ALAGAPPA UNIVERSITY

(A State University Established in 1985)

Karaikudi - 630003. Tamil Nadu, India

FACULTY OF SCIENCE
DEPARTMENT OF COMPUTER SCIENCE

M.Sc., COMPUTER SCIENCE

REGULATIONS AND SYLLABUS

(For the candidates admitted from the
Academic Year 2022 - 2023)

DEPARTMENT OF COMPUTER SCIENCE
M.Sc., Computer Science

REGULATIONS AND SYLLABUS
[For the candidates admitted from the Academic Year 2022 – 2023 onwards]

ALAGAPPA UNIVERSITY
(A State University Accredited with "A+" grade by NAAC (CGPA: 3.64) in the Third Cycle and Graded as Category-I University by MHRD-UGC)
Karaikudi -630003, Tamil Nadu.

The panel of Members-Broad Based Board of Studies

Chairperson: **Dr. T. MEYYAPPAN** Professor & Head i/c, Department of Computer Science Alagappa University, Karaikudi Teaching Experience: 31 years Research Experience: 16 years Area of Research: Big Data Analytics, Image Processing and Networks	
Foreign Expert: **Dr. ABDUL RAHAMAN WAHAB SAIT** King Faisal University, Saudi Arabia Teaching Experience: 19 years Research Experience: 10 years Area of Research: Web Mining, Big Data Analytics, Machine Learning	
Indian Expert: **Dr. P. KALAVATHY** Professor, Department of Computer Science & Applications Gandhigram Rural Institute, Gandhigram Teaching Experience: 21 years Research Experience: 16 years Area of Research: Data Mining, Digital Image Processing	
Indian Expert: **Dr. M. BALAMURUGAN** Professor, Department of Computer Science Bharathidasan University, Trichy Teaching Experience: 28 years Research Experience: 16 years Area of Research: Big Data Analytics, Computational Intelligence, Digital Image Processing	
Industry Expert: **Dr. R. GOKULAKRISHNAN** Joint Director, Software Technology Parks of India Ministry of Communication and IT Government of India, Chennai Teaching Experience: 7 years Industrial Experience: 14 Years Area of Research : Information Security, Historical Data Analysis and Nature based Algorithms	
Members: 1. **Dr. A. PADMAPRIYA** Professor, Department of Computer Science, Alagappa University, Karaikudi Teaching Experience: 19 years Research Experience: 15 years Area of Research: Data Mining, Big Data Analytics, Information and Network Security, Communication Networks	
2. **Dr. S. SANTHOSH KUMAR** Assistant Professor, Department of Computer Science, Alagappa University, Karaikudi Teaching Experience: 19 years Research Experience: 14 years Area of Research: Data Mining, Machine Learning, Health Care Analytics, IoT	

Alumnus/Alumna: **Dr. P. GEETHA** Current Position : Associate Professor Type of Profession : Teaching Dr. Umayal Ramanathsn College for Women, Karaikudi Teaching Experience: 16 years Research Experience: 10 years Area of Research: Data Mining, Big Data Analytics	
Ex-Officio Member: **Dr. V. SIVAKUMAR** The Director Curriculum Design & Development Cell, Alagappa University, Karaikudi	

ALAGAPPA UNIVERSITY
DEPARTMENT OF COMPUTER SCIENCE
Karaikudi -630003, Tamil Nadu.

REGULATIONS AND SYLLABUS-(CBCS-University Department)
[For the candidates admitted from the Academic Year 2022 – 2023 onwards]

Name of the Department	: Computer Science
Name of the Programme	**:** M.Sc., Computer Science
Duration of the Course	**:** Full Time (Two Years)

Choice-Based Credit System

A choice-Based Credit System is a flexible system of learning. This system allows students to gain knowledge at their own tempo. Students shall decide on electives from a wide range of elective courses offered by the University Departments in consultation with the Department committee. Students can undergo additional courses and acquire more than the required number of credits. They can also adopt an inter-disciplinary and intra-disciplinary approach to learning and make the best use of the expertise of available faculty.

Programme

"Programme" means a course of study leading to the award of a degree in a discipline.

Courses

'Course' is a component (a paper) of a programme. Each course offered by the Department is identified by a unique course code. A course contains lectures/ tutorials/laboratory/seminar/project/practical training/report writing /Viva-voce, etc or a combination of these, to meet the teaching and learning needs effectively.

Credits

The term "Credit" refers to the weightage given to a course, usually in relation to the instructional hours assigned to it. Normally in each of the course's credits will be assigned on the basis of the number of lectures/tutorial/laboratory and other forms of learning required to complete the course contents in a 15-week schedule. One credit is equal to one hour of lecture per week. For laboratory/field work, one credit is equal to two hours.

Semesters

An Academic year is divided into two Semesters. In each semester, courses are offered in 15 teaching weeks and 5 more weeks are devoted to conduct of examination and evaluation purposes. Each week has 30 working hours spread over 5 days a week.

Medium of Instruction

English

Departmental committee

The Departmental Committee consists of the faculty of the Department. The Departmental Committee shall be responsible for admission to all the programmes offered by the Department including the conduct of entrance tests, verification of records, admission, and evaluation. The Departmental Committee determine the deliberation of courses and specifies the allocation of credits semester-wise and course-wise. For each course, it will also identify the number of credits for lectures, tutorials, practical, seminars etc.

The courses (Core/Discipline Specific Elective/Non-Major Elective) are designed by teachers and approved by the Departmental Committees. Courses approved by the Departmental Committees shall be approved by the Board of Studies/Broad Based Board of Studies. A teacher offering a course will also be responsible for maintaining attendance and performance sheets (CIA – I, CIA – II, assignments, andseminar) of all the students registered for the course. The Non-major elective programme, MOOCs coordinator and Internship Mentor are responsible for submitting the performance sheet to the Head of the department. The Head of the Department consolidates all such performance sheets of courses pertaining to the programmes offered by the department and forward the same to be Controller ofExaminations.

