? - What is Data Mining? – What kinds of data can be mined? - What kinds of patterns can be mined? - Which technologies are used? –Which kinds of Applications are targeted? - Major issues in Data Mining . Data Warehousing and Online Analytical Processing: Data Warehouse: Basic Concepts - Data Warehouse Modeling: Data Cube and OLAP – Data Warehouse Design and Usage - Data Warehouse Implementation .	15	Up to K4	CLO1
II	Data Preprocessing – Data Preprocessing: An overview - Data Cleaning - Data Integration - Data Reduction - Data Transformation and Data Discretization. Mining frequent patterns, associations and Correlations: Basic Concepts and Methods Basic Concepts-Frequent itemset Mining Methods.	15	Up to K4	CLO2
III	Classification: Basic Concepts: Basic Concepts - Decision Tree Induction – Bayes Classification Methods – Rule-Based Classification. Classification: Advanced Methods: Bayesian Belief Networks-Classification by Back propagation – Support Vector Machines – Lazy Learners- Other Classification Methods.	15	Up to K4	CLO3
IV	Cluster Analysis: Basic Concepts and Methods: Cluster Analysis- Partitioning Methods –Hierarchical Methods – Density-Based Methods- Grid-Based Methods. Advanced Cluster Analysis: Probabilistic Model-Based Clustering - Clustering High-Dimensional Data- Clustering Graph and Network Data – Clustering with Constraints.	15	Up to K5	CLO4
V	Outlier Detection: Outliers and Outlier Analysis – Outlier Detection Methods. Data Mining Trends and Research Frontiers: Mining Complex Data Types- Other Methodologies of Data Mining-Data Mining Applications- Data Mining and Society- Data Mining Trends.	15	Up to K5	CLO5

Annexure - 3

Book for Study:

Jiawei Han and Micheline Kamber , Jian Pei , *Data Mining Concepts and Techniques* , Elsevier Publisher , 3rd Edition , 2011.

Chapters:

Unit - I	: 1.1 to 1.7, 4.1 to 4.4
Unit - II	: 3.1 to 3.5, 6.1, 6.2
Unit - III	: 8.1 to 8.4, 9.1 to 9.3, 9.5, 9.6
Unit - IV	: 10.1 to 10.5, 11.1 to 11.4
Unit - V	: 12.1, 12.2, 13.1 to 13.5

Books for Reference:

1. S.Nagabhushana , *Data Warehousing OLAP and Data Mining* , New Age International Publishers , 1st Edition , 2006
2. Pieter Adriaans , Dolf Zantinge , *Data Mining* , Pearson Education , 1st Edition , 2007.
3. Arun K.Pujari, *Data Mining Techniques* , Universities press, 3rd Edition , 2013.
4. S.K. Mourya, Shalu Gupta, *Data Mining and Data warehousing* , Narosa Publishing House Private Ltd , 1st Edition , 2013.
5. Bharat Bhushan Agarwal , Sumit Prakash Tayal , *Data Mining and Data Warehousing* , University Science Press , 1st Edition , 2009.

Web Resources :

1. https://tinyurl.com/7x37fesh
2.https://www.academia.edu
3.http://infolab.stanforg,edu

e-Books:

1. https://drive.google.com/file/d/11niDmYcpF_C44RCG9bmsH3Mndk47ulNI/view?usp=sharing
2. https://drive.google.com/file/d/1fYSW-fT3Mj24bvMnf4RxPYpvxLRyV2o/view?usp=sharing
3. https://drive.google.com/file/d/1cSVCjZxJI7AFDFsKDVlZHoQDGoVV5nxI/view?usp=sharing

Pedagogy:

Chalk and Talk, Group Discussion, Student Seminar, Spot Test, Quiz and Assignments

Rationale for Nature of the Course :

The data preprocessing methods and techniques and applications of data mining are widely used in real time

Activities to be given :

- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes (CLOs):
On Successful completion of the course, the learners should be able to

CLOs	Course Learning Outcomes	Knowledge Level(According to Bloom's Taxonomy)
CLO1	Understand the basic concepts of Data mining and Data Warehouse	**Up to K4**
CLO2	Classify the various methods of data preprocessing and frequent itemset mining	**Up to K4**
CLO3	Apply the Basic and Advanced methods in classification	**Up to K4**
CLO4	Make use of various methods of Clustering	**Up to K5**
CLO5	Examine the various types of Outlier Detection and Data Mining Applications	**Up to K5**

K1- Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – solving problems

K4- Examining, analyzing, presentation and make inference with evidences.

