

**LEARNING OUTCOMES–BASED CURRICULUM
FRAMEWORK (LOCF)**

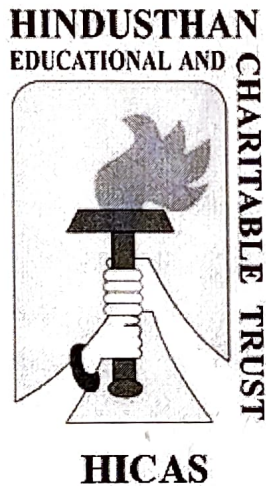
In the

POSTGRADUATE PROGRAMME

MASTER OF COMPUTER APPLICATIONS

FOR THE STUDENTS ADMITTED FROM THE

ACADEMIC YEAR 2022 - 2023 AND ONWARDS



**HINDUSTHAN COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)
(Affiliated to Bharathiar University and Accredited by NAAC) COIMBATORE-641028
TAMILNADU, INDIA.**

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PREAMBLE

Learning Outcome Based Curriculum Framework for Postgraduate education in **Master of Computer Applications**

This program focuses on providing a sound theoretical background as well as good practical exposure to students in the relevant areas. It is intended to provide modern, industry-oriented education in applied computer science. This course is inclined towards Application Development and thus has more emphasis on the latest programming language and tools to develop better and faster applications. This course is designed to meet up with the demand of qualified professionals in the IT field.

VISION

To be the source of creating Globally Technical Professionals, Researchers, Entrepreneurs and Innovators with Virtuous Personality, Attitude and Technical Skills to meet the industrial challenges.

MISSION

Offer higher grade Post Graduate and Doctoral Programmes in the Computer Applications Domain and to introduce highly knowledgeable computer professionals with leadership skills, commitment and moral values as well as to bridge the gap between the industry and the academia by framing and offering the Industry – Expect Curriculum.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 1: Augment research and entrepreneurial skills along with a rich set of communication, teamwork to excel in their profession.

PEO 2: Exhibiting persistent enhancement in their profession through life-long learning, realizing human values and principles.

PEO 3: Demonstrating technical competency and leadership to become professional engineers leading to a successful career.

PEO 4: Pursuing lifelong learning in generating innovative engineering solutions using research and complex problem-solving skills.

PEO 5: Demonstrating commitment towards sustainable development for the betterment of society.

PROGRAMME OUTCOME (PO)

FOR LAB ORIENTED SCIENCE COURSES

PO1: Knowledge Base - Understanding of computing fundamentals, computing specialization and domain knowledge appropriate for computer professional.

PO2: Problem Analysis & investigation - Identify the need and develop the ability to engage in independent learning and for continual development as a computer professional.

PO3: Communication Skills & Design - Ability to understand the impact of professional computing specialization solutions in societal, economic and environmental contexts and demonstrate knowledge of and need for sustainable development

PO4: Individual and Team Work - Develop and apply appropriate techniques, resources, and innovative tools to complex activities

PO5: Professionalism, Ethics and equity - Ability to demonstrate knowledge and understanding of management principles and apply these effectively as an individual, a member or a leader in diverse teams and in multidisciplinary settings

PO6: Life Long Learning - Ability to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PO7: Research Culture - Use research based knowledge and research approaches to provide valid conclusions.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1: The skills to analyze and develop computer programs in the areas like System Software, Software design, Web designing and Web applications, Big data analytics and Open Source Programming.

PSO2: The ability to put into practice the standard strategies in the software project development using the knowledge acquired and relevant programming technologies and deliver the authentic applications welfare of the society.

PSO3: The ability to create a novel career path to be a software engineer, an entrepreneur and a keenness for research in the computer Science field with the trending Computer languages, technologies and different platforms.

PSO4: Understand, Analyze and Develop research problems example - in medical applications by using innovative tools of varying complexity

PSO5: Demonstrate basic knowledge of computer applications and apply standard practices in software project development.

HINDUSTHAN COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)

COIMBATORE-641028

SCHEME OF EXAMINATIONS - CBCS & LOCF PATTERN

(For the Students admitted from the Academic year 2022-2023 and Onwards)

PG PROGRAMME

Programme: Master of Computer Applications Branch: Computer Applications

Course Code	Course Type	Course Title	Credit Points	Lecture Hours/ Week		Exam Duration (hours)	MAX. MARKS		
				Theory	Practical		I.E.	E.E	Total
Semester – I									
22MCP01	DSC	Programming in Java	4	4		3	50	50	100
22MCP02	DSC	Relational Database Management System	4	4		3	50	50	100
22MCP03	DSC	Security Fundamentals	4	4		3	50	50	100
22MCP04	GE	Allied: Mathematical Foundations for Computer Science	4	4		3	50	50	100
22MCP05	DSE	Electives / DSE - I	3	4		3	50	50	100
22MCP06	DSC	Practical I - Programming in Java	3		5	3	50	50	100
22MCP07	DSC	Practical II – RDBMS Programming	3		5	3	50	50	100
22MCP08	SEC	Mini Project Work / Internship / Institutional Training	2	-	2	-	100	-	100
22MCPJ01	SEC	Aptitude / Placement Training	Grade*	2		2	50		50**
22MCPV01	ACC	VAC – I	1*	2		2	50	-	50**
	SEC	SDR – Student Development Report	Assessment will be done in the end of IIIrd semester						
		Total	27	24	12		450	350	800
Semester – II									
22MCP09	DSC	PHP and MySQL Programming	4	4		3	50	50	100
22MCP10	DSC	Data Structures and Algorithms	4	4		3	50	50	100
22MCP11	DSC	Network Technologies	4	4		3	50	50	100
22MCP12	DSC	Software Development Fundamentals	4	4		3	50	50	100
22MCP13	DSE	Electives / DSE - II	3	4		3	50	50	100
22MCP14	DSC	Practical III – PHP and MySQL Programming	3		5	3	50	50	100
						3	50	50	100

22MCP15	DSC	Practical IV – Data Structures	3		5	3	50	50	100
22MCP16	SEC	Mini Project Work / Internship / Institutional Training	2	-	2	-	100	-	100
22MCPJ02	SEC	Online Courses	Grade*	-			-	-	C/NC
22MCPJ03	SEC	Aptitude / Placement Training	Grade*	2		2	50		50**
22MCPV02	ACC	VAC-II	1*	2		2	50	-	50**
		Total	27	24	12		450	350	800
Semester – III									
22MCP17	DSC	Python Programming	4	4		3	50	50	100
22MCP18	DSC	Data Mining and Warehousing	4	4		3	50	50	100
22MCP19	DSC	Internet of Things	4	4		3	50	50	100
22MCP20	DSC	Big Data Programming and Development	4	4		3	50	50	100
22MCP21	DSE	Elective / DSE - III	3	4		3	50	50	100
22MCP22	DSC	Practical V – Python Programming	3		5	3	50	50	100
22MCP23	DSC	Practical VI – Data Mining with R Tools	3		5	3	50	50	100
22MCP24	SEC	Mini – Project Work	2	-	2		100	-	100
22MCPJ04	SEC	Aptitude / Placement Training	Grade*	2			50		50**
22MCPJ05	SEC	Online Courses	Grade*	-			-	-	C/NC
22MCPV03	ACC	VAC-III	1*	2			50	-	50**
22MCPJ06	SEC	SDR – Student Development Report	2*	-	-	-	-	-	-
		Total	27	24	12		450	350	800
Semester – IV									
22MCP25	SEC	Project Work	10	-			100	100	200
		Total	10				100	100	200

- * denotes Extra credits which are not added with total credits.
- ** denotes Extra marks which are not added with total marks.
- VAC - Value Added Course (Extra Credit Courses)
- Grade - Grades depends on the marks obtained

Range of marks	Equivalent remarks
80 and above	Exemplary
70 – 79	Very good
60 – 69	Good
50 – 59	Satisfactory
Below 50	Not Satisfactory = Not Completed

- I.E-Internal Exam
- E.E-External Exam
- J-Job Oriented Course
- E-Open Electives

PASSING MINIMUM

- Passing Minimum for PG 50%(Both Internal and External)

Abstract for Scheme of Examination

(For the students admitted during the academic year 2022- 2023 and onwards)

Course	Papers	Credit	Total Credits	Marks	Total Marks
Core / DSC	11	4	44	100	1100
Electives / DSE	3	3	9	100	300
Practical DSC	6	3	18	100	600
Project SEC	1	10	10	200	200
Allied GE	1	4	4	100	100
Mini-Project	3	2	6	100	300
Job Oriented Course / Value Added Course	3	1*	3*	50	150**
Skill Based / Placement / Aptitude SEC	3	Grade*	Grade*	50	150**
Online Courses / SEC	2	Grade*	Grade*	-	-
SDR – SEC	1	2*	2*	-	-
Total			91 (5 Extra Credits)		2600 +(300**)

List of Elective Papers/ DSE (Can choose any one of the paper as electives)		
	Course Code	Title
Electives / DSE - I	22MCP05A	Cloud Computing
	22MCP05B	Web Services
	22MCP05C	AI and Machine Learning
	22MCP05D	Human to Computer Interaction
Electives / DSE - II	22MCP13A	Neural Networks
	22MCP13B	Block Chain Technologies
	22MCP13C	Data Science
	22MCP13D	Embedded Systems
Electives / DSE - III	22MCP21A	Enterprise Resource Planning
	22MCP21B	Ethical Hacking and Cyber Forensics
	22MCP21C	Network Security and Cryptography
	22MCP21D	Green Computing



Syllabus Coordinator



BOS-Chairman/Chairperson

Dr. A. V. SENTHIL KUMAR

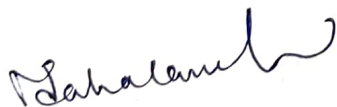
MCA., M.Phil., PGDCA, Ph.D.

Professor and Director

PG and Research Dept. Of Computer Applications

Hindusthan College of Arts and Science

(Autonomous), Coimbatore - 641 028.



Academic Council - Member Secretary

PRINCIPAL
PRINCIPAL

Hindusthan College of Arts & Science (Autonomous),
Hindusthan Gardens, Behind Nava India,
Coimbatore - 641 028.

PG Scheme of Evaluation (Internal & External Components)

(For the students admitted during the academic year 2022-2023 and onwards)

1. Internal Marks

Components	Marks
Test	15
Model Exam	15
Internal Assessment components	20 #
TOTAL	50

List of components for Internal Assessment

S.No	Components
1	Multiple choice questions
2	Video teach
3	Co-operative or Collaborative Learning
4	Mini Project/Assignment
5	Case study
6	Seminar
7	Role Play
8	Management Games

(Any four components from the above list with five marks each will be calculated $4 \times 5 = 20$ marks)

2. a) Components for Practical I.E.

Components	Marks
Test -I	15
Test - II	15
Observation	10
Application*	10
Total	50

b) Components for Practical E.E.

Components	Marks
Experiments/Exercise	40
Record	5
Viva	5
Total	50

3. Institutional/ Industrial Training, Mini Project and Major Project Work

Internships/Industrial Training (I.E)		Mini Project (I.E)	Major Project Work		
Component	Marks		Component	Marks	Total Marks
Work diary	25	-	I.E a) Attendance	20	100
Report	50	50	b) Review	30	
Viva-voce	25	50	c) Report	25	
			d) Moc Viva- Voce/ Presentation	25	
Total	100	100	E.E*		
			a) Final report	60	100
			b) Viva-voce	40	
			Total		200

*Evaluation of report and conduct of viva voce will be done jointly by Internal and External Examiners

4. Value Added Courses and Aptitude/Placement courses:

Components	Marks
Two Test (each 1 hour) of 25 marks each QP is objective pattern ($25 \times 1 = 25$)	50
Total	50

5. Guideline for Open Elective

Two tests(each 2 hours) of 50 marks each [5 out of 8 descriptive type questions 5x10=50 Marks	Marks
	100

Guidelines:

1. The passing minimum for these items should be 50%
2. If the candidate fails to secure 50% passing minimum, he / she may have to reappear for the same in the Subsequent semesters
3. Item No's:4 is to be treated as 100% Internals and evaluation through online.
4. Item No.2: * - Application should be from the relevant practical subject other than the listed programmes. It must be enclosed in the practical record.