Programme Educational Objectives- (PEO)

PEO-1	Demonstrate proficiency in the analysis of complex problems and the synthesis of solutions to those problems with the help of computers
PEO-2	Understand and use the modern software models and techniques
PEO-3	Acquire broad understanding of database concepts and database management system software and Emerging Trends in computer science
PEO-4	Learn the phases of compiler and explore knowledge about context free grammars, compiler parsing techniques, syntax directed definitions and translation schemes
PEO-5	To understand necessary approaches and techniques to build protection mechanisms to secure personal information and computernetworks
PEO-6	Learning basic and advanced methods in big data technology and tools, including MapReduce, Hadoop and its ecosystem
PEO-7	Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services
PEO-8	Gives technology-oriented students the knowledge and skill to develop creative solutions
PEO-9	Apply computer science theory and software development concepts to construction level
PEO-10	Design and develop computer programs/computer systems in the fields related to algorithms, networks, web design, cloud computing, Artificial Intelligence, mobile applications

Programme Specific Objectives-(PSO)

PSO-1	Computer Science Postgraduates enriches their knowledge in special areas of computing, such as open source programming, artificial intelligence, cloud computing, information and network security
PSO-2	Computer Science Postgraduates will apply their knowledge and skills to succeed in their career/ professional development and/or postgraduate education to pursue flexible career paths amidst future technological changes
PSO-3	Our postgraduates will apply basic principles and practices of computing grounded in mathematics and science to successfully complete hardware and/or software related engineering projects to meet customer business objectives and/or productively engage in research
PSO-4	Our postgraduates will demonstrate a sense of societal and ethical responsibility in their professional endeavors, and will remain informed and involved as full participants in our profession and our society
PSO-5	Our postgraduates will demonstrate strong communication skills and the ability to function effectively in multi-disciplinary teams

Programme Outcome-(PO)

PO-1	Students to have a wide perspective on software development including web-based applications as well as graphic applications
PO-2	Apply knowledge of management theories and HR practices to solve business problems through global research.
PO-3	Foster analytical and critical thinking abilities for data-based decision-making.
PO-4	Inculcate contemporary business practices to enhance employability skills in the competitive environment.
PO-5	Students will be able to solve simple computational problems using programing skills
PO-6	Students will be able to bridge the gap between the industry and academia
PO-7	Make them capable of working according to the current demand of the IT sector and responsible citizen
PO-8	Be technology oriented, have knowledge and ability to develop creative solutions and a better understanding of future impacts development of computer systems and technology for people and to society
PO-9	Able to understand the role of computer science in solving facts time problems in society
PO-10	Develop programming, analytical and logical thinking skills

Programme Specific Outcomes-(PSO)

PSO-1	Apply profound knowledge to analyze and design software and systems containing hardware and software components of varying complexity
PSO-2	Analyze and identify the customer requirements in multidisciplinary domains, create high level design and implement robust software applications using latest technological skills
PSO-3	Apply mathematical model, algorithmic principles, and computer science theory in the design of real-time applications

PSO-4	Understand professional ethics and Cyber regulations and develop youth with social commitments.
PSO-5	Apply mathematical foundations, algorithmic principles, and Computer Science theory in the modeling and design of computational systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

Eligibility for admission

Candidates for admission to the first year of the Master of Science in Computer Science[M.Sc. (Computer Science) programme is required to pass in any one of the following Examinations of any recognized University with a minimum of 55% marks in Part-III (minimum 50% marks for SC/ST candidates):

B.Sc. Degree in Computer Science / Information Technology / B.C.A. / B. Voc (Software Development) or any qualification equivalent thereto in 10+2+3 pattern

Minimum Duration of programme

The programme is for a period of two years. Each year shall consist of two semesters viz. Odd and Even semesters. Odd semesters shall be from June / July to October / November and even semesters shall be from November / December to April / May. Each semester there shall be 90 working days consisting of 6 teaching hours per working day (5 days/week).

Components

A PG programme consists of a number of courses. The term "course" is applied to indicate a logical part of the subject matter of the programme and is invariably equivalent to the subject matter of a "paper" in the conventional sense. The following are the various categories of the courses suggested for the PG programmes:

A. Core courses (CC)– "Core Papers" means "the core courses" related to the programme concerned including practicals and project work offered under the programme and shall cover core competency, critical thinking, analytical reasoning, and research skill.

B. Discipline-Specific Electives –(DSE) means the courses offered under the programme related to the major but are to be selected by the students, shall cover additional academic knowledge, critical thinking, and analytical reasoning.

C. Non-Major Electives (NME)– Exposure beyond the discipline
• Students have to undergo a total of two Non Major Elective courses with 2 credits offered by other departments (one in II Semester another in III Semester).

• A uniform time frame of 3 hours on a common day (Tuesday) shall be allocated for the Non-Major Electives.

• Non-Major Elective courses offered by the departments pertaining to a semester should be announced before the end of previous semester.

- Registration process: Students must register for the Non- Major Elective course within 15 days from the commencement of the semester either in the department or NME Portal (University website).

D. Self Learning Courses from MOOCs platforms.

- MOOCs shall be on voluntary for the students.
- Students have to undergo a total of 2 Self Learning Courses (MOOCs) one in II semester and another in III semester.

- The actual credits earned through MOOCs shall be transferred to the credit plan of programmes as extra credits. Otherwise, 2 credits/course be given if the self Learning Course (MOOCs) is without credit. While selecting the MOOCs, preference shall be given to the course related to employability skills.

- While selecting the MOOCs, preference shall be given to the course related to employability skills.

E. Projects / Dissertation /Internships (Maximum Marks:200)

The student shall undertake the Project/Dissertation/internship during the fourth semester.

Project/Dissertation

The candidate shall undergo Project/Dissertation Work during the final semester. The candidate should prepare a scheme of work for the dissertation/project and should get approval from the guide. The candidate, after completing the dissertation /project work, shall be allowed to submit it to the university departments at the end of the final semester. If the candidate is desirous of availing the facility from other departments/universities/laboratories/organizations, they will be permitted only after getting approval from the guide and HOD. In such a case, the candidate shall acknowledge the same in their dissertation/project work.

Internship

The students who have opted for an Internship must undergo industrial training in the reputed organizations to accrue industrial knowledge in the final semester. The student must find industry related to their discipline (Public limited/Private Limited/owner/NGOs etc.,) in consultation with the faculty in charge/Mentor and get approval from the head of the department and Departmental Committee before going for an internship.

Project / Dissertation / Internship format details are given in Annexure - I

Teaching methods

Teaching method includes chalk and talk, ICT tools such as Power Point Presentation, Interactive board, online live lectures and webresources.

Attendance

Students must have earned 75% of attendance in each course to appear in the examination. Students who have earned 74% to 70% of attendance need to apply for condonation in the prescribed form with the prescribed fee. Students who have earned 69% to 60% of attendance need to apply for condonation in the prescribed form with the prescribed fee along with the Medical Certificate. Students who have below 60% of attendance are not eligible to appear for the End Semester Examination (ESE). They shall re- do the semester(s) after completion of the programme.

Examination

The examinations shall be conducted separately for theory and practical's to assess (remembering, understanding, applying, analysing, evaluating, and creating) the knowledge required during the study. There shall be two systems of examinations viz., internal and external examinations. The internal examinations shall be conducted as Continuous Internal Assessment tests I and II (CIA Test I& II).

Internal Assessment

The internal assessment shall comprise a maximum of 25 marks for each subject. The following procedure shall be followed for awarding internal marks.