K5 – Evaluate , making Judgments based on criteria

Course Learning Outcomes:

Mapping of Course Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	3	2	2	2	1	1
CLO2	3	2	2	3	2	1
CLO3	3	2	3	3	3	3
CLO4	3	3	3	3	3	3
CLO5	3	3	3	3	3	3

1. Basic level **2. Intermediate level** **3. Advanced level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	• Why Data Mining,- What is Data Mining, What kinds of data can be mined, What kinds of patterns can be mined	4		Chalk and Talk
	• Which technologies are used, Which kinds of Applications are targeted, Major issues in Data Mining.	4		Chalk and Talk
	• Data Warehouse: Basic Concepts, ,Data Warehouse Modeling : Data Cube and OLAP – Data Warehouse Design and Usage - Data Warehouse Implementation.	4	15	Chalk and Talk
	• Data Warehouse Design and Usage - Data Warehouse Implementation	3		Chalk and Talk
II	• Data Preprocessing: An overview - Data Cleaning	4		Chalk and Talk
	• Data Integration - Data Reduction	4	15	PPT
	• Data Transformation and Data Discretization	4		Chalk and Talk
	• Basic Concepts-Frequent itemset Mining Methods.	3		PPT
III	• Basic Concepts ,Decision Tree Induction, Bayes Classification Methods , Rule-Based Classification.	4		Chalk and Talk
	• Bayesian Belief Networks, Classification by Back propagation	4	15	Chalk and Talk
	• Support Vector Machines ,Lazy Learners, Other Classification Methods.	3		Chalk and Talk
	• Clustering Graph and Network Data, Clustering with Constraints.	4		PPT
IV	• Cluster Analysis, Partitioning Methods ,Hierarchical Methods , Density-Based Methods, Grid-Based Methods	5	15	Chalk and Talk
	• Probabilistic Model-Based Clustering , Clustering High-Dimensional Data	5		Chalk & Talk, Assignment
	• Clustering Graph and Network Data , Clustering with Constraints.	5		Chalk and Talk & Group Discussion

Annexure - 3

V	• Outliers and Outlier Analysis ,Outlier Detection Methods. • Mining Complex Data Types, Other Methodologies of Data Mining • Data Mining Applications, Data Mining and Society, Data Mining Trends	5 5 5	15	PPT Chalk and Talk PPT

Course Designer
Dr.(Mrs.)S.Vijayasankari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs.**	**CIA**	**External Exam**	**Total**
II	Elective	22OPCADSE2B	Artificial Intelligence	4	5	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√		√

Course Objectives:

1) To enable computers to perform such intellectual tasks as decision making, problem solving, perception, understanding human communication .
2) Artificial intelligence shapes the future of every company.
3) Artificial intelligence creates synergy between humans and AI
4) Artificial intelligence helps with planning
5) Artificial intelligence performs more complex tasks

Course Content :