For all PG/MBA/MCA Programmes

(2022-2023 Regulations)

QUESTION PAPER PATTERN FOR CIA EXAM

Reg.No:-----

Q.P.CODE:

HINDUSTHAN COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
PG/MBA/MCA DEGREE CIA EXAMINATIONS -----20-----

(-----Semester)

BRANCH: -----

Subject Name: -----

Time: Two Hours

Maximum: 50 Marks

Section-A (4 x 4=16 Marks)

Answer ALL Questions

ALL questions carry EQUAL Marks
(Q.No: 1 to 4 Either Or type)

Section-B (3 x 8=24 Marks)

Answer any THREE Questions out of FIVE Questions

ALL questions carry EQUAL Marks
(Q.No: 5 to 9)

Section-C (1 x 10=10 Marks)

(Compulsory Question: It should be a Case study/Application oriented/Critical analysis
from any of the units)

(Q.No: 10)

QUESTION PAPER PATTERN FOR MODEL / END SEMESTER EXAM

Reg.No:-----

Q.P.CODE:

HINDUSTHAN COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
PG/MBA/MCA DEGREE MODEL EXAMINATIONS -----20-----

(-----Semester)

BRANCH: -----

Subject Name: -----

Time: Three Hours

Maximum: 60 Marks

SECTION - A (5x4=20 marks)

Answer ALL Questions

ALL Questions carry EQUAL Marks
(Q.No 1 to 5 Either Or type)
(One question from each Unit)

SECTION - B (3x10=30 Marks)

Answer any THREE Questions Out of FIVE Questions

ALL Questions carry EQUAL Marks
(Q.No 6 to 10)

(One question from each Unit)

SECTION - C (1x10=10Marks)

(Compulsory Question: It should be a Case study/Application oriented/Critical analysis
from any of the units)

(Q.No: 11)

PG Programme Regulations for the academic year 2022-2023

1. Internal marks components for all the candidates admitted from the academic year 2022-2023 and onwards is as follows.

For Theory courses

Components	Marks
Test	15
Model Exam	15
Internal Assessment components	20
TOTAL	50

For Practical courses

Components	Marks
Test –I	15
Test – II	15
Observation/Excercise	10
Application*	10
TOTAL	50

2. Pattern of question paper for External Examination will be maximum of 60 marks for all theory courses. The marks obtained will be converted into 50 marks as per the scheme.
3. Passing minimum marks for all PG programme is 50 % in internal and 50% in External and the composition of total 50 marks out of 100 marks.
4. Project work is considered as a special course involving application of knowledge in problem solving / analyzing /exploring a real-life situation. A Project work may be given in lieu of a discipline specific elective paper. Distribution of marks for major project work for all PG Programmes will be of 50:50 pattern for both Internal and External in total of 200 marks.
5. Internship / Institutional Training / Mini-Project/ Extension Activity is related to the discipline. The students can be permitted to complete the Internship / Institutional Training / Mini-Project/ Extension Activity before the end of respective semesters (end of I, II and III semester) and submit a report.

Internship / Institutional Training/ Extension Activity	Not more than seven days
Mini project	During the course of study for not more than seven days.

6. For fully internal subjects, Two test will be conducted one at the time of CIA I and the other will be during Model Examinations.
7. Retest for the failure candidates in the above case should be conducted immediately before the End Semester Examinations.
8. For the Theory cum Practical blended courses, 50:50 Internal and External pattern will be followed for theory examination and Fully internal pattern will be followed for Practical examination. For theory part, External examination will be conducted as regular pattern (max of 70 marks) and it will be converted into 25 marks.

Course	Internal Marks		External marks		Total marks (Max. marks 50)	
	Min.	Max.	Min.	Max.	Min.	Max.
Theory	12.5	25	12.5	25	25	50
Practical	25	50	-	-	25	50

9. For Practical components for Theory cum Practical courses (Fully Internal)

Components	Marks
Test I	10
Test II	10
Experiment/Exercise	20
Record	5
Viva	5
Total	50

The Internal mark 50 will be converted into 25.

10. For the candidates admitted under the Fast Track System (FTS) must register their names to their concerned department heads and get approval from the COE office at the beginning of the II semester.
11. Self Study will be a Core Paper of the department for which the examination pattern of other theory subjects is followed.
12. Online courses is incorporated as a non-credit skill enhancement course for the III and IV semesters and Grades will be assessed based on the certificates produced by the students. It is compulsory to produce one online course certificate for each semester to avail grades for the students. (2 certificates in any of the online platform is mandatory).
13. SDR – Student Development Report to be received by the department from the students till end of the **Third** semester. (Evidences of Curriculum activities and Co-curriculum activities).
14. Open elective courses:
Departments can offer list of subjects which teaches moral ethics to the young community for the better future. The topics relevant to Indian ethics, Culture, Women rights, Yoga, Green farming, Indian constitution etc., as an open elective courses. These courses can be offered by the department or other department as inter department courses. Marks earned for this subject will not be included for the CGPA calculation.

Blue Print of Question Paper for all PG Programmes

(For the academic year 2021-22, 2022-23)

FOR CIA I - QUESTION PATTERN

Max. Marks:50

Sec	Question No	Type	No of Question	Questions to be answered	Mark per question	K-level
A	1 to 4	Either or Type (a or b)	8	4	4 (4x4=16)	2 Questions will be in K1 4 Questions will be in K2 2 Questions will be in K3
B	5 to 9	Open choice	5	3	8 (3x8=24)	2 Questions will be in K3 2 Questions will be in K4 1 Questions will be in K5
C	10	Compulsory	1	1	10 (1x10=10)	1 Question will be in K5

FOR MODEL/ESE - QUESTION PATTERN

Max. Marks:60

Sec	Question No	Type	No of Questions	Questions to be answered	Mark per question	K-level
A	1 to 5	Either or Type (a or b)	10	5	4 (5x4=20)	2 Questions will be in K1 4 Questions will be in K2 4 Questions will be in K3
B	6 to 10	Open choice	5	3	10 (3x10=30)	2 Questions will be in K3 2 Questions will be in K4 1 Questions will be in K5
C	11	Compulsory	1	1	1 (1x10=10)	1 Question will be in K5

Distribution of section-wise marks with K levels for PG 2021-22, 2022-23

CIA - PG								
Sec.	K1	K2	K3	K4	K5	Total questions	Questions to be answered	Total marks
A- Either or type	2	4	2			8	4	4X4=16
B - Open choice			2	2	1	5	3	3X8=24
C- Compulsory Question					1	1	1	1X10=10
Total Marks	8	16	16	16	18			84
% of marks without choice	9.52	19.05	19.05	119.05	21.43			100

Model Exam - PG								
Sec.	K1	K2	K3	K4	K5	Total questions	Questions to be answered	Total marks
A- Either or type	2	4	4			10	5	5X4=20
B - Either or type			2	2	1	5	3	3X10=30
C - Compulsory Question					1	1	1	1X10=10
Total Marks	8	16	36	20	20			100
% of marks without choice	8	16	36	20	20			100

Regulations of Fast Track System (FTS)

- From the academic year 2021-22, our college is offering Fast Track System (FTS) for all UG and PG programmes. In this system, we are offering two courses under the course type of Discipline Specific Elective (DSE) in the sixth semester for all UG programmes and fourth semester for all PG programmes, which are equivalent and related with **National Programme on Technology Enhanced Learning/Study Webs of Active-Learning for Young Aspiring Minds (NPTEL/SWAYAM)** courses.
- The students have the option of taking two subjects of the sixth semester of their programme through NPTEL/SWAYAM portal from the list given by NPTEL and can complete the online course before fifth semester and submit the received original certificates to the COE office for getting approval. If the student completes these courses before the beginning of the sixth semester (UG)/fourth semester (PG), the candidate can be considered and exempted to write the examination from the assigned DSE courses in the sixth semester/fourth semester. They should complete only the self study course and project work during the VI/IV semester as assigned in the scheme. The candidate who completes the online courses and submits the successful course completion credentials, the credit transfer will be considered as per our Scheme of Examination for qualifying the degree. **The minimum duration of the registered online course must be 12 weeks.** Course duration of less than 12 weeks will not be considered.
- For all PG programmes, the candidates who were admitted during the academic year 2021-2022 under the Fast track system, for the self study course, the internal mark component will be as follows. For others regular internal pattern follows.

TEST	Max. Marks	Mode
CIA I	50 (50x1=50)	Online objective type
Model Exam.	50 (50x1=50)	Online objective type

Out of these two tests, the total marks will be converted into 40 marks as Internal.

- For all UG programmes, the candidates who were admitted during the academic year 2021-2022 under the Fast track system, for the self study course, the internal mark component will be as follows. For others regular internal pattern follows.

TEST	Max. Marks	Mode
CIA I	50 (50x1=50)	Online objective type
CIA II	50 (50x1=50)	Online objective type
Model Exam.	50 (50x1=50)	Online objective type

Out of three tests, the total mark will be converted into 30 marks as Internal.

- For the students admitted in Fast Track System, must enroll their names to the concerned department heads and get approval from the COE office at the beginning of III semester for all UG Programmes and at the beginning of II semester for all PG programmes.
- The students who cleared and got certified for online courses under the fast track system, the grade obtained will be converted into average marks of range. The received certificates must be submitted to the COE office for approval of the Controller and the Principal. The FTS courses will be treated as fully external.

DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSC	22MCP01	Programming in Java	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives
- To understand the concepts of C.
- To Acquire the Knowledge of OOP's with C++, Function Overloading.
- To Learn and Implement how to use String Manipulation, Packages
- To apply the Java concepts with GUI Tools, TCP/IP, Java Bean
- To learn about the Database concepts in Java Programming

Unit	Course Contents	Hours	K Level
I	Introduction to C: Structure of C-character set – token –variable – Identifier in c - constant –Data types – console I/O operation – operator and Expression Control Structure – array and string - pointer –function –types of function call - Structure and Union. File Handling: operation – mode – random access file.	10	Up to K5
II	OOPS With C++: Overview of OOPs Principles - Basics of Console Input and Output- inline function - Function overloading - Introduction to classes & objects - Creation & destruction of objects - Constructor & Destructor - Static class member - Operator overloading - Friend class and functions. Inheritance - Types of Inheritance - Virtual functions – Polymorphism – I/O Stream – File Stream – Exception Handling.	11	Up to K5
III	Core JAVA: Basics of java – History and features – C++ Vs java – JDK,JRE and JVM - keywords and operator – data types – array – methods-class and object :declaration and creation -Constructor–inheritance – super, final and static key words – string manipulation –packages –Exception Handling –I/O Stream – Multi Threading.	11	Up to K5

IV	GUI Tools: Applet – AWT-Button control, Radio Button, menu, dialog box – Swing –JComponents – Jpanel - JMenu-Layout manager. Networking fundamentals-socket overview – TCP-IP Client socket- Datagram client and server socket – RMI – Java Bean –BDK-JAR file- Manifest file - Creating simple bean.	10	Up to K5
V	Database Concepts in Java: JDBC concepts:- Introduction to JDBC Driver-JDBC class and interface - Database connection- Statement Object-Result set- Transaction processing- meta Data- Creation of Table- Dropping a-Updating row and Column in Table –Calculating data-Grouping and ordering Data.	10	Up to K5

Note: The Questions should be asked in the ratio of 60% programs and 40% for theory.

Book for Study

- 1 Schaum Series, Gottfried B.S., "Programming with C", Tata McGraw Hill
- 2 E Balagurusamy, "Object oriented Programming with C++" 2001, Tata McGraw-Hill
- 3 Herbert Scheldt," The Complete Reference JAVA2", Tata McGraw-Hill, 7th Edition.2019.