Theory -25 marks

Sr.No.	Content	Marks
1	Average marks of two CIA test	15
2	Seminar/group discussion/quiz	5
3	Assignment/field trip report/case study report	5
	Total	25

Practical -25 Marks

Project/Dissertation/ Internship – 50 Marks (assessed by Guide/incharge/HOD/ Supervisor)

1	Two presentations (mid-term)	30Marks
2	Progress report	20 Marks
	Total	50 Marks

External Examination

• There shall be examinations at the end of each semester, for odd semesters in the month of October / November; for even semesters in April /May.

• A candidate who does not pass the examination in any course(s) may be permitted to appear in such failed course(s) in the subsequent examinations to be held in October / November or April / May. However, candidates who have arrears in Practical shall be permitted to take their arrear Practical examination only along with Regular Practical examination in the respective semester.

• A candidate should get registered for the first semester examination. If registration is not possible owing to shortage of attendance beyond condonation limit / regulation prescribed OR belated joining OR on medical grounds, the candidates are permitted to move to the next semester. Such candidates shall re-do the missed semester after completion of the programme.

• For the Project Report/ Dissertation Work / internship the maximum marks will be 100 marks for project report evaluation and for the Viva-Voce it is 50 marks (if in some programmes, if the project is equivalent to more than one course, the project marks would be in proportion to the number of equivalent courses).

• Viva-Voce: Each candidate shall be required to appear for Viva- Voce Examination (in defense of the Dissertation Work//Project/ Internship).

F. Scheme of External Examination (Question Paper Pattern)

Theory - Maximum 75 Marks

Section A	10 questions. All questions carry equal marks. (Objective type questions)	10 x 1 = 10 Marks	10 questions – 2 each from every unit
Section B	5 questions Either / or type like 1.a (or) b. All questions carry equal marks, and each answer	5 x 5 = 25	5 questions – 1 each from every unit
Section C	5 questions Either / or type like 1.a (or) b. All questions carry equal marks, and each answer	5 x8 = 40	5 questions – 1 each from everyunit

Practical –Maximum 75 Marks

Section A	Aim, procedure / Algorithm and Program (2 Nos.)	20 Marks
Section B	Coding and Compilation	20 Marks
Section C	Debugging and Output	20 Marks
Section D	Record work	5 Marks
Section E	Vivo voce	10 Marks

2. Dissertation /Project report/Internship report Scheme of evaluation

Dissertation /Project report/Internship report	100 Marks
Vivo voce	50 Marks

Results

The results of all the examinations will be published through the Department where the student underwent the course as well as through University Website.

Passing minimum

- A candidate shall be declared to have passed in each course if he/she secures not less than 40% marks in the End Semester Examinations and 40% marks in the Internal Assessment and not less than 50% in the aggregate, taking Continuous assessment and End Semester Examinations marks together.

- The candidates not obtained 50% in the Internal Assessment are permitted to improve their Internal Assessment marks in the subsequent semesters (2 chances will be given) by writing the CIA tests and by submitting assignments.

- Candidates, who have secured the pass marks in the End- Semester Examination and in the CIA but failed to secure the aggregate minimum pass mark (E.S.E + C I.A), are permitted to improve their Internal Assessment mark in the following semester and/or in University examinations.

- A candidate shall be declared to have passed in the Project / Dissertation / Internship if he /she gets not less than 40% in each of the Project / Dissertation / Internship Report and Viva-Voce and not less than 50% in the aggregate of both the marks for Project Report and Viva-Voce.

- A candidate who gets less than 50% in the Project / Dissertation / Internship Report must resubmit the thesis. Such candidates need to take again the Viva-Voce on the resubmitted Project report.

Grading of the Courses

The following table gives the marks, Grade points, Letter Grades and classifications meant to indicate the overall academic performance of the candidate.

Conversion of Marks to Grade Points and Letter Grade (Performance in Paper / Course)

RANGE OF MARKS	GRADE POINTS	LETTER GRADE	DESCRIPTION
90 - 100	9.0 – 10.0	O	Outstanding
80 - 89	8.0 – 8.9	D+	Excellent
75 - 79	7.5 – 7.9	D	Distinction
70 - 74	7.0 – 7.4	A+	Very Good
60 - 69	6.0 – 6.9	A	Good
50 - 59	5.0 – 5.9	B	Average
00 - 49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

a) Successful candidates passing the examinations and earning GPA between 9.0 and **10.0 and marks from 90 – 100 shall be declared to have Outstanding (O).**
b) Successful candidates passing the examinations and earning GPA between 8.0 and **8.9 and marks from 80 - 89 shall be declared to have Excellent (D+).**
c) Successful candidates passing the examinations and earning GPA between 7.5 – **7.9 and marks from 75 - 79 shall be declared to have Distinction (D).**

d) Successful candidates passing the examinations and earning GPA between 7.0 – **7.4 and marks from 70 - 74 shall be declared to have Very Good (A+).**

e) Successful candidates passing the examinations and earning GPA between 6.0 – **6.9 and marks from 60 - 69 shall be declared to have Good (A).**

f) Successful candidates passing the examinations and earning GPA between 5.0 – **5.9 and marks from 50 - 59 shall be declared to have Average (B).**

g) Candidates earning GPA between 0.0 and marks from 00 - 49 shall be declared tohave Re-appear (U).

h) Absence from an examination shall not be taken as an attempt.

From the second semester onwards the total performance within a semester and continuous performance starting from the first semester are indicated respectively **by Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA).**

These two are calculated by the following formulate

GRADE POINT AVERAGE (GPA) = $\sum_i C_i\ G_i / \sum_i C_i$

$$\text{GPA} = \frac{\underline{\textbf{Sum of the multiplication of Grade Points by the credits of the courses}}}{\textbf{Sum of the credits of the courses in a Semester}}$$

Classification of the final result

CGPA	Grade	Classification of Final Result
9.5 – 10.0	O+	First Class – Exemplary*
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction*
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
0.0 and above but below 5.0	U	Re-appear

The final result of the candidate shall be based only on the CGPA earned by the candidate.

a) Successful candidates passing the examinations and earning CGPA between 9.5 and 10.0 shall be given Letter Grade (O+), those who earned CGPA between 9.0 and 9.4 shall be given Letter Grade (O) and declared to have First Class –Exemplary*.

b) Successful candidates passing the examinations and earning CGPA between 7.5 and 7.9shall be given Letter Grade (D), those who earned CGPA between 8.0 and 8.4 shall be given Letter Grade (D+), those who earned CGPA between 8.5 and 8.9 shall be given Letter Grade (D++) and declared to have First Class with Distinction*.

c) Successful candidates passing the examinations and earning CGPA between 6.0 and 6.4shall be given Letter Grade (A), those who earned CGPA between 6.5 and 6.9 shall be given Letter Grade (A+), those who earned CGPA between 7.0 and 7.4 shall be given Letter Grade (A++) and declared to have First Class.

d) Successful candidates passing the examinations and earning CGPA between 5.0 and 5.4shall be given Letter Grade (B), those who earned CGPA between 5.5 and 5.9 shall be given Letter Grade (B+) and declared to have passed in Second Class.

i) Candidates those who earned CGPA between 0.0 and 4.9 shall be given Letter Grade (U) and declared to have Re-appear.

e) Absence from an examination shall not be taken as an attempt.