Unit	Course Content	Hours	K-Level	CLO
I	**Artificial Intelligence**: What is Artificial Intelligence - The AI Problems - The Underlying Assumption - What is an AI Technique - Criteria for Success . **Problems - Problem Spaces and Search** : Defining the Problem as a State Space Search - Production Systems – Problem Characteristics - Production System Characteristics - Issues in the Design of Search Programs.	15	Up to K4	CLO1
II	**Heuristic Search Techniques**: Generate and Test - Hill Climbing - Best First Search – Problem Reduction - Constraint Satisfaction - Means Ends Analysis. **Knowledge Representation Issues** : Representations and Mapping - Approaches to Knowledge Representation - Issues in Knowledge Representation - The Frame Problem	15	Up to K4	CLO2
III	**Using Predicate Logic:** Representing Simple Facts in Logic - Representing Instance and Isa Relationships - Computable Functions and Predicates – Resolution - Natural Deduction. **Representing Knowledge Using Rules:** Procedural Versus Declarative Knowledge - Logic Programming - Forward Versus Backward Reasoning – Matching - Control Knowledge.	15	Up to K4	CLO3
IV	**Statistical Reasoning:** Probability and Bayes' Theorem - Bayesian Networks - Fuzzy Logic. **Game Playing:** Overview - The Minimax Search Procedure - Adding Alpha-beta CutOffs - Iterative Deepening.	15	Up to K5	CLO4

V	**Natural Language Processing:** Introduction - Syntactic Processing - Semantic Analysis. **Expert Systems**: Representing and Using Domain Knowledge - Expert System Shells – Explanation - Knowledge Acquisition.	15	Up to K5	CLO5

Book for Study :

Elaine Rich , Kevin Knight and Shivashanker B Nair , *Artificial Intelligence* , McGraw Hill , 3rd Edition , 2010

Chapters:

Unit - I **:** 1(1.1 – 1.3 , 1.5) , 2(2.1-2.5)

Unit - II **:** 3(3.1-3.6) , 4(4.1-4.4)

Unit - III **:** 5(5.1 – 5.5) , 6(6.1-6.5)

Unit - IV **:** 8(8.1,8.3,8.5) , 12(12.1-12.3 , 12.5)

Unit - V **:** 15(15.1 – 15.3) , 20(20.1 -20.4)

Books for Reference :

1. Kaushik , *Artificial Intelligence* , Cengage Publisher , 1st Edition , 2011.
2. Dr.Dheeraj Mehrotra , *Basics Of Artificial Intelligence & Machine Learning* , Notion Press; 1st Edition 2019
3. Stuart Russell , *Artificial Intelligence:A Modern Approach* , Pearson Education , 3rd Edition, 2013.
4. Jatinder Singh , Amardeep Singh , Gurjeet Singh , *A Text book of Artificial Intelligence* ,VDH Publisher , 1st Edition , 2012.
5. Deepak Khemani , *A first Course in Artificial Intelligence* , McGraw Hill Education , 3rd Edition , 2013.

Web Resources :

1.https://www.javatpoint.com/artificial-intelligence-tutorial
2.http://zsi.tech.us.edu.pl/~nowak/bien/BIEN_introduction
3https://www.guru99.com/artificial-intelligence-tutorial.html

e-b ooks:

1. https://cs.calvin.edu/courses/cs/344/kvlinden/resources/AIMA-3rd-edition.pdf
2. https://www.cin.ufpe.br/~tfl2/artificial-intelligence-modern-approach.9780131038059.25368.pdf
3.http://www.freebookcentre.net/ComputerScience-Books-Download/Artificial-Intelligence-Lecture-Notes-Veer-Surendra-Sai-University.html

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Assignments , Quiz

Rationale for Nature of the Course :

Studying artificial intelligence opens a world of opportunities. At a basic level, its better to understand the systems and tools that we interact with on a daily basis. In the field of artificial intelligence, the possibilities are truly endless.

Activities on Knowledge and Skill

- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes(CLO):
On Successful Completion of the course students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Understand the importance, the basic concepts and the Applications of AI	**Up to K4**
CLO2	Apply various search techniques used for Intelligent systems	**Up to K4**
CLO3	Efficiently represent the various knowledge representation schemes used for intelligent systems.	**Up to K4**
CLO4	Apply some statistical like Bayes Theorem and Soft computing techniques (like ANN and GA) to solve the AI problem.	**Up to K5**
CLO5	Understand the phases and the architecture of various advanced system like NLP based system and Expert System.	**Up to K5**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – Solving Problems
K4 –Examining, analyzing, presentation and make inferences with evidences
K5 – Evaluate , making Judgments based on criteria.