Books for Reference

- 1 Muthu C, "Programming with Java", Tata McGraw Hill, Second Edition, 2010.
- 2 Deitel and Deitel, "Java How to Program", PHI/Pearson Education Asia, Third Edition.2015.
- 3 Keyur Shab, "Java 2 Programming", Tata McGraw-Hill Pub. Company Ltd, 2018.
- 4 Herbert Scheldt "The Complete Reference J2EE", Tata McGraw Hill, 7th Edition.2012
- 5 R. Nageswara Rao "Core Java: An Integrated Approach, New: Includes All Versions up to Java 8", Dream tech Press, 2016
- 6 E. Balagurusamy, "Programming in ANSI C", McGraw Hill
- 7 Robert Lafore, "Object Oriented Programming in Turbo C++", 1994, the WAITE Group Press.

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can develop Programmers who will be involved in solving real time applications in IT Sector.

Activities to be given

- 1 Demonstrate develop, test, debug simple C, C++ & Java programs, and implementing the concepts of Core Java
- 2 Assignment given on extended features of Java programming
- 3 Preparing the students to develop programs for real time applications in IT sector.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze the perception of various GUI tools	Up to K5
CLO2	Identify the knowledge of various components used at server side	Up to K5
CLO3	Apply the Interface, API and Package to manipulate data in numerous applications	Up to K5
CLO4	Apply the visual basic concepts to create various domains	Up to K5
CLO5	Analyzing various applications using the Connectivity JDBC	Up to K5


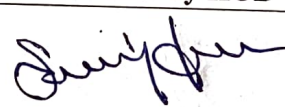
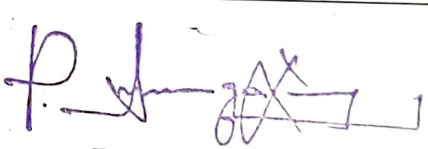
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	2	2	2	3	3	2
CLO 2	3	3	2	2	2	2	2
CLO 3	3	2	2	1	3	3	2
CLO 4	3	3	3	3	3	2	1
CLO 5	3	2	2	2	3	2	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Mr. A. Ganesan	 Dr. A. V. Senthil Kumar Dr. A. V. SENTHIL KUMAR	 Dr. P. Arumugasamy

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DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSC	22MCP02	Relational Database Management System	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives
<ul style="list-style-type: none"> - To summarize the various Users and Designs of Database - To understand the features of Relational models and basic statements of SQL - To apply the functions with Normalization models and dependencies - To organize the stored files in the database using various techniques. - To understand data storage and various database design

Unit	Course Contents	Hours	K Level
I	Databases and Database Users: Introduction - Characteristics of the database approach - Actors - Advantages. Database system - History of Data base applications. Data Base system concepts and Architecture- Data models - Components of data model - Data Model Basic Building Blocks, Schemes and instances - Three schema architecture - Data Independence - DBMS Languages and Interfaces – Database system Environment- DBMS component modules - centralized DBMS architecture – Basic Client/Server Architecture – Working & Structure of Client-server Database Architecture in DBMS – Advantages & Disadvantages of Client-server Database Architecture in DBMS	11	Up to K5
II	Database Design: Using High level conceptual data models - Entity types, entity sets - Attributes and keys - Relationship types, Relationship sets, roles and structural constraints - weak entity types refining the ER design - ER Diagrams - naming conventions - The Enhanced Entity–Relationship (EER) - EER modeling - Relationship types of degree higher than two.	10	Up to K5
III	Relational Model: Relational model concepts - relational model constraints - Relational database schemas - Update operations and dealing with constraints violations. Relational Algebra - unary Operations - Set operations -Binary Operations - additional	11	Up to K5

	operations. ER and EER to relational Mapping - Relational Database Design Using ER-to-Relational Mapping EER Model Constructs to Relations. SQL - Schema Definition, Basic constraints and Queries: SQL Data Definition - Specifying basic constraints - Schema change Statements - Basic queries - complex queries - other DML statements - views - Programming with PL/SQL.		
IV	Normalization: Purpose – Objective - Types of Anomalies - Informal Design guidelines - Functional Dependencies - Definition - Inference rules - Normal forms based on Primary keys - General definitions of 2NF and 3NF - BCNF - Properties of relational decompositions - Multi- valued Dependencies and 4NF.	10	Up to K5
V	Data Storage and Indexing: File Organizations and Indexed – Organizing files and records on disk – Single-level, Multi-level Indexes - Secondary storage devices - Buffering of Blocks - Placing File records on disk - Files of ordered and unordered records – Hashing Techniques - RAID Technology - Indexing structures for files - Types of Single-Level Ordered Indexes -Multilevel Indexes - Indexes on Multiple Keys.	10	Up to K5

Note: The Questions should be asked in the ratio of 60% programs and 40% for theory.

Book for Study

- 1 Ramez Elmasri, Shamkant B. Navathe Durvasula, L.N.Somayajulu, Shyam K. Gupta, "Fundamentals of Database Systems", Fourth Edition, Pearson Education, 2019.
- 2 Silberschatry, Korth, Sundarshan, Database system Concepts, McGraw-Hill Higher Education, Fourth Edition, 2018.

Books for Reference

- 1 Elmasri Ramez, Navathe Shamkant, Fundamentals of Database System, Pearson Paperback, Seventh Edition, June 2017.
- 2 Rajiv Chopra, Database Management Systems (DBMS), S Chand & Co Ltd, Revised Edition, Jan 2016.
- 3 Raghu Ramakrishnan and Johannes Gehrke, Database Management Systems, McGraw Hill Education, July 2014.
- 4 Christopher Allen, Simon Chatwin, Catherine A. Creary, "Introduction to relational Databases and SQL Programming" Tata McGraw-Hill.

Pedagogy: Chalk & Talk, Exercise, Assignments, Case Study & PPTs.

Rationale for Nature of the Course: Can develop Programmers who will be involved in solving applications in Industry using back end (Database) works

Activities to be given

- 1 Demonstrate and develop, Database Architecture.
- 2 Assignment given on SQL Data Definition - Specifying basic constraints.
- 3 Preparing the students to develop programs for real time applications in IT sector related to the back-end (Database) works.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K – Level
CLO1	Analyze about the database architecture and database users.	Up to K5
CLO2	Exemplify about knowledge on the Database design.	Up to K5
CLO3	Experimenting the knowledge about Relational Model and Relational Algebra.	Up to K5
CLO4	Determine the knowledge about normalization techniques.	Up to K5
CLO5	Evaluate the knowledge on storing data on secondary storage devices	Up to K5

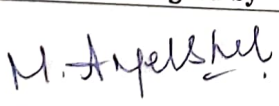
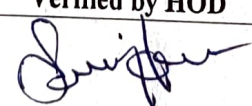
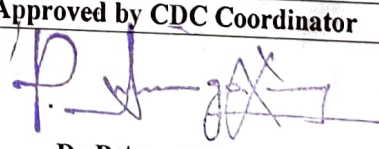
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	2	2	3	2
CLO 2	2	3	2	2	2	3	2
CLO 3	2	2	3	3	3	3	2
CLO 4	2	2	3	2	3	3	3
CLO 5	2	2	2	3	2	3	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Mrs. M. Angel Shalini	 Dr. A. V. Senthil Kumar	 Dr. P. Arumugasamy

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 Coimbatore-641 028.

DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSC	22MCP03	Security Fundamentals	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives

- To learn about various security layers
- To summarize about Authentication, Authorization
- To apply security layers with network security policies and techniques
- To study and applying security features with network security
- To learn and gain the knowledge about client server protection.

Unit	Course Contents	Hours	K Level
I	Understand Security Layers: Introducing Core Security Principles -Understanding Confidentiality - Understanding Integrity - Understanding Availability - Understanding the Principle of Least Privilege - Understand User Authentication: Multifactor authentication –Understand Encryption.	12	Up to K5
II	Understanding Authentication, Authorization, and Accounting: Starting Security with Authentication - Configuring Multifactor Authentication - Understanding Domain Controllers - Understanding NTLM - Understanding Kerberos -Understand Internet Security - Understand Wireless Security.	12	Up to K5
III	Understanding Security Policies: Using Password Policies to Enhance Security - Using Password Complexity to Make a Stronger Password - Using Account Lockout to Prevent Hacking - Examining Password Length -Using Password History to Enforce Security.	10	Up to K5
IV	Understanding Network Security : Using Dedicated Firewalls to Protect a Network - Understanding the OSI Model -Types of Hardware Firewalls and Their Characteristics - Understanding When to Use a Hardware Firewall Instead of a Software Firewall -Understanding Stateful Inspection and Stateless Inspection	10	Up to K5
V	Understand Security Software: Understand Client Protection - Understand Email Protection – understand Server Protection.	8	Up to K5

Note: The Questions should be asked in the ratio of 40% examples and 60% for theory.

Book for Study

- 1 Crystal Panek, "Security Fundamentals", Fourth Edition, Pearson Education, November 2019.
- 2 Rajesh Kumar Goutam, "Cybersecurity Fundamentals", BPB Publications, India May 2021

Books for Reference

1. Sanil Nadkarni, "Fundamentals of Information Security: A Complete Go-to Guide for Beginners to Understand All the Aspects of Information Security Paperback", 22 November 2020
2. William Stallings, Lawrie Brown, "Computer Security - Principles and Practice" Fourth Edition, By Pearson Paperback, October 2019
3. Michael J.Hahn, "IT Security Fundamentals – A Quick and comprehensive Guide to managing Secure Systems", Pearson Education, May 2020
4. Jones & Barlett, "Fundamentals of Information Systems Security", No 2019

Pedagogy: Chalk & Talk, Exercise, Assignments, & PPTs.

Rationale for Nature of the Course: Can develop analysts related to security related works

Activities to be given

- 1 Demonstrate and develop, Understanding Security Layers.
- 2 Assignment given on Security Software.
- 3 Preparing the students to get knowledge about operating system security, network security and various security software.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze about the details of user authentication, File permission, Password policies, Encrypting file system and malware.	Up to K5
CLO2	Outline knowledge about the security principles.	Up to K5
CLO3	Examine the knowledge about dedicated firewall network isolation.	Up to K5
CLO4	Illustrate the knowledge about protecting the client, server and e-mail from virus.	Up to K5
CLO5	Evaluate the knowledge of spoofing and phishing.	Up to K5




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

Programme Outcomes							
CLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	2	2	2	2	2	2
CLO 2	3	3	2	2	3	2	2
CLO 3	3	3	2	2	2	3	1
CLO 4	3	2	2	3	3	2	2
CLO 5	2	2	2	3	2	2	2

3 – Advance Application

2 – Intermediate
Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Dr. N. Revathy	 Dr. A. V. Senthil Kumar	 Dr. P. Arumugasamy Co-ordinator

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DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSE	22MCP05A	Elective I -Cloud Computing	3	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- To study about the Virtual machine and the virtualization method.
- To understand the functions of cloud computing and its features working with data centers.
- To apply various services with the cloud technology.
- To work with storage and recovery of applications in the cloud.
- To work with various Cloud Platforms

Unit	Course Contents	Hours	K Level
I	Introduction to Virtualization and Virtual Machine: - Implementation Levels of Virtualization -Virtualization Structures/Tools and Mechanisms - Virtualization in Cluster/Grid Context -Virtual Network, Information Model and Data Model for Virtual Machine-Software as a Service (SaaS) - SOA on Demand Computing.	10	Up to K5
II	Cloud computing: Introduction- Roots of Cloud Computing – Layers and Types of Clouds - Cloud Application Architectures - Value of Cloud Computing-Cloud Infrastructure Models – Scaling a Cloud Infrastructure - Capacity Planning - Cloud Scale.	10	Up to K5
III	Data Center to Cloud: Cloud Ecosystem and Enabling Technologies - Datacenter Design and Interconnection Networks - Software Licenses, The Shift to a Cloud Cost Model, Service Levels for Cloud Applications-Security; Disaster Recovery- Web Application Design, Machine Image Design - Privacy Design-Database Management-Data Security - Network Security- Host Security - Compromise Response.	10	Up to K5

IV	Defining Clouds for the Enterprise: Storage-as-a-Service, Database-as-a-Service, Information-as-a-Service, Process-as-a-Service, Application-as-a-Service, Platform-as-a-Service, Integration-as-a-Service, Security – as – a – Service, Management/Governance-as-a-Service, Testing-as-a-Service, Infrastructure-as-a-Service.	11	Up to K5
V	Cloud Platform and Disaster Recovery: Introduction to various Cloud Platform options, Cloud Foundry concepts and deploying applications on Cloud Foundry, Backup and restore cloud foundry installations, Upgrade cloud foundry installations. Disaster Recovery – Planning - Cloud Disaster Management Case Study: Types of Clouds- Cloud Centers in Detail- Comparing Approaches- Xen, OpenNEbula, Eucalyptus, Amazon & Nimbus	11	Up to K5

Note: The Questions should be asked in the ratio of 40% real time examples and 60% for theory.