CUMULATIVE GRADE POINT AVERAGE (CGPA) = $\sum_n \sum_i C_{ni} \; G_{ni} / \sum_n \sum_i C_{ni}$

CGPA = Sum of the multiplication of Grade Points by the credits of the entire Programme
         Sum of the credits of the courses for the entire Programme

Where 'Ci' is the Credit earned for Course i in any semester; 'Gi' is the Grade Point obtained by the student for Course i and 'n' refers to the semester inwhich such courses were credited.

CGPA (Cumulative Grade Point Average) = Average Grade Point of all the Courses passed starting from the first semester to the current semester.

Note: * The candidates who have passed in the first appearance and withinthe prescribed Semesters of the PG Programme are alone eligible for this classification.

Maximum duration of the completion of the programme
The maximum period for completion of M.Sc., in <u>COMPUTER SCIENCE</u> shall not exceed eight semesters continuing from the first semester.

☐ No. of copies of the dissertation/project report/internship report

The candidate should prepare three copies of the dissertation/project/report and submit the same for the evaluation of examiners. After evaluation, one copy will be retained in the department library, one copy will be retained by the guide and the student shall hold one copy.

☐ Format to be followed for dissertation/project report

The format /certificate for thesis to be followed by the student are given below

☐ Title page

☐ Certificate

☐ Acknowledgment

Content as follows:

Chapter No	Title	Page number
1	Introduction	
2	Aim and objectives	
3	Review of literature	
4	Materials and methods	
5	Result	
6	Discussion	
7	Summary	
8	References	

Format of the title page

Title of Dissertation/Project work

Dissertation/Project submitted in partial fulfilment of the requirement for the degree of Master of Science to the Alagappa University, Karaikudi -630003.

By

(Student Name)

(Register Number)

University Logo

Department of ---

Alagappa University

(A State University Accredited with "A+" grade by NAAC (CGPA: 3.64) in the ThirdCycle and Graded as Category-I University by MHRD-UGC, 2019: QS ASIA Rank- 216, QS BRICS Rank-104,QS India Rank-20)

Karaikudi - 630003

(Year)

Format of certificates

Certificate -Guide

This is to certify that the Dissertation/Project entitled"--------------------------------------

-----------" submitted to Alagappa University, Karaikudi-630 003 in partial fulfilment for the degree of Master of Science in-----------by Mr/Mis--------------------(Reg No --------------) under my supervision. This is based on the results of studies carried out by him/her in the Department of-------------------------, Alagappa University, Karaikudi-630 003. This dissertation/Project or any part of this work has not been submitted elsewhere for any other degree, diploma, fellowship, or any other similar titles or record of any University or Institution.

Place:

Karaikudi

Date:_____

Research Supervisor

Certificate - (HOD)

  This is to certify that the thesis entitled " --- " submitted by Mr/Mis -----------------(Reg No: --------------) to the Alagappa University, in partial fulfilment for the award of the degree of Master of-----------------in------------ is a bonafide record of research work done under the supervision of Dr--------------------- , *<<Designation>>*,Department of -- , Alagappa University. This is to further certify that the thesis or any part thereof has not formed the basis of the award to the student of any degree, diploma, fellowship, or any other similar title of any University or Institution.

Place: Head of the Department

Karaikudi Date:

Declaration (student)

I hereby declare that the dissertation entitled" -- " submitted to the Alagappa University for the award of the degree of Master of -------- in------ ------- has been carried out by me under the guidance of Dr.---------------------, *<<Designation>>*,Department of , Alagappa University, Karaikudi – 630 003.This is my original and independent work and has not previously formed the basis of the award of any degree, diploma, associateship, fellowship, or any other similar title of any University or Institution.

Place: Karaikudi   (--------------)

Date:

Internship

Format to be followed for Internship report

The format /certificate for internship report to be followed by the student are given below

Acknowledgment
Content as follows:

Chapter No	Title	Page number
1	Introduction	
2	Aim and objectives	
3	Organisation profile /details	
4	Methods / Work	
5	Observation and knowledge gained	
6	Summary and outcome of the Internship study	
7	References	

☐   Title page -**Format of the titlepage**

Title of internship report

Internship report submitted in partial fulfilment of the requirement for the
Master of degree in   to the Alagappa University, Karaikudi-630003.

By (Student
Name)(Register
Number)
University
Logo

Department of ---

Alagappa University

(A State University Accredited with "A+" grade by NAAC (CGPA: 3.64) in the ThirdCycle and Graded as Category-I University by MHRD-UGC, 2019: QS ASIA Rank- 216, QS BRICS Rank-104,QS India Rank-20)

Karaikudi -
630003 (Year)

⬚ Certificate-(Format of certificate – faculty in-charge)

This is to certify that the report entitled " --- "
submitted to Alagappa University, Karaikudi-630 003 in partial fulfilment for the Master of
Science in -------------by Mr/Mis------------(Reg No--------------) under my supervision.
This is based on the work carried out by him/her in the organization M/S   --.   This
Internship report or any part of this work has not been submitted elsewhere for any other
degree, diploma, fellowship, or any other similar record of any University or Institution.

Place: Research Supervisor
Date:_____

Certificate (HOD)

This is to certify that the Internship report entitled " --------------------- "
submitted by Mr/Mis.-----------------(RegNo --------------------) to the Alagappa University, in
partial fulfilment for the award of the Master of Science in ----------- is a bonafide record of
Internship report done under the supervision of ---------------, <<Designation>>,Department
of ----------------------, Alagappa University and the work carried out by him/her in the
organization M/S --------------------------. This is to further certify that the thesis or any part
thereof has not formed the basis of the award to the student of any degree, diploma,
fellowship, or any other similar title of any University or Institution.

Place: **Head of the Department**
Karaikudi
Date:

Certificate-(Format of certificate – Company supervisor or Head of the
Organization)

This is to certify that the Internship report entitled"---
----" submitted to Alagappa University, Karaikudi-630 003 in partial fulfilment for the
Master of Science in ---------------------by Mr/Mis------------ (Reg No -------------) under my
supervision. This is based on the work carried out by him/her in our organization M/S--
------------------------ for the period of three months or------- --. This Internship report or any
part of this work has not been submitted elsewhere for any other degree, diploma, fellowship, or
any other similar record of any University or Institution.