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	3	2	2	3
CLO2	1	2	3	2	2	3
CLO3	2	3	2	2	2	1
CLO4	2	2	3	2	2	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours		Mode of Teaching
I	▪ **Artificial Intelligence:** What is Artificial Intelligence - The AI Problems - The Underlying Assumption - What is an AI Technique - Criteria for Success **.**	5	15	Chalk & Talk, Spot Test
	▪ **Problems - Problem Spaces and Search :** Defining the Problem as a State Space Search - Production Systems	5		Chalk & Talk
	▪ Problem Characteristics - Production System Characteristics - Issues in the Design of Search Programs.	5		Chalk & Talk , Group Discussion ,
II	▪ **Heuristic Search Techniques:** Generate and Test - Hill Climbing - Best First Search - Problem Reduction - Constraint Satisfaction - Means Ends Analysis .	5	15	Chalk & Talk, Spot Test
	▪ **Knowledge Representation Issues :** Representations and Mapping –	5		Chalk & Talk
	▪ Approaches to Knowledge Representation - Issues in Knowledge Representation - The Frame Problem	5		Chalk & Talk , Group Discussion ,
III	▪ **Using Predicate Logic:** Representing Simple Facts in Logic - Representing Instance and Isa Relationships - Computable Functions and Predicates – Resolution - Natural Deduction.	5	15	Chalk & Talk, Spot Test
	▪ **Representing Knowledge Using Rules:** Procedural Versus Declarative Knowledge -	5		Chalk & Talk

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	Logic Programming ▪ Forward Versus Backward Reasoning – Matching - Control Knowledge.	5		PowerPoint Presentation , Group Discussion ,
IV	▪ **Statistical Reasoning:** Probability and Bayes' Theorem - Bayesian Networks - Fuzzy Logic. ▪ **Game Playing:** Overview - The Minimax Search Procedure ▪ Adding Alpha-beta CutOffs - Iterative Deepening.	5 5 5	15	Chalk & Talk, Spot Test PowerPoint Presentation Chalk & Talk,
V	▪ **Natural Language Processing:** Introduction - Syntactic Processing - Semantic Analysis. ▪ **Expert Systems:** Representing and Using Domain Knowledge ▪ Expert System Shells – Explanation - Knowledge Acquisition**.**	5 5 5	15	Chalk & Talk, Spot Test PowerPoint Presentation Chalk & Talk

Course Designer
Mrs.M.Murugeswari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
II	Core	22OPCA21P	Open Source Technology Lab	2	5	40	60	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course Objectives :

1. To be aware of the evolution and fundamental concepts of Data types and variables
2. To Classify various Functions and String Manipulation
3. To practice the fundamental programming methodologies in the PHP programming language via laboratory experiences.
4. To code, document, test, and implement a well-structured, robust computer program using the PHP language.
5. To performing database queries and building Form Submission to a Database

Course Content :

.Unit	Content	Hours	K-Level	CLO
I	1. Program using String. 2. Program using PHP Time zone 3. Program using Sorting Array. 4. Program using Global Array	15	Up to K4	CLO1
II	5. Program using Function. 6. Program for reading data in Web pages. 7. Program using browser handling Power. 8. Program using Oops concept. Program using cookies	15	Up to K4	CLO2
III	9. Program using exception handling 10. Program using File.	15	Up to K4	CLO3

	11. Program using Form Validation. 12. Program using PHP XML Parser			
IV	13. Program using PHP Filter 14. Program using MySQL Database Creation. 15. Program using MySQL Database table 16. Program using Session 17. Program using Cookies and FTP.	15	Up to K5	CLO4
V	18. Program using Web application Security 19. Program using web forms and database 20. Program using Web application Security.	15	Up to K5	CLO5

Book for Study :

Steve Suehring , Tim Converse and Joyce Park , PHP6 and MySQL , Wiley Publishers , 3rd Edition , 2014 .