Book for Study

- 1 Michael Miller, Cloud Computing-Web Based Applications That Change the Way You Work and Collaborate Online“, Pearson Education, 2018.
- 2 David S. Linthicum, Cloud Computing and SOA Convergence in Your Enterprise: A Step-by-Step Guide“, Addison-Wesley Professional, 2019.

Books for Reference

- 1 Ritting house, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Security, CRC Press, 2017.
- 2 George Reese, “Cloud Application Architectures“, 1st Edition, O’Reilly Media, 2009.
- 3 Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, “Distributed and cloud computing from Parallel Processing to the Internet of Things“, Morgan Kaufmann, Elsevier, 2012.
- 4 Barrie Sosinsky, “Cloud Computing Bible“, John Wiley & Sons, 2010. 2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, “Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance“, O’Reilly, 2019.

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can develop students to learn and know about Virtualization and Virtual Machine.

Activities to be given

- 1 Demonstrate and develop, Cloud Computing concept like its different services.
- 2 Assignment given on extended features of Cloud Computing, Cloud Platform and Disaster Recovery

3 Preparing the students to develop knowledge about Data Center to Cloud.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze the cloud computing technology with its different types of services	Up to K5
CLO2	Compare the difference between the various available cloud services	Up to K5
CLO3	Apply the kind of cloud service required for a specific process	Up to K5
CLO4	Analyze about the cloud Storage systems and cloud security, the risks involved and its impact	Up to K5
CLO5	Experiment the applications that use cloud computing and sort out the related security issues	Up to K5

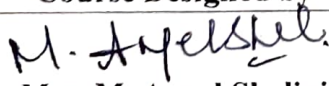
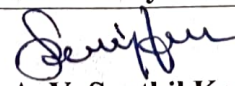
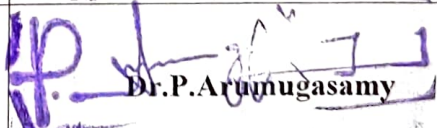
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	2	2	1	2	2	2
CLO 2	3	3	2	2	3	3	2
CLO 3	3	3	2	2	2	2	1
CLO 4	3	2	2	3	3	3	2
CLO 5	3	2	3	2	2	2	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Mrs. M. Angel Shalini	 Dr. A. V. Senthil Kumar	 Dr. P. Arumugasamy

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DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSE	22MCP05B	Elective I - Web Services	3	4	50	50	100

Nature of Course

Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- To learn about Web services and its features.
- To elaborate the functionalities and fundamental concepts of SOAP, WSDL.
- To study about UDDI and its working functions.
- To elaborate the functionalities and fundamental concepts of XML Fundamentals.
- To summarize the quality of service for web services.

Unit	Course Contents	Hours	K Level
I	Introduction to Web Services: Introduction to Web Services – Definition of Web service – Basic operational model of web service – tools and Technologies – Characteristics – Benefit & challenges of web service – Architecture of web service – Building blocks of web service – Standard and technologies available for web service – Types of Web Services	10	Up to K5
II	SOAP: Fundamentals of SOAP, SOAP Building Blocks - SOAP message structure, SOAP Envelope Element - SOAP – Communication Model - SOAP Encoding, Encoding of different data type, SOAP message exchanging model, SOAP communication and Messaging, Limitation of SOAP – SOAP UI-Setup- Properties-Steps in SOAP UI. - Describing Web services, WSDL, WSDL in the world of web services, Web service life cycle, Anatomy of WSDL definition document, WSDL buildings, WSDL Tools, Limitation of WSDL.	11	Up to K5
III	XML Fundamentals: Design of an XML Document – XML Attributes – XML Validation – Viewing XML Files - XML Namespaces –XML Schema – Processing XML Feedback – XML	10	Up to K5

	Encryption – XML Signature - Parser - Browsers and XML - Create DTD-Create XML Schema-Create an XSLT - XSL-FO (Formatting Object).		
IV	UDDI : Discovering web services, Service discovery, Role of service discovery in SQA, Service discovery and UDDI, UDDI registries and its Uses, UDDI Technical Architecture - UDDI registries, Use of UDDI registries, Programming with UDDI, UDDI data structure, Publishing API, Publishing information to a UDDI Registry. Searching information in a UDDI Registry. Deleting information in a UDDI Registry. Limitations of UDDI. Searching and selecting Information in a UDDI registries	11	Up to K5
V	Quality of Service: Importance of QoS for Web Services – QoS Metrics – QoS Issues in Web Services -Holes – Design Patterns – QoS Enable Web Services – QoS Enabled Applications. Web Services Management – Web Services Standards and Future Trends	10	Up to K5

Note: The Questions should be asked in the ratio of 40% real time examples for concepts and 60% for theory.

Book for Study

- 1 Ramesh Nagappan, Robert Skeczylas, Rima Patel Sriganesh, “Developing Java Web Services”, Wiley India Edition, 2019.
- 2 Ethan Carami, “Web Services Essentials”, O’Reily Media, 2018.

Books for Reference

- 1 Randy J. Ray and Pavel Kulchenko, “Programming Web Services with Perl”, O’Reily Media, 2012.
- 2 Gottfried Vossen and Stephan Magemann, “Unleashing Web 2.0 from Concept to Creativity”, Morgan Kaufmann Publishers, 2012.
- 3 Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services: An Architects Guide”, Prentice Hall, 2014

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can make the students to receive knowledge about SOAP and XML fundamentals.

Activities to be given

- 1 Demonstrate and develop, Standard & technologies available for web service
- 2 Assignment given on extended features of XML Fundamentals.

3 Preparing the students to apply the concepts of UDDI and Quality of Service.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze about the concepts of Web Services	Up to K5
CLO2	Illustrate about various tools of web services.	Up to K5
CLO3	Apply the knowledge about the fundamentals of XML	Up to K5
CLO4	Apply the concepts of Tools of Web Services (UDDI, SOAP & WSDL etc.,)	Up to K5
CLO5	Analyzing the various concepts of Quality of Service.	Up to K5

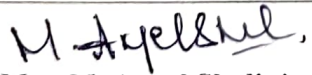

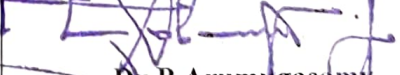
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

Programme Outcomes							
CLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	2	2	1	2	2	2
CLO 2	3	3	3	2	3	3	3
CLO 3	3	2	2	1	2	2	2
CLO 4	3	2	2	3	2	2	2
CLO 5	3	2	3	2	3	3	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Mrs. M. Angel Shalini	 Dr. A. V. Senthil Kumar	 Dr. P. Arumugasamy

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DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSE	22MCP05C	Elective I -AI and MachineLearning	3	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives

- To explaining the basic Introduction of Artificial Intelligence
- To evaluate Problem Solving with Searching Techniques
- To represent with Knowledge information's
- To represent with Knowledge Representation techniques
- To classify AI techniques with various Machine Learning algorithms

Unit	Course Contents	Hours	K Level
I	Overview of AI: Basics of Artificial intelligence (AI) - Goals of AI- AI Techniques - Necessity of learning AI - Applications of AI - Branches of AI - Intelligence - Agent and Environment - structure of Intelligent Agents – Properties of Environment -Overview of Knowledge Inferring systems and Planning	10	Up to K5
II	Problem Solving by Search: Search space - Blind Search – DFS, BFS, Iterative Deepening-Performance measures, Informed Search - Introduction to Heuristics- Variants of heuristic search- uniform cost, A*,Greedy– Adversarial Search – Minimax, Alpha beta pruning	10	Up to K5
III	Knowledge Representation: Logic, Types, Properties, Uses, Knowledge Cycle , Techniques, Approaches, Requirements, Semantic Networks, Frames, Rules, Scripts, Conceptual Dependency, and ontologies, Expert Systems, Handling Uncertainty in Knowledge Compromise Response.	11	Up to K5

IV	Machine Learning Algorithms 1: Introduction to Machine Learning Methods, Classification of Machine Learning methods, Multiple Variable Linear regression, Multiple regression, Logistic regression, K-NN classification, Naive Bayes classifiers, and Support vector Machines.	11	Up to K5
V	Machine Learning Algorithms 2: K-means clustering, Hierarchical clustering, High-dimensional clustering, Dimension Reduction PCA, Ensemble techniques Decision Trees, Random Forests, Bagging, Boosting - Value based methods Q-learning.	10	Up to K5

Note: The Questions should be asked in the ratio of 60% programs (Algorithms) and 40% for theory.

Book for Study

- 1 ChandraS.S.V, “Artificial Intelligence and Machine Learning”, Prentice Hall India Learning PrivateLimited; 4 edition(2018)
- 2 A First Course in Artificial Intelligence, Deepak Khemani, McGraw Hill Education (India), 2013.

Books for Reference

- 1 Dr.A.V.Senthil Kumar, “Challenges and Applications for Implementing Machine Learning in Computer Vision”, IGI Global Publications USA, October 2019
- 2 Yager, Ronald R., and LotfiA. Zadeh, Eds. An introduction to fuzzy logic applications in IntelligentSystems. Vol.165. Springer Science & Business Media,2012
- 3 Abe, Shigeo. Neural networks and fuzzy systems: theory and applications. Springer Science &Business Media, 2012.
- 4 Janet Finlay and Alan Dix, “An Introduction To Artificial Intelligence”, CRC Press; 1st edition,2017
- 5 Elaine Ric, Kevin Knight and Shiv Shankar B. Nair, Artificial Intelligence, 3rd edition, Tata McGraw Hill, 2019.

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can make the students to learn Computational Models of Classification, Regression using supervised learning and Predictive Analytics with Ensemble Learning.