Place: **Supervisor or in charge**
Date:_____

Conferment of the Master's Degree

A candidate shall be eligible for the conferment of the Degree only after he/ she has earned the minimum required credits for the Programme prescribed therefor (i.e. 90 credits) Programme).

Village Extension Programme

The Sivaganga and Ramnad districts are very backward districts where most people Lives in poverty.

The rural mass is economically and educationally backward. Thus, the aim of the introduction of this Village Extension Programme is to extend out to reach environmental awareness, social activities, hygiene, and health to the rural people of this region. The students in their third semester must visit any one of the adopted villages within the jurisdiction of Alagappa University and can arrange various programs to educate the rural mass in the following areas for three days based on the theme.1. Environmental awareness 2. Hygiene and Health. A minimum of two faculty members can accompany the students and guide them.

M. Sc. COMPUTER SCIENCE - PROGRAMME STRUCTURE

S. No.	Paper Code		Title of the paper	T/P	Credits	Hours /Week	Marks		
							I	**E**	**Total**
I Semester									
1	551101	Core 1	Design and Analysis of Algorithms	T	5	5	25	75	100
2	551102	Core 2	Advanced Database Management Systems	T	5	5	25	75	100
3	551103	Core 3	Distributed Operating Systems	T	4	4	25	75	100
4	551104	Core 4	Advanced Java Programming	T	4	4	25	75	100
5	551105	Core 5	Lab-I : Algorithms using C++ and Advanced Java Programming Lab	P	4	8	25	75	100
6		DSE*-1	Web Services / Mobile Application Development / Sustainability Computing	T	3	3	25	75	100
7			Library / Yoga/ Counseling/Field trip			1			
			I Semester Total		**25**	**30**	**150**	**450**	**600**
II Semester									
8	551201	Core 6	Machine Learning	T	4	4	25	75	100
9	551202	Core 7	Compiler Design	T	4	4	25	75	100
10	551203	Core 8	Functional Programming usingPython	T	4	4	25	75	100
11	551204	Core 9	Wireless Sensor Networks	T	4	4	25	75	100
12	551205	Core 10	Lab-II: Machine Learning andFunctional Programming Lab	P	4	8	25	75	100
13		DSE*2	R Programming / Cloud Computing / Software Testing	T	3	3	25	75	100
14		NME	Non-Major Elective **		2	3	25	75	100
15			Self-learning course (SLC) –MOOCs***		*Extra credit*				
			II Semester Total		**25**	**30**	**175**	**525**	**700**
III Semester									
16	551301	Core 11	Advanced Web Technology	T	4	4	25	75	100
17	551302	Core 12	IoT and Robotics	T	4	4	25	75	100
18	551303	Core 13	Data Analytics	T	4	4	25	75	100
19	551304	Core 14	Deep Learning	T	4	4	25	75	100
20	551305	Core 15	Lab-III: Advance Web Technologyand Data Analytics Lab	P	4	8	25	75	100
21		DSE*3	Cyber Security / Digital Marketing / Block Chain Technology	T	3	3	25	75	100
22		NME	Non-Major Elective **		2	3	25	75	100
23			Self-learning course (SLC) –MOOCs***		*Extra credit*				
			III Semester Total		**25**	**30**	**175**	**525**	**700**
IV Semester									
24	551401	Core 16	Project Work or Internshipprogramme		15	30	50	150	200
			IV Semester Total		**15**	**30**	**50**	**150**	**200**
			Overall Total		**90 +ExtraCredits**		**550**	**1650**	**2200**

DSE – Student Choice and it may be conducted by parallel sections.

** NME –Student have to select courses offered by other (Faculty) departments.

*** SLC – Voluntary basis

T – Theory   P – Practical

A. Core Courses

Semester	Corse Code	Core	Course Name
1	551101	Core 1	Design and Analysis of Algorithms
	551102	Core 2	Advanced Database Management Systems
	551103	Core 3	Distributed Operating Systems
	551104	Core 4	Advanced Java Programming
	551105	Core 5	Lab-I : Algorithms using C++ and Advanced Java Programming Lab
2	551201	Core 6	Machine Learning
	551202	Core 7	Compiler Design
	551203	Core 8	Functional Programming using Python
	551204	Core 9	Wireless Sensor Networks
	551205	Core 10	Lab-II: Machine Learning and Functional Programming Lab
3	551301	Core 11	Advanced Web Technology
	551302	Core 12	IoT and Robotics
	551303	Core 13	Data Analytics
	551304	Core 14	Deep Learning
	551305	Core 15	Lab-III: Advance Web Technology and Data Analytics Lab
4	551401	Core 16	Project Work or Internship programme

B. Discipline Specific Electives

Semester	Corse Code	DSE	Course Name
1	551501	DSE – 1	A. Web Services
	551502		B. Mobile Application Development
	551503		C. Sustainability Computing
2	551504	DSE – 2	A. R Programming
	551505		B. Cloud Computing
	551506		C. Software Testing
3	551507	DSE – 3	A. Cyber Security
	551508		B. Digital Marketing
	551509		C. Block Chain Technology

C. Non Major Electives offered for other Departments

Semester	Corse Code	Course Name
2		Office Automation
3		Web Designing

Semester-I					
Core 1	**Course Code 551101**	**Design And Analysis Of Algorithms**	**T**	**Credits: 5**	**Hours: 5**
Unit– I					
Objective 1	To learn the basics of algorithm, data structures and asymptotic notation				
Introduction: - Algorithm Definition – Algorithm Specification – Performance Analysis-Asymptotic Notations. Elementary Data Structures: Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs					
Outcome 1	Able to determine time and space complexity of algorithms				**K2**
Unit– II					
Objective 2	To understand divide and conquer policy and the working principle of search and sort methods				
Divide And Conquer: The General Method – Defective Chessboard – Binary Search – Finding the Maximum and Minimum – Merge Sort – Quick Sort – Selection - Strassen'sMatrix Multiplication.					
Outcome 2	Able to implement divide and conquer policy in search and sort algorithms and solve problems in fastest time.				**K3**
Unit– III					
Objective 3	To understand the application of greedy method in optimal storage and shortest path determination				
The Greedy Method: General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing with Deadlines - Minimum Cost Spanning Trees - Optimal Storage on Tapes – Optimal Merge Patterns - Single Source Shortest Paths.					
Outcome 3	Able to use greedy principle to minimize cost in real world problems.				**K2**
Unit– IV					
Objective 4	To understand graph representation and traversals				
Dynamic Programming: - The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.					
Outcome 4	Able to formulate problems using graphs and traversal techniques to reduce algorithm complexities				**K5**
Unit– V					
Objective 5	To understand backtracking technique in problem solving				
Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: Least Cost Search - 0/1 Knapsack Problem.					
Outcome 5	Able to use backtracking technique for solving real world problems				**K6**

Suggested Readings:

Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms. Galgotia Publications

Langsam, Y., Augenstein, M. J., & Tenenbaum, A. M. (1996). Data Structures using C and C++. Prentice Hall Press

Aho Alfred, V., Hopcroft John, E., Ullman Jeffrey. Data structures and algorithms. USA : Addison-Wesley.