Books for Reference:

1. Tom Butler , Kevin Yank , PHP & MySQL Novice to Ninja, Sitepoint , 6th Edition , 2017
2. Luke Welling , Laura Thomson , PHP and My SQL Web Development , Addison-Wesley , 5th Edition 2017.
3. Robin Nixon , Learning PHP, MySQL & JavaScript with j Query, CSS & HTML5, O Reilly , 4th Edition, 2015.
4. Apache , Beginning PHP6 MySQL Web Development , Wiley , 2nd Edition , 2014.
5 . Joel Murach, Ray Harris , Murach's PHP & MySQL , Mike Murach & Associates Inc., 2nd Edition ,2014

Web Resources :

1. http://www.gov.pe.ca
2. https://www.esri.com
3. https://www.redhat.com/

e-books :

1. https://books.goalkicker.com/CPlusPlusBook/
2. https://www.computer-pdf.com/getfile
3. https://people.cs.vt.edu/~shaffer/Book/C++3e20120102.pdf

Pedagogy:

Chalk and Talk, PowerPoint Presentation, Group Discussion, Student Seminar, Spot Test, Practical Labs, Assignments, Quiz

Rationale for Nature of the Course :

The Open source is source code that is made freely available for possible modification and redistribution. A main principle of open-source software development is peer production, with products such as source code and documentation freely available to the public.

Activities to be Given :

- Practice to Code Programs
- Practice Lab Exercises

Course Learning Outcomes(CLO):

On successful Completion of the course Students will be able to

CLOs	Course Learning Outcomes	Knowledge (According to Bloom's Taxonomy)
CLO1	Develop the basic Programs using strings and arrays	**Up to K4**
CLO2	Make use of functions and OOPS concepts in PHP	**Up to K4**
CLO3	Write Programs for files and form validation	**Up to K4**
CLO4	Construct different types of Database programs in PHP	**Up to K5**
CLO5	Build the programs using web applications	**Up to K5**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – Solving Problems
K4 –Examining, analyzing, presentation and make inferences with evidences
K5 – Evaluate , making Judgments based on criteria.

Annexure - 3

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
LO1	2	2	1	2	2	3
CLO2	1	2	2	3	1	2
CLO3	2	3	2	2	2	1
CLO4	2	3	3	3	3	2
CLO5	3	2	3	2	3	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

LESSON PLAN :

Unit	Programs	Hours	Mode of Teaching
I	Program using String. Program using PHP Time zone Program using Sorting Array. Program using Global Array	15	Demo & Practical Session
II	Program using Function. Program for reading data in Web pages. Program using browser handling Power. Program using Oops concept.	15	Demo & Practical Session
III	Program using File. Program using Form Validation.	15	Demo & Practical Session
IV	Program using PHP Filter Program using MySQL Database Creation. Program using MySQL Database table	15	Demo & Practical Session
V	Program using Session , Cookies and FTP. Program using Web application Security.	15	Demo & Practical Session

Course Designer
Mrs.J.Chinna

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
II	Core	22OPCA22P	Advanced Java Programming Lab	2	5	40	60	100

Nature of the Course :

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
√	√	

Course objectives

1. To Implement basic Java programs
2. To write coding for constructor overloading and inheritance
3. To built programs using package and method overriding.
4. To Develop programs for exception handling, interface and file I/O
5. To design Applet programs, AWT and event driven GUI

Course Content :

Unit	Content	Hours	K-Level	CLO
I	Basic Programs 1) Write java program to print Biggest of 3 Numbers using Logical Operators 2) Write a java program to print first 10 numbers in Fibonacci series 3) Write a java program to print Factorial of a given number 4) Write a java program to print the names in sorted order using arrays 5) Write a java program to print multiplication table using arrays Method Overloading 1) Write a java program to demonstrate method overloading	**15**	Up to K4	CLO1
II	Constructor overloading : 1) Write a java program to illustrate the concept of constructors and its overloading. 2) Write a java program for Rectangle class using constructor overloading with different no. of parameter list. Inheritance	**15**	Up to K4	CLO2