Activities to be given

- 1 Demonstrate and develop, Overview of Knowledge Inferring systems, Planning in AI and Machine Learning Algorithms like High-dimensional clustering, Dimension Reduction PCA
- 2 Assignment given on various techniques in Problem Solving by Search.
- 3 Preparing the students to apply algorithms like K-means clustering, Hierarchical clustering, High-dimensional clustering for real time applications development.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze various concepts of AI and Machine Learning	Up to K5
CLO2	Gather and implement the various Computational Models of Classification, Regression using supervised learning and Predictive Analytics with Ensemble Learning	Up to K5
CLO3	Present about the various approaches of Artificial Neural Networks	Up to K5
CLO4	Analyze the real world problem for understanding and implementation of the dynamic behavior of Machine Learning	Up to K5
CLO5	Defend about the different machine learning techniques to design AI machine for real world problems.	Up to K5

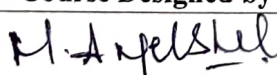
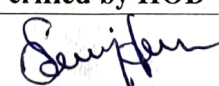
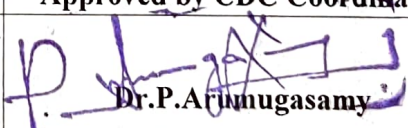
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
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CLO 5	3	3	3	3	2	3	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Mrs. M. Angel Shalini	 Dr. A. V. Senthil Kumar	 Dr. P. Arimugasamy

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DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
I	DSE	22MCP05D	Elective I -Human to Computer Interaction	3	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- To learn about basics of Human to Computer Interaction
- To summarize the Design process and various theoretical models of HCI
- To explain the functions of mobile HCI
- To study about various Models and Theories in HCI
- To study about the web applications using Interface designs

Unit	Course Contents	Hours	K Level
I	Foundations of HCI: The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models–frameworks–Ergonomics–styles–elements– Interactivity- Paradigms.	10	Up to K5
II	Design & Software Process: Interactive Design basics–process–scenarios–navigation–screen design – Iteration and prototyping. HCI in software process - software life cycle–usability engineering– Prototyping in practice– design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.	12	Up to K5
III	Models and Theories: Cognitive models –Socio-Organizational issues and stake holder requirements – Communication and collaboration models- Hypertext, Multimedia and WWW – Understanding hypertext -Text - Hypertext – Hyper media – Animation – Audio & Video.	10	Up to K5

IV	Mobile HCI: Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools	10	Up to K5
V	Web Interface Design: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies – Mobile HCI - Layers of the Mobile Ecosystem - Application Frameworks in Mobile Ecosystem.	10	Up to K5

Note: The Questions should be asked in the ratio of 40% programs (real time examples) and 60% for theory.

Book for Study

- 1 Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2014
- 2 Brian Fling, “Mobile Design and Development”, First Edition, O’Reilly Media Inc., 2018

Books for Reference

- 1 Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O’Reilly, 2019
- 2 K.Meena, R.Sivakumar, “Human-Computer Interaction”, first Edition, O’Reilly, 2018
- 3 I.Scott Mackenzie, “Human-Computer Interaction – An Empirical Research Perspective”, Elsevier: Science.
- 4 Andrew Sears, Julie A.Jacko, “Human-Computer Interaction Fundamentals”, CRC Press, 2019.

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can develop students Design process and various theoretical models of Human Computer Interaction.

Activities to be given

- 1 Demonstrate and develop, : Interactive Design in HCI
- 2 Assignment given on extended features of HCI
- 3 Preparing the students to develop Mobile Human Computer Interaction and Web Interface Design.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze the design effective concepts of Human Computer Interaction.	Up to K5
CLO2	Estimate about the effective dialog for Human Computer Interaction	Up to K5

CLO3	Interpreter the designing of Web Interfaces	Up to K5
CLO4	Analyze the knowledge about various Models, Internet and WWW	Up to K5
CLO5	Evaluate the knowledge about various types of Mobile Applications like Widgets, Applications and Games	Up to K5


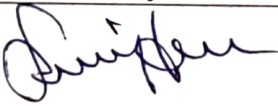
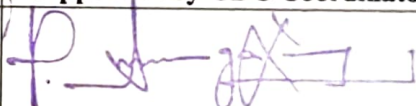
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

Programme Outcomes							
CLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	2	3	2	3	2	2
CLO 2	2	3	2	2	2	3	1
CLO 3	2	3	2	1	2	2	2
CLO 4	3	2	3	2	3	2	2
CLO 5	3	2	2	2	2	3	1

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Dr. N. Revathy	 Dr. A. V. Senthil Kumar	 Dr. P. Arumugasamy

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Coimbatore
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Coimbatore-641 028.

DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
1	DSC	22MCP06	Practical I - Programming in Java	3	5	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives

- To understand the concepts of Core Java
- To acquire the knowledge of Interfaces, Packages and their tools
- To learn and implement how to use GUI Tools
- To apply the Java concepts with Network Programming with JDBC
- To learn about the extended features of Java programming

Unit	Course Contents	Hours	K Level
	1. Create an employee package to maintain the information about the employee. Use constructors to initialize the employee number and use overloading method to set the basic pay of the employee. By using this package create a java program.	5	Up to K5
	2. Design and Develop a Java program to implement polymorphism, inheritance and inner classes.	4	Up to K5
	3. Create a frame with user specific size and position it at user specific position (use command line argument). Then different shapes with different colors (use menus)	4	Up to K5
	4. Develop a Java program to handle different mouse events.	4	Up to K5
	5. Create an applet for a calculator application.	4	Up to K5
	6. Develop a Java program to maintain the student information in text file.	4	Up to K5
	7. Animate images at different intervals by using multi-threading concepts.	5	Up to K5
	8. Develop a Java program to send a text message to another system and receive the text message from the system (use socket programming).	5	Up to K5
	9. Develop a Java program by using JDBC concepts to access a database.	5	Up to K5
	10. Design and Develop a Java program to implement RMI.	5	Up to K5
	11. Design and Develop a Java program to implement the tree viewer.	5	Up to K5
	12. Develop a Java bean program to view an image.	5	Up to K5

13. Design a Java program to Create a Dialog Box	5	Up to K5
14. Create a Java program to implement Tool Bar, Menu & Popup Menu	5	Up to K5

Note: The Questions should be asked in the ratio of 100% programs.

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can develop programs for real time applications.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Illustrate with the integrated development environment to write, compile, run, and test simple object-oriented Java programs	Up to K5
CLO2	Identify and fix defects and common security issues in code.	Up to K5
CLO3	Illustrate the elementary modifications to Java programs that solve real- world problems	Up to K5
CLO4	Illustrate with a Java program to implement RMI.	Up to K5
CLO5	Test to validate input in a Java program	Up to K5

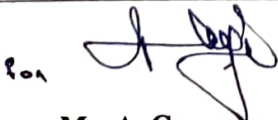


Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

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CLO 4	3	3	3	3	3	2	2
CLO 5	3	2	2	2	2	3	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Mr. A. Ganesan	 Dr. A. V. Senthil Kumar	 Dr. P. Arumugasamy

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DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
1	DSC	22MCP07	Practical II - RDBMS Programming	3	5	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives

- To summarize the various Users and Designs of Database
- To understand the features of Relational models and basic statements of SQL
- To apply the functions with Normalization models and dependencies
- To organize the stored files in the database using various techniques.
- To understand data storage and various database design

Unit	Course Contents	Hours	K Level
	1. Creating and Manipulating Tables using SQL Queries and to perform the basic Mysql operations.	4	Up to K5
	2. Develop SQL queries to implement the concept of Constraints while creating tables	4	Up to K5
	3. Retrieve data from a table using various SQL select clause queries.	4	Up to K5
	4. Write SQL Queries to restrict and sort data	4	Up to K5
	5. Write Queries to execute Single row functions such as LENGTH, CONCAT, SUBSTR, INSTR and so on	4	Up to K5
	6. Write a SQL query to display data from multiple tables using joint operations (Inner Join, Outer Join, Left Join, Right Join)	5	Up to K5
	7. Write Queries for Aggregating data using Group function	5	Up to K5
	8. Develop SQL queries to implement nested sub-queries <ul style="list-style-type: none"> a. Set membership (int, not int) b. Set membership (int, not int) c. Set comparison (some, all) 	5	Up to K5

d. Empty relation (exists, not exists) e. Check for existence of Duplicate tuples (unique, not unique)		
9. Write queries to illustrate the usage of the following features: a. Views b. Sequence c. Index d. Synonym	5	Up to K5
<u>PL/SQL</u>		
10. Write a SQL query to display Date time functions and execute the SET operations (Union, Intersect, Minus)	5	Up to K5
11. Write PL/SQL Programs a. To calculate Student mark percentage. b. To Update the salary in employee table.	5	Up to K5
12. Write a Cursor to display the list of employees who are working as managers. TheCursor should be Declared, Opened, Fetched and Closed.	5	Up to K5
13. a. Write a Procedure which accept the account number of a customer and retrieve the balance b. Write a Procedure which accepts the student number and displays the department in which he belongs to.	5	Up to K5
14. a. Write an update trigger on Account table and keep track of the record that are being updated. b. Write a before delete trigger on student table	5	Up to K5

Note: The Questions should be asked in the ratio of 100% programs.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Find the perception of various data and library functions	Up to K5
CLO2	Execute various applications using PL/SQL	Up to K5
CLO3	Outline the visual basic concepts to create various domains	Up to K5
CLO4	Analyze the SQL queries to manipulate data in numerous applications	Up to K5
CLO5	Apply the SQL queries to update and delete work on student table	Up to K5

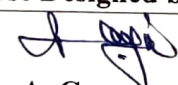
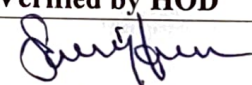

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

Programme Outcomes							
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CLO 2	2	2	3	2	3	3	1
CLO 3	2	3	3	1	3	2	2
CLO 4	2	3	3	3	2	2	2
CLO 5	3	2	2	2	2	3	1

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Co. Mr. A. Ganesan	 Dr. A. V. Senthil Kumar	 Dr. P. Arumugasamy

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Co-ordinator
Curriculum Development Cell
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Coimbatore-641 028.

DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22MCP09	PHP and MySQL Programming	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives

- To learn about basics concepts of PHP
- To work with Arrays HTML forms with PHP and its features
- To learn about the basic concepts of MySQL
- To learn about Handling HTML Forms and working of Database and SQL
- To evaluate the basic functions of MySQL with Files and Directories

Unit	Course Contents	Hours	K Level
I	Introduction: Introduction to PHP - What is PHP?-Common uses of PHP – Characteristics of PHP- Embedding PHP with HTML, Commenting PHP Code, Enhancing further, PHP Language Basics: Using variable in PHP, Understanding Data Types, Operator and Expressions. Decisions and Loops: Simple Decisions with If Statements, Providing an Alternative Choice with the else Statement, Switch, Ternary Operator, Do...While loop, For Statement, Break, Loop Skip Iteration, Nested Loop, Function: Calling Functions, Working with Variable - Functions, Own Functions References, Recursive Functions	10	Up to K5
II	Arrays: Creating Arrays, Accessing Array Elements- Looping Through Arrays, Working with Multidimensional Array: Creating a Multidimensional Array - Accessing Elements of Multidimensional Arrays - Looping Through Multidimensional Arrays- Manipulating Array Strings - Creating and Accessing Strings - Searching Strings, Replacing Text Within Strings and Formatting Strings.	11	Up to K5

III	Handling HTML Forms with PHP: How HTML Forms work, Capture Form Data with PHP, Dealing with Multi Value Fields, and Generating Web Forms with PHP, Storing PHP Variables in Forms. Create File Upload Forms and Redirecting after form Submission	10	Up to K5
IV	Introducing Database and SQL: Deciding how to store data - Setting up MySQL - Quick Play with MYSQL, Connecting to MYSQL from PHP, Retrieving Data from MYSQL with PHP. Manipulating MYSQL: Manipulating MYSQL Data with PHP Insert, Update, Delete Records, Different ways of working with MySQL and PHP: MySQLi(Object – Oriented), MySQLi(Procedural), PDO.	11	Up to K5
V	Working with Files and Directories: File Open modes, Understanding Files and Directories, Getting Information on Files, Opening and Closing Files, Reading Files and Writing to Files, Working with File Permissions, Copying, Renaming and Deleting Files, Common File Tasks, Working with Directories, Get Directory contents.	10	Up to K5

Note: The Questions should be asked in the ratio of 60% programs and 40% for theory.

Book for Study

- 1 Matt Doyle, “Beginning PHP 5.3”, Wunley India Edition, 2019.
- 2 Vikram Vaswani, “PHP: A Beginners guide”, Tata Mc graw Hill, Edition 2018.

Books for Reference

- 1 Larry Ullman, “PHP 6 and MySQL 5”, Pearson Education, 2008.
- 2 Law point, “Guide to PHP”, Computer series, Edition 2017.
- 3 Pratiyush Guleria, “PHP Beginner’s Practical Guide”, Tata Mc graw Hill, Edition 2019, BPB Publications.
- 4 Steven Holzner, “PHP Complete Reference”, Pearson Education, 2018.