Goodman, S. E., & Hedetniemi, S. T. Introduction to the Design and Analysis of Algorithms. McGraw-Hill, Inc.

Coello, C. A. C., Lamont, G. B., & Van Veldhuizen, D. A. (2007). Evolutionary algorithms for solving multi-objective problems (Vol. 5, pp. 79-104). New York: Springer.

Online Resources

https://ocw.mit.edu/courses/6-006-introduction-to-algorithms-fall-2011/
https://www.geeksforgeeks.org/fundamentals-of-algorithms/

K1-Remember	K2-Understand	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Designed by: Dr. S. Santhoshkumar

Course Outcome Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S (3)	M (2)	S (3)	L (1)	L (1)	S (3)	S (3)	M (2)	M (2)	L (1)
CO2	M (2)	L (1)	S (3)	L (1)	M (2)	L (1)	M (2)	S (3)	S (3)	M (2)
CO3	L (1)	S (3)	M (2)	M (2)	S (3)	M (2)	L (1)	L (1)	M (2)	S (3)
CO4	S (3)	M (2)	L (1)	S (3)	M (2)	S (3)	-	M (2)	L (1)	M (2)
CO5	L (1)	M (2)	M (2)	M (2)	L (1)	M (2)	M (2)	M (2)	S (3)	L (1)
W.AV	1.8	1.8	2	1.6	1.6	2	1.4	1.8	2	1.8

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome Vs Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S (3)	S (3)	M (2)	L (1)	L (1)
CO2	M (2)	M (2)	M (2)	S (3)	L (1)
CO3	M (2)	M (2)	M (2)	L (1)	M (2)
CO4	M (2)	L (1)	M (2)	S (3)	M (2)
CO5	M (2)	L (1)	M (2)	S (3)	M (2)
W.AV	2	1.6	1.8	2	1.4

S –Strong (3), M-Medium (2), L- Low (1)

I - Semester					
Core – 2	Course Code 551102	Advanced Database Management Systems	T	Credits:5	Hours:5
Unit– I					
Objective 1	To acquire knowledge of Database Models in designing a database				
Relational And Parallel Database Design: Basics, Entity Types, Relationship Types, ER Model, ER-to-Relational Mapping algorithm.					
Outcome 1	Able to design databases using various data models and apply the process ofnormalization to resolve complex dependencies				K2
Unit– II					
Objective 2	To understand the distributed database technology and associated protocols				
Normalization: Functional Dependency, 1NF, 2NF, 3NF, BCNF, 4NF and 5NF. Architecture, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism.					
Outcome 2	Able to design distributed, object-oriented and object-relational databases				K3
Unit– III					
Objective 3	To understand the way of representing spatial objects in spatial databases				
Distributed And Object Based Databases: Architecture, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control, Query Processing.					
Outcome 3	Able to represent and retrieve spatial data				K4
Unit– IV					
Objective 4	To understand the basics of XML hierarchical database				
Spatial Database: Spatial Database Characteristics, Spatial Data Model, Spatial Database Queries, Techniques of Spatial Database Query, Complex Data Types, Structured Types and Inheritance, Table Inheritance, array and Multiset,					
Outcome 4	Able to design, use and exchange data in XML databases for different applications.				K1
Unit– V					
Objective 5	To learn the ways to represent temporal and multimedia data in respective databases				
Logic based Databases: Introduction, Overview, Propositional Calculus, Predicate Calculus, Deductive DatabaseSystems, Recursive Query Processing.					
Outcome 5	Able to represent and retrieve time-stamped data and multimedia data in databases				K6

Suggested Readings

Silberschatz, A., Korth, H. F., & Sudarshan, S. (2011). Database system concepts.

C. J. Date, A. Kannan, S. Swamynathan. (2016). An Introduction to DatabaseSystems.8-thed.Pearson Education Reprint.

Ramez Elmasri, Shamkant B Navathe, (2016). *Fundamental of Database Systems Pearson*,7th edition.

Thomas Connolly, Carolyn Begg. (2014). *Database Systems a practical approach to Design, Implementation and Management*, Pearson Education.

Online Resources

https://www.geeksforgeeks.org/design-of-parallel-databases-dbms/
https://www.tutorialspoint.com/dbms/index.htm

K1-Remember	K2-Understand	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Designed by : Dr. T. Meyyappan

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M (2)	M (2)	M (2)	S (3)	M (2)	L (1)	M (2)	M (2)	M (2)	L (1)
CO2	M (2)	L (1)	L (1)	L (1)	S (3)	S (3)	L (1)	M (2)	M (2)	M (2)
CO3	L (1)	L (1)	L (1)	M (2)	M (2)	M (2)	L (1)	S (3)	L (1)	M (2)
CO4	M (2)	L (1)	L (1)	M (2)	M (2)	L (1)	L (1)	L (1)	M (2)	S (3)
CO5	S (3)	M (2)	M (2)	S (3)	S (3)	L (1)	L (1)	M (2)	M (2)	M (2)
W. AV	2	1.4	1.4	2.2	2.4	1.6	1.2	2	1.8	2

S –Strong (3), M-Medium (2), L-Low (1)

Course outcome VS Programme Specific Outcome

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L (1)	M (2)	M (2)	M (2)	L (1)
CO2	M (2)	L (1)	L (1)	M (2)	L (1)
CO3	L (1)	L (1)	S (3)	L (1)	M (2)
CO4	L (1)	M (2)	M (2)	M (2)	L (1)
CO5	L (1)	L (1)	L (1)	L (1)	L (1)
W.AV	1.2	1.4	1.8	1.6	1.2

S –Strong (3), M-Medium (2), L-Low (1)

		I – Semester			
Core 3	**Course Code 551103**	**Distributed Operating Systems**	**T**	**Credits: 4**	**Hours: 4**

Unit -I	
Objective 1	To study Distributed operating system concepts and underlying architecture.

Introduction: Operating System Definition – Functions of Operating System – Types of Advanced Operating System – Design Approaches – Synchronization Mechanisms – concepts of a Process – Critical Section Problem – Process Deadlock – Models of Deadlock – Conditions for Deadlock – System with single-unit requests, Consumable Resources, Reusable Resources.