	1) Write a java program for Rectangle class using Simple Inheritance 2) Write a Java program to demonstrate multilevel inheritance.			
III	Method Overriding 1) Write a java program for Bank class using Method Overriding. 2) Write a java program to demonstrate Method overriding (use super keyword) Packages: 1) Write a Java program to demonstrate use of user defined packages. 2) Write a java package for book class and then import and display the result. 3) Write a java program to find the cube of a number for various data types using package and then import and display the results	**15**	Up to K4	CLO3
IV	Interfaces: 1) Write a Java program to illustrate the multiple inheritance by using Interfaces. Exception handling: 1) Write a java program to demonstrate simple example for exception handling 2) Write a java program to demonstrate exception handling with multiple catch blocks 3) Write a java program using Number Format exception File I/O and Streams 1) Write a java program to Demonstration of File Output Stream and Print Stream classes 2) Write a java program to Write bytes to a file 3) Write a java program to copy bytes from one file to another.	**15**	Up to K5	CLO4
V	X Applets 1) Write a java program for Sum of Two Numbers using Applet 2) Write a java program for Applet using drawstring(), drawRect() and drawOval() 3) Write a Java program to demonstrate banner applet. XI AWT 1)Write a java program that prints a message by clicking on the button using AWT 2) Write a java program to demonstrate Grid Layout manager using AWT 3) GUI with controls menus and event handling using SWING	**15**	Up to K5	CLO5

Book for Study :

Herbert Schildt , *The Complete Reference - Java*^{TM} , Tata McGraw Hill , 9th Edition , 2014.

Books for Reference:

1. Raoul Gabriee Urma, *Introducing java 8*, O Reilly Mrdia, 1st Edition, 2015.
2. James Gosling, Bill Joy, Guy Steele, Gilad Bracha, Alex Bukley, *The Java Language Specification Java SE*, 7th Edition, 2013.
3, Joshua Bloch, *Effective Java* , Pearson Addison – Wesley , 3rd Edition , 2018
4, E.Balagurusamy, *Progamming with Java A Primer*, Tata MC Graw Hill, 6th Edition, 2019.
5. Hari Mohan Pandey , *Java Programming* , Pearson , 1st Edition , 2012.

Web Resources:

1. https://www.javatpoint.com/java-tutorial
2. https://www.w3schools.com/java/java_intro.asp
3. https://en.wikipedia.org/wiki/Java_(programming_language)

e-books:

1. https://mrcet.com/pdf/Lab%20Manuals/JAVA%20PROGRAMMING.pdf
2. https://www.csd.uoc.gr/~hy252/references/Programming%20in%20Java.pdf
3. http://www.jnit.org/wp-content/uploads/2020/04/4CS4-25-Java-Lab-Manual.pdf

Pedagogy:

Chalk and Talk, PowerPoint Presentation, , Practical Labs

Rationale for Nature of the Course:

Java is designed to enable development of portable, high-performance applications its includes concepts such as method overriding, constructor overloading, Packages, Exception Handling, and Applets etc.

Activities to be Given :

- Practice to Code Programs
- Practice Lab Exercises

Annexure - 3

Course Learning Outcomes (CLO):

On Successful completion of the course, he learners should be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Develop the basic Programs in Java	**Up to K4**
CLO2	Make use of Overloading and Overriding methods in Java	**Up to K4**
CLO3	Write Programs for various types of Inheritance	**Up to K4**
CLO4	Construct different types of APPLET and AWT Programs in Java	**Up to K5**
CLO5	Build various Packages of Java	**Up to K5**

K1- Remembering and recalling facts with specific answers
K2- Basic understanding of facts and stating main ideas with general answers
K3 – Application oriented – Solving Problems
K4 –Examining, analyzing, presentation and make inferences with evidences
K5 – Evaluate , making Judgments based on criteria

Mapping of Course Learning Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	2	1	2	2	3
CLO2	1	2	3	3	1	2
CLO3	2	3	2	2	2	1
CLO4	2	3	3	2	3	2
CLO5	2	2	3	2	2	3