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can develop web based applications to solve the real time problems.

Activities to be given

- 1 Demonstrate and develop, : What is PHP?-Uses of PHP

- 2 Assignment given on Introducing Database and SQL
- 3 Preparing the students to develop programs for real time applications in IT sector.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Apply the concepts of PHP to develop simple real time applications	Up to K5
CLO2	Apply the concepts of arrays and strings to create applications	Up to K5
CLO3	Execute various HTML forms with PHP	Up to K5
CLO4	Apply the knowledge about the backend - MySQL	Up to K5
CLO5	Analyze the concepts of files and various operations performed on it	Up to K5



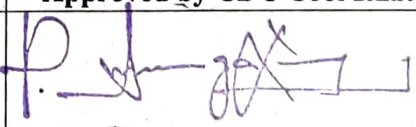
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CLO 5	3	3	3	2	3	3	2

3 – Advance Application

2 – Intermediate
Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
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DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22MCP10	Data Structures and Algorithms	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- To study about the basic introductory concepts of Data structures
- To work with concepts of Linear and Non Linear Data structures
- To develop applications with Algorithms and its features
- To evaluate with advanced features of data structures
- To learn and use to evaluate about various optimum techniques

Unit	Course Contents	Hours	K Level
I	Data Structure Introduction: Introduction: Data Structure Types, Needs, Classification of Data Structure, Operations on Data Structure. Introduction of Algorithms, Characteristics, Data Flow of an Algorithm – Factors – Approaches - Analyzing Algorithms. Arrays: Sparse Matrices - Representation of Arrays. Stacks and Queues. Fundamentals –Operation -Application of stack and queue-Evaluation of Expression Infix to Postfix Conversion –Multiple Stacks and Queues - Perform Analyze the Algorithms.	11	Up to K5
II	Linear Data Structure: Linked List: Introduction , Characteristics, properties, Singly Linked List - Linked Stacks and Queues - Polynomial Addition - Sparse Matrices - Doubly Linked List and Dynamic-Storage Management-Garbage Collection and Compaction	10	Up to K5
III	Non Linear Data Structure: Trees: Basic Terminology - Binary Trees- Binary Tree Representations - Binary Trees- Traversal - Threaded Binary Trees - Binary Tree - Representation of Trees -	10	Up to K5

	Council Binary Trees. Graphs: Terminology and Representations- Traversals, Connected Components and Spanning Trees.		
IV	Basics of Algorithm and Techniques: Algorithm - Algorithm Specification - Performance Analysis. Divide - And Conquer: The General Method - Application of Divide and Conquer - Binary Search - Finding Maximum and Minimum - Quick Sort - Merge Sort - Heap Sort-Selection. The Greedy Method: The General Method-Minimum Cost Spanning Trees- Single Source Shortest Paths (Dijkstra"s Algorithm) – Analysis of Algorithm	10	Up to K5
V	Optimum Techniques: Dynamic Programming: The General Method - Multistage Graphs - forward approach-backward approach -All Pairs Shortest Paths - Single Source Shortest Paths. Backtracking: The General Method - The 8 Queens Problem -Sum of Subsets - Graph Coloring - Hamiltonian cycle. Branch and Bound Technique - Case Study: Applications of Branch and Bound Technique.	11	Up to K5

Note: The Questions should be asked in the ratio of 60% programs and 40% for theory.

Book for Study

- 1 Ellis Horowitz, Sartaj Shani "Fundamentals of Computer Algorithm", Second Edition, GalgotiaPublication, 2014.
- 2 Seymour Lipschutz, "Data Structures", Schaum"s Outlines, 2018.

Books for Reference

- 1 Ellis Horowitz, Sartaj Shani, Sanguthevar Rajasekaran,"Computer Algorithms", GalgotiaPublication,2008
- 2 Jean Paul Tremblay and Paul G.Sorenson, "An Introduction to Data Structures With Applications",Tata McGraw-Hill, Second Edition
- 3 Ellis Horowitz, Sartaj Shani, "Data and File Structures", Galgotia Publication, Second Edition, 2013.
- 4 Alfred V.Aho, John E.Hopcroft, Jeffrey D.Ullman, "Data Structures and Algorithms", Pearson Publications, 1st Edition 2019.

Pedagogy: Chalk & Talk, Exercise, Assignments, Case Studies & PPTs.

Rationale for Nature of the Course: Can develop Programmers to learn and implement Linear and Non Linear Data Structure.

Activities to be given

- 1 Demonstrate and develop: Analyzing Algorithms.
- 2 Assignment given on extended features of Data Structures.
- 3 Preparing the students to learn and implement Basics of Algorithm and optimum Techniques.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Illustrate the working procedure of Sorting, Searching and Selection	Up to K5
CLO2	Outline the knowledge about Graphs, Backtracking, Branch and Bound Technique	Up to K5
CLO3	Apply the basic data structure concepts to create various domains	Up to K5
CLO4	Acquire the concepts of Linear Data Structure like Linked List, Matrices and Storage Management	Up to K5
CLO5	Analyze the Non - Linear Data Structure like Trees and Graphs	Up to K5

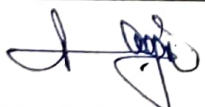
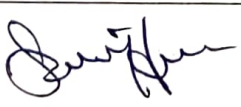
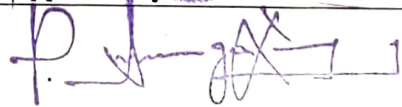
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3 – Advance Application

2 – Intermediate
Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
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DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22MCP11	Network Technologies	4	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives

- To explore the features of Wireless networks
- To elaborate the working with Mobile technological layers like Network and Transport layers
- To learn about the various architectures of Wireless WAN
- To learn about Wireless Wide Area Networks and its categories.
- To extend the features of advanced network technologies like 4G and 5G networks.

Unit	Course Contents	Hours	K Level
I	WIRELESS LAN: Introduction-WLAN Architecture and Components-WLAN technologies: Infrared, UHF narrowband, spread spectrum -IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a - Hiper LAN: WATM,BRAN, HiperLAN2 - Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security - IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX	11	Up to K5
II	MOBILE NETWORK LAYER: Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6- Network layer in the internet- Mobile IP session initiation protocol - mobile ad-hoc network: Routing, destination Sequence distance vector, Dynamic source routing	10	Up to K5
III	MOBILE TRANSPORT LAYER: TCP enhancements for wireless protocols - Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility - Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction	10	Up to K5

	oriented TCP - TCP over 3G wireless networks. Introduction for pair Operating System – Characteristics.		
IV	WIRELESS WIDE AREA NETWORK: Characteristics of WWAN and Advantages and disadvantages of WWAN-Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3GSGSN, 3G-GGSN, SMS-GMSC/SMS-IW MSC, Firewall, DNS/DHCP- High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.	10	Up to K5
V	4G NETWORKS: Introduction - 4G vision - 4G features and challenges - Applications of 4G - 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio. 4.5G Introduction– Features – Differences between 4G and 4.5G – Network Sniffer. 5G NETWORKS: Introduction - Architecture - Advantages & Disadvantages - Challenges - Application Areas - Performance – Deployment – 5G Devices – Technology.	11	Up to K5

Note: The Questions should be asked in the ratio of 60% programs (Real time examples) and 40% for theory.

Book for Study

- 1 Simon Haykin , Michael Moher, David Koilpillai, “Modern Wireless Communications”, First Edition, Pearson Education 2013.
- 2 Erik Dahlman, Stefan Parkvall, Johan Skold, “5G NR: The Next Generation Wireless Access Technology”, Second Edition, Academic Press, 2018

Books for Reference

- 1 Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", Second Edition, Academic Press, 2008.
- 2 Anurag Kumar, D.Manjunath, Joy kuri, “Wireless Networking”, First Edition, Elsevier 2011
- 3 Vijay Garg , “Wireless Communications and networking”, First Edition, Elsevier 2007
- 4 Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education 2012.

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can develop students to learn about Wireless LAN, Mobile Network and Transport Layer.

Activities to be given

- 1 Demonstrate and develop: Wireless Wide Area Network
- 2 Assignment given on extended features of 4G and 5G Networks
- 3 Preparing the students to know about 5G Networks.

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze the technology of Hiper LAN and IEEE Standards	Up to K5
CLO2	Build the concepts of Mobile IP and Mobile Ad-hoc Networks	Up to K5
CLO3	Explain about Traditional TCP and Classical TCP improvements	Up to K5
CLO4	Acquire the knowledge about 4G, 4.5G and 5G Networks	Up to K5
CLO5	Explain the knowledge UMTS, DHCP and HSDPA	Up to K5


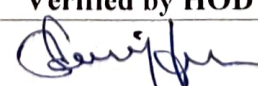
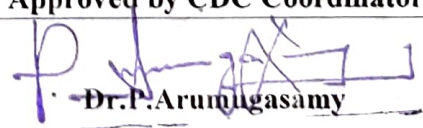
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

Programme Outcomes							
CLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	2	3	2	2
CLO 2	3	2	2	2	2	3	1
CLO 3	3	3	2	3	3	2	2
CLO 4	3	3	3	2	2	2	2
CLO 5	3	3	3	3	3	3	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Mrs. V. Bakyalakshmi	 Dr. A. V. Senthil Kumar	 Dr. P. Arumugasamy

Dr. A. V. SENTHIL KUMAR
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Co-ordinator
 Curriculum Development Cell
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 Coimbatore-641 028.

DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22MCP12	Software Development Fundamentals	4	4	50	50	100

Nature of Course	
Knowledge and Skill Oriented	Employability Oriented
	Entrepreneurship Oriented
	Skill Development

Course Objectives

- To learn about the various Quality Assurance methodologies
- To summarize the methods, events of an object-oriented security layers.
- To learn about software development and types of testing
- To elaborate about the agile concepts
- To analyze with the storage applications using Query methods

Unit	Course Contents	Hours	K Level
I	Introduction: Software Products and Ideas Behind Them - Different Models- Research and Development- Knowledge Sharing Platform. Roles, Responsibilities, and Methodologies- Business Owner- Product Manager- Designers- Backend- Frontend- Quality Assurance (QA)- Methodologies- Scrum- Kanban.	12	Up to K5
II	Understanding Object-Oriented Security Layers: Understand the Fundamentals of Classes: properties, methods, events, and constructors; how to create a class; how to use classes in code - Understand Inheritance - Understand Polymorphism - Understand Encapsulation.	12	Up to K5
III	Understanding General Software Development: Understand Application Life Cycle Management; phases of application life cycle management; software testing – Different Types of Testing- Unit Testing- Integration Testing- System Testing- Acceptance Testing- Regression Testing.	10	Up to K5

IV	Understanding Agile Concepts: Introduction – Agile is different – Preparation of agile using Kanban – Scrum essential – Scrum day by day – Agile in the organization – support mechanisms	8	Up to K5
V	Understanding Desktop Applications: Understand Windows Store Applications- Understand Console-based Applications - Understand Windows Services. Understanding Databases: Understand Relational Database Management Systems - Understand Database Query Methods - Understand Database Connection Methods.	10	Up to K5

Note: The Questions should be asked in the ratio of 60% programs (Real Time Applications) and 40% for theory.

Book for Study

- 1 Software Development Fundamentals, Exam 98-361(www.Wiley.com/college/microsoft)
- 2 O. Filipova and R. Vilão, Software Development, From A to Z, (https://doi.org/10.1007/978-1-4842-3945-2_1)

Reference Books

1. Head First Design Patterns, Author — Eric Freeman, Bert Bates, Kathy Sierra & Elisabeth Robson.
2. Introduction to Algorithms, Authors — Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest & Clifford Stein

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can develop students to learn about Core Programming and Object-Oriented Security Layers.