Outcome 1	Gain clear understanding of concepts and underlying architecture of distributed OS.	**K2**

Unit - II	
Objective 2	To learn the techniques used by distributed OS and related algorithms.

Distributed Operating Systems: Introduction- Issues – Communication Primitives – Inherent Limitations –Lamport's Logical Clock, Vector Clock, Global State, Cuts – Termination Detection – Distributed Mutual Exclusion – Non-Token Based Algorithms – Lamport's Algorithm - Token Based Algorithms –Distributed Deadlock Detection – Distributed Deadlock Detection Algorithms – Agreement Protocols

Outcome 2	Appreciate the use of concurrent processes and solving the issues related to them.	**K4**

Unit - III	
Objective 3	To learn the resource management principles of distributed OS.

Distributed Resource Management: Distributed File Systems – Architecture – Mechanisms – Design Issues – Distributed shared Memory – Architecture – Algorithm –Protocols – Design Issues – Distributed Scheduling – Issues – Components – Algorithms.

Outcome 3	Understand several techniques for resource management and scheduling in distributed OS	**K4**

Unit - IV	
Objective 4	To understand failure, recovery, fault tolerant features and associated protocols of distributed OS.

Failure Recovery And Fault Tolerance: Concepts – Failure Classifications – Approaches to Recovery – Recovery in Concurrent Systems – Synchronous and Asynchronous Check pointing and Recovery –Check pointing in Distributed Database Systems – Fault Tolerance Issues – Two-Phase and Nonblocking Commit Protocols – Voting Protocols – Dynamic Voting Protocols.

Outcome 4	Gain Knowledge about fault tolerance and recovery in distributed OS.	**K4**

Unit - V	
Objective 5	To learn scheduling and process synchronization operations of multiprocessor and database OS.

Multiprocessor And Database Operating Systems: Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory management – Reliability/Fault Tolerance – Database Operating Systems – concepts – Features of Android OS, Ubuntu, Google Chrome OS and Linux operating systems.

Outcome 5	Acquire knowledge about multi-processor and database operating systems in distributed environment.	**K5**

Suggested Readings:

Mukesh Singhal N. G. Shivaratri. (2011), *Advanced Concepts in Operating Systems*. McGraw Hill.

Tanenbaum, A. S. Distributed operating systems. Pearson Education India. PHI.

Abraham Silberschatz, Peter B. Galvin, G. Gagne (2003). *Operating Concepts*. 6thEdition Addison Wesley publications

Tanenbaum, A. S.(2001).Modern Operating Systems.2ndEdition Addison Wesley.

Online resources:

https://techworldthink.github.io/MCA/Download/S2/El%20-%20OS/FULL/OS_MD_1.pdf

https://csc-knu.github.io/sys-prog/books/Andrew%20S.%20Tanenbaum%20-%20Modern%20Operating%20Systems.pdf

https://davarpanahjazi.iut.ac.ir/sites/davarpanahjazi.iut.ac.ir/files/u125/distribute_os-tanenbaum.pdf

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. A. Padmapriya

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)
CO2	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	L(1)	M(2)	L(1)	L(1)
CO3	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	L(1)	M(2)	L(1)	L(1)
CO4	M(2)	S(3)	M(2)	L(1)	M(2)	L(1)	L(1)	L(1)	L(1)	L(1)
CO5	L(1)	S(3)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)	M(2)	M(2)
W.AV	1.6	2.2	1.4	1	1.2	1	1	1.6	1.2	1.2

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	L(1)	L(1)	L(1)	L(1)
CO2	L(1)	L(1)	L(1)	L(1)	L(1)
CO3	L(1)	M(2)	M(2)	M(2)	L(1)
CO4	M(2)	M(2)	M(2)	M(2)	M(2)
CO5	L(1)	M(2)	M(2)	M(2)	M(2)
W.AV	1.2	1.6	1.6	1.6	1.4

S –Strong (3), M-Medium (2), L- Low (1)

I - Semester					
Core - 4	**Course Code 551104**	**Advanced Java Programming**	**T**	**Credits: 4**	**Hours: 4**
Unit– I					
Objective 1	To become familiar with the advanced features of Java Language and various designpatterns in Core Java				
Design Patterns: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern- Adapter Pattern- Proxy Pattern-Decorator Pattern-Command Pattern- Template Pattern- Mediator Pattern					
Outcome 1	Appreciate the advanced features of Core Java and design patterns.				**K1**
Unit– II					
Objective 2	To acquire knowledge of designing applets to be floated on web pages.				
CollectionFramework – Array List class – Linked List class – Array List vs. Linked List - List Iterator interface - Hash Set class- Linked Hash Set class-Tree Set class Priority Queue class - Map interface-Hash Map class- Linked Hash Map class –Tree Map class - Comparable interface - Comparator interface-Comparable vs. Comparator					
Outcome 2	Design applets embedded on web pages and will realize the power of java programmingin web				**K2**
Unit– III					
Objective 3	To understand back-end database connectivity and network programming features				
Applet Fundamentals: Applet Class - Applet lifecycle- Steps for Developing Applet Programs- Passing Values through Parameters- Graphics in Applets- GUI Application - Dialog Boxes - Creating Windows					
Outcome 3	Create front-end applications with java and connect back-end databases using JDBC				**K4**
Unit– IV					
Objective 4	To learn server-side programming with servlets				
Layout Managers – AWT Component classes – Swing component classes- Borders – Event handling with AWT components - AWT Graphics classes - File Choosers - Color Choosers – Tree – Table –Tabbed panels– Progressive bar - Sliders.					
Outcome 4	Able to write server-side program using servlets				**K3**
Unit– V					
Objective 5	To learn LAMBDA expressions, the new feature of Java SE 8 and create functionalinterface				
JDBC -INTRODUCTION - JDBC Architecture - JDBC Classes and Interfaces – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database andTable with JDBC- Working with Database Metadata.					
Outcome 5	Able to use the powerful feature of Java SE8 in problem solving				**K5**

Suggested Readings:

De, A. (2015). *Spring 4 and Hibernate 4: Agile Java Design and Development*. McGraw-HillEducation.

Schildt, H. (2014). *The Complete Reference – Java 2 (9th ed.).* Tata McGraw Hill

Farrell, J. (2014), *Java Programming, (7th ed.).* Cengage Learning.

Dean, J., & Dean, R. (2014). *Introduction to Programming with JAVA – A Problem SolvingApproach*. Tata Mc Graw Hill.

Matha, M. P. (2011). *Core Java A Comprehensive Study*. Prentice Hall of India.