1 – Basic Level **2 – Intermediate Level** **3- Advanced Level**

Annexure - 3

LESSON PLAN :

Units	Description	Hours	Mode of Teaching
I	• Write java program to print Biggest of 3 Numbers using Logical Operators Write a java program to print first 10 numbers in Fibonacci series Write a java program to print Factorial of a given number • Write a java program to print the names in sorted order using arrays Write a java program to print multiplication table using arrays Write a java program to demonstrate method overloading	15	Demo & Practical Session Demo & Practical Session
II	• Write a java program to illustrate the concept of constructors and its overloading. Write a java program for Rectangle class using constructor overloading with different no. of parameter list. • Write a java program for Rectangle class using Simple Inheritance Write a Java program to demonstrate multilevel inheritance.	15	Demo & Practical Session Demo & Practical Session
III	• Write a java program for Bank class using Method Overriding. Write a java program to demonstrate Method overriding (use super keyword) Write a Java program to demonstrate use of user defined packages. • Write a java package for book class and then import and display the result. Write a java program to find the cube of a number for various data types using package and then import and display the results	15	Demo & Practical Session Demo & Practical Session
IV	• Write a Java program to illustrate the multiple inheritance by using Interfaces. Write a java program to demonstrate simple example for exception handling Write a java program to demonstrate exception handling with multiple catch blocks	15	Demo & Practical Session

Annexure - 3

	• Write a java program using Number Format exception Write a java program to Demonstration of File Output Stream and Print Stream classes Write a java program to Write bytes to a file Write a java program to copy bytes from one file to another.		Demo & Practical Session
V	• Write a java program for Sum of Two Numbers using Applet Write a java program for Applet using drawstring(), drawRect() and drawOval() Write a Java program to demonstrate banner applet. • Write a java program that prints a message by clicking on the button using AWT Write a java program to demonstrate Grid Layout manager using AWT GUI with controls menus and event handling using SWING	15	Demo & Practical Session Demo & Practical Session

Course Designer
Dr.(Mrs.)S.Vijayasankari

Annexure - 3

Department of Computer Applications				Class : I M.C.A				
Sem.	**Category**	**Course Code**	**Course Title**	**Credits**	**Hrs**	**CIA**	**External Exam**	**Total**
II	IDC	22OPCAID2	E- Commerce	2	2	25	75	100

Nature of the Course

Knowledge and Skill Oriented	Employability Oriented	Entrepreneurship Oriented
	√	√

Course Objectives:

1.To learn the basic concepts of E-Commerce
2. To study the architecture and technologies of E-Commerce
3. To understand the business and process models
4.To analyse the B2B business models
5.To evaluate the Impacts of E-Commerce

Course Content :

Unit	Course Contents	Hours	K Level	CLO
I	Basics and definition - The Term E- Commerce - E-Commerce with the 5-C -Model – Additional terms - Role of internet	6	Up to K4	CLO1
II	Frameworks and Architectures - Actors and stakeholders – Fundamental sales process- Basic Technologies	6	Up to K4	CLO2
III	B2C Business – The Process Model and its variants – Buying via internet – Variants of the process.	6	Up to K4	CLO3
IV	B2B Business - The Process Model and its variants – Definition of B2B –Difference between B2B and B2C - Strong B2B relationship – Supply chain management	6	Up to K5	CLO4
V	Impact of E- Commerce - Ethics ,Morale, & technology – Ethical Aspects of ICT – Information Rights & information duties - Proprietary Rights and duties - Accountability and Check – Overall impacts of E- Commerce	6	Up to K5	CLO5

Proprietary

Book for Study :

Martin Kutz , Introduction to E- Commerce Combining Business and Information Technology, Bookboon.com The eBook company, 1st edition,2016.