Activities to be given

- 1 Demonstrate and develop: Web Applications
- 2 Assignment given on extended features of General Software Development
- 3 Preparing the students to know about Desktop Applications and Databases

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze the various quality assurance methods.	Up to K5
CLO2	Gathering knowledge on the Object oriented Programming concepts.	Up to K5
CLO3	Outline the knowledge about Software development concepts.	Up to K5
CLO4	Analyze the knowledge about web page development tools.	Up to K5
CLO5	Examine the knowledge on storing data on secondary storage devices	Up to K5

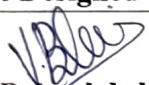
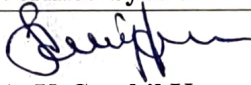
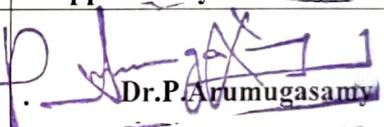
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

Programme Outcomes							
CLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	1	3	2	2
CLO 2	3	3	2	2	3	3	1
CLO 3	3	2	3	2	3	2	2
CLO 4	3	2	3	2	3	2	2
CLO 5	3	2	3	3	3	3	1

3 – Advance Application

2 – Intermediate
Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Mrs. V. Bakyalakshmi	 Dr. A. V. Senthil Kumar	 Dr. P. Arumugasamy

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DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSE	22MCP13A	Elective II - Neural Networks	3	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives
- To learn about the basic functions of Neural networks
- To explore the architectures of Neural networks and its developing algorithms
- To illustrate the concepts of fuzzy logic in Neural network
- To learn and work Fuzzy Logic in Neural Network
- To work with the features of real time applications

Unit	Course Contents	Hours	K Level
I	Structures of Neural Network: Introduction, Principles and Promises, Perception Representation, Linear Separability, Learning, Back Propagation, Training Algorithm, Applications, Counter Propagation networks, Network Structure, Types, working principles and Applications.	10	Up to K5
II	Neural Network Architecture: Adaptive Resonance Theory, Overview, Architecture, Classification, Implementation, Optical Neural Network, Holographic Correlators, Cognition and Neo cognition, Structure, Training. Part of Neural network in Machine learning and deep learning	10	Up to K5
III	Neural Network Algorithm: Statistical Methods, Boltzmann's Training, Cauchy Training, Cauchy Training, Cauchy Training Hopfield Nets, Associative Memory, Applications	11	Up to K5
IV	Fuzzy Logic in Neural Network: Fuzzy Sets: Classical Sets to Fuzzy Sets, Fuzzy Sets Versus CRISP Sets, Operations on Fuzzy Sets, Fuzzy Arithmetic and Fuzzy Relations. Fuzzy Logic, Applications	10	Up to K5

V	Case Study: Application of Neural Networks in Character Recognition, Drug Discovery, Speech Recognition; Application of Fuzzy Logic Concepts in Fuzzy Controller Design and Fuzzy Querying in Relational Database Model.	11	Up to K5
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Note: The Questions should be asked in the ratio of 40% programs (Real Time Applications) and 60% for theory.

Book for Study

- 1 Philip D. Wasserman, "Neural Computing Theory and Practice", Anza Research Van Nostrand Reinhold, New York 2018
- 2 George J. Klir and Bo Yuan, "Fuzzy sets and Fuzzy logic – Theory and Applications", PHI 2014.

Book for Reference

- 1 Dr. A. V. Senthil Kumar, "Applications of Artificial Neural Networks for Nonlinear Data", IGI Global Publications, USA September 2019
- 2 Beale R. and Jackson T, "Neural Computing an Introduction", Adam Hilger, 2015
- 3 Igor Aleksander and Helen Morton, "An Introduction to Neural Computing", Chapman & Hall, 2016
- 4 Charu C. Aggarwal, "Neural Networks and Deep Learning: A Textbook", September 2018
- 5 Martin T. Hagan, "Neural Network Design", 1st Edition, 2019

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Students can learn about neural network, its architecture and Fuzzy logic in Neural Network.

Activities to be given

- 1 Demonstrate and develop: Neural Network Algorithms
- 2 Assignment given on extended features of Neural Network Architectures
- 3 Students can do Case Studies on various concepts using Neural Network and Fuzzy Logic

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze the various Neural Networks Algorithms and Fuzzy logic Techniques	Up to K5
CLO2	Outline about the fuzzy logic and neural network techniques to build intelligent machines	Up to K5
CLO3	Apply neural network and fuzzy logic models to handle uncertainty and solve problems	Up to K5
CLO4	Gathering the feasibility of applying neuro fuzzy models for a particular problem	Up to K5

CLO5	Determine and implement machine learning solutions to evaluate and interpret results of an algorithm	Up to K5
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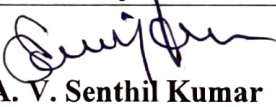

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

Programme Outcomes							
CLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	1	3	2	2
CLO 2	3	3	2	2	3	3	3
CLO 3	3	2	3	2	3	2	2
CLO 4	3	2	3	2	3	2	2
CLO 5	3	2	3	3	3	3	3

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Mrs. V. Bakyalakshmi	 Dr. A. V. Senthil Kumar	 Dr. P. Arumugasamy

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 Coimbatore-641 028.

DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSE	22MCP13B	Elective II Blockchain Technologies	3	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives

- To summarize the fundamental and basic concepts of Block chain
- To illustrate block chain concepts with Big data techniques
- To study about the Security and precautionary methods using Bitcoins
- To learn about various Mining and Simulating Blockchain
- To explore the block chain concepts with various tools and its applications

Unit	Course Contents	Hours	K Level
I	Block chain Technology: History of centralized service, Trusted third party for Transaction, Difference between centralized ,decentralized and distributed peer-to-peer networks, needs of block chaining, decentralized transaction, types of block chaining, Public, Private and Consortium block chain. History of bitcon, problem area of bitcon - Requirements for block chaining in business environment.	10	Up to K5
II	Fundamental Concepts: Over view of block chain technology, Block, verify and confirm block, Hashes, hash cryptography, Encryption vs hashing, Transaction: recording transaction, digital signature, verifying and confirming transaction, Block and block chaining, Hash pointers, block consensus building - Distributed consensus, Byzantine generals problem, Consensus mechanisms: POW, POS, POB, POA, POET, etc., Blockchain Architecture, Blockchain Architecture, Types, Use cases and Challenges, Markle Root Tree, blockchain and future world of web3.0.	10	Up to K5

III	Mining and Simulating Blockchain: Mining and simulating blockchain: Game theory behind competitive mining, Race to beat the others (including hackers), Incentives-mining and transactions fees, CPU considerations, Energy expended in mining, Bitcoin Mining-Bitcoin Profit, Working Principles - Profitability Mining tools, Blockchain for Bigdata.	11	Up to K5
IV	Bitcoins, Security and Safeguard Bitcoin: Bitcoin creation and economy, Bitcoin exchanges, Bitcoin limited supply and deflation? Famous hacks, Block chain and Bitcoin Wallets, types, Security and safeguards: Protecting blockchain from attackers, Forks-soft and hard, Blockchain Security Key Management in Bitcoin, Case Studies.	10	Up to K5
V	Platforms and Applications: Introduction to Blockchain platform: Ethereum, Hyperledger, IOTA, EOS, Multichain, Bigchain, Corda, Openchain, Solidity, Design a new blockchain, potential for disruption, How to Government, Identity management, Auto executing contracts, Three signature escrow, Triple entry accounting, Elections and voting?, Property records, titles, Micropayments, Notary, Sidechains, Blockchain Smart Contracts, Challenges and Research Issues in Blockchain.	11	Up to K5

Note: The Questions should be asked in the ratio of 40% programs (Real Time Applications) and 60% for theory.

Book for Study

- 1 Bradley Lakeman, "Blockchain Basics 2019: The New Updated Invested Paperback", 2018
- 2 Arvind Narayana, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", 2019

Book for Reference

- 1 Paul Laurence, "Blockchain: Step-By-Step Guide to Understand" 2016
- 2 Chirs Dannen, "Introducing Ethereum and Solidity Foundations of Cryptocurrency and Blockchain Programming for Beginners" 2018, A press.

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Students can learn about Block chain technology, Bitcoins, Security and Safeguard Bitcoin.

Activities to be given

- 1 Demonstrate : Various Platforms and Applications of Block Chain Technology
- 2 Assignment given on extended features of Bitcoins, Security and Safeguard Bitcoin
- 3 Students can learn Mining and Simulating in Blockchain technology

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze the neediness of Block chaining and its types along with the requirements	Up to K5
CLO2	Interpret about the Block chain technology and its architecture	Up to K5
CLO3	Experimenting Block Chain with Mining Tools	Up to K5
CLO4	Analyze security key management. Creation and exchange of Bitcoins.	Up to K5
CLO5	Evaluate the platforms and Applications of Block chain	Up to K5

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

Programme Outcomes							
CLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	1	3	2	2
CLO 2	3	3	2	2	3	3	1
CLO 3	3	2	3	2	3	2	2
CLO 4	3	2	3	2	3	2	2
CLO 5	3	2	3	3	3	3	3

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Mrs. V. Bakyalakshmi	Dr. A. V. Senthil Kumar	Dr.P.Arumugasamy

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Coimbatore-641 028.

DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSE	22MCP13C	Elective II -Data Science	3	4	50	50	100

Nature of Course

Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives

- To explain the basic concepts and background process of Data science
- To extract the applications with data science methods
- To work with the features of Map reduce, Pregel and Hadoop
- To summarize advanced data with real time applications
- To learn about Random Forests, David Huffaker :Google's Hybrid Approach to Social Research

Unit	Course Contents	Hours	K Level
I	Data Science Introduction: Getting Started with Data Science, What makes someone a Data Scientist, Beyond the Big Data type, Datafication, Data science jobs, Data Science profile, Statistical thinking in the Age of Big data, Exploratory Data Analysis, The data science process-Data science Life Cycle-Data Science process steps and Framework.	10	Up to K5
II	Origins: Data Collection, Preparation and Reporting - Clustering: Data Ordering and Visualization - Sharing: Data access, Dissemination and Quality Assessment, Interpreting: Data Transformation - Interpreting: Data Transformation, Analysis and Reuse The Reuse of Digital Computer Data: Transformation, Recombination and Generation of Data Mixes in Big Data	10	Up to K5

II	Extracting Meaning from Data: The Kaggle Model, A single contestant, Their customers, Feature Selection, Filters, Wrappers- Embedded Methods Tree Algorithm, Entropy, Decision tree Algorithm-Classification Tree and Regression Tree , Handling Continuous variables in decision trees, Random Forests, David Huffaker : Google's Hybrid Approach to Social Research, Moving from Descriptive to Predictive, Social at Google	11	Up to K5
IV	Data Engineering : Map Reduce, Pregel and Hadoop: Map Reduce- World Frequency Problem- Pregel, On being a data scientist- Data Abundance versus Data Scarcity- Designing Models-Steps for data science modeling- Economic Interlude : Hadoop, A brief Introduction to Hadoop- Cloudera	10	Up to K5
V	Data Sources – Data Types – Data at scale - „Big“ Clinical Data: The Four „Vs“ - Standards in Healthcare Data- Research Data Stewardship for Healthcare Professionals - Extracting Features from Time Series-Transactional and Time series data-Time series Decomposition.	11	Up to K5

Note: The Questions should be asked in the ratio of 40% programs (Real Time Applications) and 60% for theory.

Book for Study

- 1 Levin, Rubin, (2018), "Statistics for Management", 13th edition, Pearson Education.
- 2 Anderson D.R, Sweeney D.J, Williams T.A, (2019), "Statistics for Business and Economics, 11th edition, Cengage Learning.