Chapters:

Unit I : Chapter 1 , 1.1 , 1.1.4, 1.1.5, 1.1.6,
Unit II : Chapter 2,2.1, 2.2,2.3.1,
Unit III : Chapter 3, 3.1.1, 3.1.2
Unit IV : Chapter 4 , 4.1, 4.1.1, 4.1.2, 4.1.3,4.1.4
Unit V : Chapter 5 , 5.1, 5.2., 5.2.1, 5.2.2, 5.2.3, 5.3

Books for Reference:

. 1. Janice Reynolds ,*'The Complete E-commerce Book: Design, Build & Maintain a Successful Web-based Business'* CMP Books ,2000.
2. Kenneth C.Laudon, , Carol GuercioTraver,' *E-Commerce 2017', Business Technology, Society',13th edition, 2017*
3. Dave Chaffey *' E-Business and E-Commerce Management: Strategy, Implementation and Practice,5th Edition, 2013*
4. P.T. Joseph , S.J,'E-Commerce : An Indian Perspective ', PHI Publication, 3rd edition,,2009.
5. Janice donald, the complete E-commerce book, CRC press 2nd edition, 2014

Web Resources :

1. https://www.practicalecommerce.com/12-new-ecommerce-books-for-summer-2021
2. https://www.ddegjust.ac.in/studymaterial/mcom/mc-201.pdf
3. https://www.learn4good.com/bookstore/ebusiness_ecommerce_books_cds.htm

E-Books:

1 https://irp-cdn.multiscreensite.com/1c74f035/files/uploaded/introduction-to-e-commerce.pdf

2 https://vdocuments.mx/e-commerce-fundamentals-and-applications.html

3 http://my.spc.edu.ph:70/e_books/Business%20Admin/Financial%20Management/E-commerce.pdf

Pedagogy :

Chalk and Talk , Group Discussion , Student Seminar ,Spot Test , Practical Labs , Assignments , Quiz.

Rationale for Nature of the Course :

The purpose of the C++ class construct is to provide the programmer with a tool for creating new types that can be used as conveniently as the built-in types.

Activities on Knowledge and Skill

- Group Discussion
- Seminar

Annexure - 3

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLOs	Course Learning Outcomes	Knowledge Level (According to Bloom's Taxonomy)
CLO1	Discuss the basic concepts of E-Commerce	**Up to K4**
CLO2	Describe the architecture and technologies of E-Commerce	**Up to K4**
CLO3	Illustrate the various business and process models	**Up to K4**
CLO4	Analyse the B2B business models	**Up to K5**
CLO5	Evaluate the Impacts of E-Commerce	**Up to K5**

K1- Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – solving problems

K4- Examining, analyzing, presentation and make inference with evidences.

K5-Evaluate , making Judgments based on criteria

Mapping of Course Outcomes(CLOs) with Program Outcomes(POs)

	PO1	PO2	PO3	PO4	PO5	PO6
CLO1	2	1	3	2	3	2
CLO2	1	2	3	2	1	2
CLO3	1	1	2	2	2	3
CLO4	2	2	3	2	2	3
CLO5	2	2	2	2	3	3

1. Basic level **2. Intermediate level** **3. Advanced level**

Annexure - 3

LESSON PLAN :

Unit	Description	Hours	Mode of Teaching
I	Basics and definition - The Term E-Commerce - E- Commerce with the 5C model – Additional terms - Role of internet	6	Chalk and Talk Presentation
II	Frameworks and Architectures - Actors and stakeholders – Fundamental sales process-Basic Technologies	6	Chalk and Talk Presentation
III	B2C Business –The Process Model and its variants – buying via internet – variants of theprocess	6	Chalk and Talk PPT , Presentation
IV	B2B Business - The Process Model and its variants – Definition of B2B – Difference between B2B and B2C - Strong B2B relationship – Supply chain management	6	Chalk and Talk PPT Presentation
V	Impact of E- Commerce - Ethics ,Morale, & technology – Ethical Aspects of ICT – Information Rights & information duties - Proprietary Rights and duties - Accountability and Check – Overall impacts of E- Commerce	6	Chalk and Talk

Course Designer
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