Book for Reference

- 1 Pieter Kubben Michel Dumontier Andre Dekker (2019), Fundamentals of Clinical Data Science, Springer Open.
- 2 Sabina Leonelli Niccolò Tempini, Data Journeys in the Sciences, Springer Open.
- 3 Gerald Keller, (2014), Statistics for Management and Economics, 10th edition, Cengage Learning.
- 4 Rajendra Nargunkar (2016), Marketing Research, Tata McGraw Hill

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Students can learn about Introduction of Data Science

Activities to be given

- 1 Demonstrate : Data Engineering : Map Reduce, Pregel and Hadoop

- 2 Assignment given on extended features and origins of Data Science
- 3 Students can learn different data sources

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze the various concepts of Data science	Up to K5
CLO2	Gather knowledge on the Univariate Analysis	Up to K5
CLO3	Outline the knowledge about Prescriptive, Predictive and bivariate analysis	Up to K5
CLO4	Illustrate about the Bi-Variate Analysis	Up to K5
CLO5	Evaluate the concepts of Data science in real time applications	Up to K5

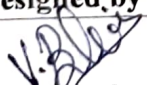
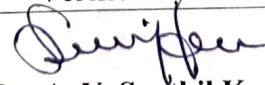

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

Programme Outcomes							
CLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	1	3	2	2
CLO 2	3	3	2	2	3	3	1
CLO 3	3	2	3	2	3	2	2
CLO 4	3	2	3	2	3	2	2
CLO 5	3	2	3	3	3	3	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by  Mrs. V. Bakyalakshmi	Verified by HOD  Dr. A. V. Senthil Kumar Dr. A. V. SENTHIL KUMAR MCA, M.Phil., PGDCA, Ph.D. Professor and Director PG and Research Dept. Of Computer Applications Hindusthan College of Arts and Science (Autonomous),	Approved by CDC Coordinator  Dr. P. Arunugasamy Co-ordinator Curriculum Development Cell Hindusthan College of Arts & Science, Coimbatore-641 028.
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DEPARTMENT OF COMPUTER APPLICATIONS(PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSE	22MCP13D	Elective II -Embedded Systems	3	4	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	
	Skill Development	✓

Course Objectives

- To learn about the concepts of Embedded systems
- To extract the basic knowledge of embedded platforms with computing designs
- To apply the interfacing concepts with Arduino systems
- To learn about Arm Processors, Embedded Firmware
- To work with Programming structures and its firmware technology

Unit	Course Contents	Hours	K- Level
I	Introduction to Embedded Computing and Arm Processors: Complex systems and microprocessors–Types of Embedded systems- Elements of Embedded Systems-Embedded system design process –Steps in the Embedded System Process–Design example: Model train controller- Instruction sets preliminaries - ARM Processor – CPU: programming input and output-supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power Consumption.	10	Up to K5
II	Embedded Computing Platform Design: The CPU Bus - Memory devices and systems – Designing with computing platforms consumer electronics architecture – platform- level performance analysis - Components for embedded programs- Models of programs- Assembly, linking and loading.	10	Up to K5

II	Sensor Interfacing with Arduino: Basics of hardware design and functions of basic passive components - Hardware Components of the Embedded Systems - sensors and actuators- Arduino code – library file for sensor interfacing-construction of basic applications.	11	Up to K5
IV	Embedded Firmware: Reset Circuit, Brown-out Protection Circuit- Oscillator Unit - Real Time Clock-Watchdog Timer - Embedded Firmware Design Approaches-Super Loop Based Approach- Embedded Operating System Based Approach- Development Languages-Assembly Language Based Development – High Level Language Based Development-Mixing Assembly and High Level Language.	10	Up to K5
V	Embedded C Programming: Introduction-Creating - hardware delays using Timer 0 and Timer 1- Reading switches-Adding Structure to the code- Generating a minimum and maximum delay-Example: Creating a portable hardware delay- Timeout mechanisms-Creating loop timeouts-Testing loop timeouts-hardware timeouts-Testing a hardware timeout.	11	Up to K5

Note: The Questions should be asked in the ratio of 40% programs (Real Time Applications) and 40% for theory.

Book for Study

- 1 Marilyn Wolf -“Computers as Components - Principles of Embedded Computing System Design”, Third Edition - Morgan Kaufmann Publisher (An imprint from Elsevier), 2019.
- 2 Michael J. Pont – “Embedded C”, 2nd Edition, Pearson Education, 2018.

Book for Reference

- 1 Elecia White, “Making Embedded Systems: Design Patterns for Great Software”, 2011
- 2 P.Marwedel and Peter Marwedel,” Embedded System Design”, 2013, Pearson Publications.
- 3 Michael Barr,” Programming Embedded Systems: With C and GNU Development Tools”, 2018, first Edition, BPB Publications
- 4 Edward A. Lee and Sanjit Arunkumar, ”Introduction to Embedded Systems - A Cyber-Physical Systems Approach”, Second Edition, 2018

Pedagogy: Chalk & Talk, Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Students can learn about Introduction Embedded Systems.

Activities to be given

- 1 Demonstrate: basic knowledge of embedded platforms with computing designs
Assignment given on interfacing concepts with Arduino systems, Arm Processors, Embedded
- 2 Firmware
- 3 Students can learn and implement Embedded C Programming

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Analyze the concepts and various techniques of Embedded Computing.	Up to K5
CLO2	Gather the knowledge on the Embedded Computing Platform Design	Up to K5
CLO3	Analyze the knowledge about Sensor Interfacing with Arduino	Up to K5
CLO4	Illustrate about the Embedded Firmware	Up to K5
CLO5	Evaluate the concepts of Generating delay, Timeout mechanisms	Up to K5

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

CLOs	Programme Outcomes						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CLO1	3	3	2	1	3	2	2
CLO2	3	3	2	2	3	3	1
CLO3	3	2	3	2	3	2	2
CLO4	3	2	3	2	3	2	2
CLO5	3	2	3	3	3	3	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
Mrs. V. Bakyalakshmi	Dr. A. V. Senthil Kumar.	Dr. P. Arumugasamy

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DEPARTMENT OF COMPUTER APPLICATIONS (PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22MCP14	Practical III - PHP and MySQL Programming	3	5	50	50	100

Nature of Course		
Knowledge and Skill Oriented	Employability Oriented	✓
	Entrepreneurship Oriented	✓
	Skill Development	✓

Course Objectives

- To learn about basics concepts of PHP
- To work with Arrays HTML forms with PHP and its features
- To learn about the basic concepts of MySQL
- To learn about Handling HTML Forms and working of Database and SQL
- To evaluate the basic functions of MySQL with Files and Directories

Unit	Course Contents	Hours	K - Level
	1. Write a program to build a factorial calculator.	3	Up to K5
	2. Write a program for Interactive HTML color sampler.	3	Up to K5
	3. Design a HTML page and write a program for arithmetic operation in PHP using switch case.	3	Up to K5
	4. Design & write a program to calculate average and grade of a class using arrays.	4	Up to K5
	5. Write a program to manipulate string using different types of string function in PHP	4	Up to K5
	6. Design and write a program to calculate age in years, months and days from the date of birth in PHP.	4	Up to K5
	7. Write a program to access multi-dimensional array.	4	Up to K5
	8. Create a web form in HTML that contain variety of form fields and display the values using PHP.	4	Up to K5
	9. Design a web page and write a program to find number of hits in a webpage.	5	Up to K5
	10. Create employee database using MySQL, insert records and display in neat format.	5	Up to K5
	11. Design a login authentication system using PHP.	5	Up to K5

12. Design an online resume submission form using PHP.	5	Up to K5
13. Create a student mark list using PHP.	5	Up to K5
14. Write a PHP program to display patient details in a hospital.	5	Up to K5
15. Write a PHP program to display book details in a library.	6	Up to K5

Note: The Questions should be asked in the ratio of 100% programs.

Pedagogy : Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can develop Programmers who will be involved in solving real time applications in IT Sector.

Activities to be given

- 1 Demonstrate AND Develop: What is PHP? Simple PHP Programs
- 2 Assignment given on Introducing Database and SQL
- 3 Preparing the Students to Develop Programs for Real Time Applications in IT Sector

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Implement the Calculator program and Implement the Factorial Calculation	Up to K5
CLO2	Identification of web form using HTML and PHP	Up to K5
CLO3	Execute the database using MySQL and Implementation of record insertion and deletion operations	Up to K5
CLO4	Estimate the application to implement Hospital management	Up to K5
CLO5	Estimate the application to implement book details in a library.	Up to K5



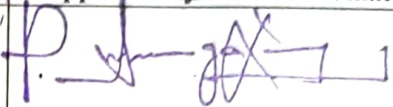
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

CLOs	Programme Outcomes						
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	2	3	2	2
CLO 2	3	3	2	2	3	3	1
CLO 3	3	2	3	2	3	2	2
CLO 4	3	2	3	2	3	2	2
CLO 5	3	2	3	3	3	3	2

3 – Advance Application

2 – Intermediate Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Dr. N. Revathy	 Dr. A. V. Senthil Kumar	 Dr.P.Arumugasamy

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Coimbatore-641 028.

DEPARTMENT OF COMPUTER APPLICATIONS (PG)				CLASS: I MCA				
Sem	Course Type	Course Code	Course Title	Credits	Contact Hours / Week	CIA	Ext	Total
II	DSC	22MCP15	Practical IV - Data Structures	3	5	50	50	100

Nature of Course			
Knowledge and Skill Oriented	Employability Oriented		✓
	Entrepreneurship Oriented		✓
	Skill Development		✓

Unit	Course Contents	Hours	K - Level
	1. Write a program to implement recursive and non-recursive a. Linear search b. Binary search.	8	Up to K5
	2. Write a program to implement a. Bubble sort b. Selection sort c. Quick sort d. Insertion sort	9	Up to K5
	3. Write a program to implement the following using an array. a. Stack ADT b. Queue ADT	9	Up to K5
	4. Write a program to implement list ADT to perform following a. Insert an element into a list. b. Delete an element from list c. Search for a key element in list d. Count number of nodes in list	9	Up to K5
	5. Write a program that use recursive functions to traverse the given binary tree in a. Pre-order b. In-order and c. Post-order.	10	Up to K5
	6. Write a program for binary tree creation, addition, deletion and display the node.	10	Up to K5
	7. Write a program to find minimum cost of spanning tree using kruskal's method.	10	Up to K5

Note: The Questions should be asked in the ratio of 100% programs.

Pedagogy : Exercise, Assignments & PPTs.

Rationale for Nature of the Course: Can develop Programmers to learn and implement Linear and Non Linear Data Structure.

Activities to be given

- 1 Demonstrate and develop: Analyzing Algorithms.
- 2 Assignment given on extended features of Data Structures.
- 3 Preparing the students to learn and implement Basics of Algorithm and optimum Techniques

Course Learning Outcomes

CLOs	On Completion of the Course, the students should be able to	K - Level
CLO1	Experiment the various Searching operations.	Up to K5
CLO2	Implementing Stack and Queue with its operation.	Up to K5
CLO3	Estimate the performance of addition, deletion of a node in non-linear Data structure.	Up to K5
CLO4	Solve a program to implement various types of Sorting.	Up to K5
CLO5	Evaluate to find minimum cost of spanning tree	Up to K5

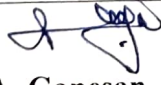
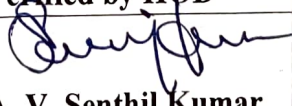
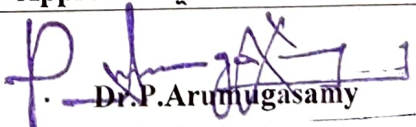
Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs)

Programme Outcomes							
CLOs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CLO 1	3	3	2	1	3	2	2
CLO 2	3	3	2	2	3	3	3
CLO 3	3	2	3	2	3	2	2
CLO 4	3	2	3	2	3	2	2
CLO 5	3	2	3	3	3	3	2

3 – Advance Application

2 – Intermediate
Level

1 – Basic Level

Course Designed by	Verified by HOD	Approved by CDC Coordinator
 Mr. A. Ganesan	 Dr. A. V. Senthil Kumar	 Dr. P. Arumugasamy Co-ordinator

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