Rao, R. N. (2016). *Core Java: An Integrated Approach*. DreamTech Press

Online resources:

https://www.javacodegeeks.com/

https://www.infoworld.com/uk/category/java/

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by : Dr. A. Padmapriya

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L (1)	L (1)	L (1)	L (1)	M (2)	M (2)	M (2)	M (2)	M (2)	S (3)
CO2	M (2)	M (2)	L (1)	S (3)	S (3)	M (2)	L (1)	L (1)	M (2)	L (1)
CO3	L (1)	M (2)	L (1)	M (2)	M (2)	S (3)	L (1)	L (1)	L (1)	M (2)
CO4	L (1)	S (3)	L (1)	L (1)	M (2)	L (1)	L (1)	L (1)	M (2)	M (2)
CO5	M (2)	M (2)	M (2)	L (1)	S (3)	M (2)	L (1)	M (2)	M (2)	S (3)
W.AV	1.4	2	1.2	1.6	2.4	2	1.2	1.4	1.8	2.2

S –Strong (3), M-Medium (2), L-Low (1)

Course outcome VS Programme Specific Outcome

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M (2)	M (2)	L (1)	M (2)	L (1)
CO2	M (2)	L (1)	L (1)	L (1)	M (2)
CO3	L (1)	S (3)	M (2)	L (1)	L (1)
CO4	M (2)	M (2)	L (1)	M (2)	L (1)
CO5	L (1)	L (1)	L (1)	L (1)	L (1)
W.AV	1.6	1.8	1.2	1.4	1.2

S –Strong (3), M-Medium (2), L-Low (1)

Core - 5	Course Code 551105	Lab – I : Algorithms Using C++ and AdvancedJava Programming Lab	P	Credits: 4	Hours: 8
Objectives	➢ Learn to use the features of C++ and Advanced features of Java languages to solveproblems. ➢ Learn to use data structures and object-oriented features in C++ and Java language ➢ Learn to write algorithms/programs for sorting and searching in C++ ➢ Learn to use various design pattern in Java programming ➢ Learn to create web applications using applets, servlets, and database connectivity.				

Algorithms using C++

1. Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
2. Using OpenMP, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3. Implement 0/1 Knapsack problem using Dynamic Programming.
4. From a given vertex in a weighted connected graph, find shortest paths to other vertices usingDijkstra's algorithm.
5. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
6. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
7. Implement 0/1 Knapsack problem using Dynamic Programming.
8. Implement N Queen's problem using Back Tracking

Advanced Java Programming Exercises:

1. Write a Java program to demonstrate the use of singleton design pattern
2. Write a Java program to demonstrate the use of factory design pattern
3. Write a Java program to demonstrate the use of adaptor design pattern
4. Write a Java program to create and use array list data structure.
5. Write a Java program to create and use priority queue data structure.
6. Write a Java program to create linked hash set data structure.
7. Write a Java swing program to draw graphics objects on the screen.
8. Write a Java Applet program for loan EMI calculator.
9. Write a GUI application for scientific calculator
10. Write a GUI application to produce bill for purchase of products

Outcomes	➤ Able to implement simple algorithms and measure complexities
	➤ Able to implement algorithms in C++ to solve complex problems. Concepts
	➤ Able to write efficient java programs using design patterns
	➤ Able to design web applications with applets, servlets, and database connectivity
	➤ Able to design user interface using GUI features of Java

Online Resources:
https://www.uoitc.edu.iq/images/documents/informatics-
institute/Competitive_exam/DataStructures.pdf
https://www.w3resource.com/java-exercises/

K1-Remember	K2-Understand	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Designed by: Dr. T. Meyyappan

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	S(3)	S(3)
CO2	L(1)	M(2)	L(1)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)	L(1)
CO3	M(2)	L(1)	M(2)	M(2)	L(1)	M(2)	M(2)	L(1)	L(1)	M(2)
CO4	M(2)	M(2)	L(1)	L(1)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)
CO5	S(3)	M(2)	M(2)	L(1)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)
W.AV	2.2	1.8	1.6	1.6	1.6	1.8	2.2	2	2	2

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	L(1)	M(2)	S(3)	M(2)
CO2	M(2)	S(3)	L(1)	M(2)	M(2)
CO3	L(1)	M(2)	M(2)	L(1)	M(2)
CO4	S(3)	L(1)	S(3)	S(3)	M(2)
CO5	M(2)	M(2)	L(1)	M(2)	L(1)
W.AV	2	1.8	1.8	2.2	1.8

S –Strong (3), M-Medium (2), L- Low (1)

Semester-II					
Core 6	Course Code 551201	Machine Learning	T	Credits: 4	Hours: 4

Unit– I	
Objective 1	To acquire knowledge on the basic concepts of machine learning

Machine Learning: Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

Outcome 1	Able to identify problems and issues in machine learning	K1

Unit– II	
Objective 2	To understand Bayesian and Computational Learning principles

Bayesian And Computational Learning: Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

Outcome 2	Able to use Bayesian and Probability learning principles in problem solving	K2

Unit– III	
Objective 3	To understand decision tree learning and its state space search

Decision Tree Learning: Introduction – Representation – Basic Decision Treealgorithm-Hypothesis State space search in Decision Tree Learning – Inductive Bias- Issues – Instance Based Learning

Outcome 3	Able to solve a suitable problem with decision tree learning technique	K3

Unit– IV	
Objective 4	To acquire basic knowledge on artificial neural networks

Artificial Neural Networks – Biological Motivation – Representation-Appropriate problems – perceptrons – Multilayer Networks- Back propagation algorithm

Outcome 4	Appreciate the use of simulated biological neurons in problem solving using artificial neural networks	K4

Unit– V	
Objective 5	To learn evolutionary learning concepts using genetic algorithms

Genetic Algorithms – Hypothesis space search –Genetic programming – Models ofEvolution and Learning – Parallelizing genetic algorithms – **Learning sets of Rules –** Introduction – Sequential covering algorithm- Learning rule sets – First order rules – learning sets of Foil.

Outcome 5	Able to use evolutionary models and genetic algorithms in rule-based learning	K6

Suggested Readings: -		

Suggested Readings: -

O'Neil, C., & Schutt, R. (2014). *Doing Data Science. Straight Talk from the Frontline*. O'Reilly Edition.

Mitchell,T.M.*MachineLearning*.(2013).McGraw-HillEducation(India)PrivateLimited.

Leskovek, J., Rajaraman, A., &Ullman, J. (2014). *Mining of Massive Datasets* (v2.1). Cambridge University Press.(free online)

Murphy, K.P. (2013). *Machine Learning: A Probabilistic Perspective*.ISBN0262018020.

Online Resources

https://www.geeksforgeeks.org/machine-learning/

https://www.tutorialspoint.com/machine_learning/index.htm

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. S. Santhoshkumar

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M (2)	S (3)	L (1)	M (2)	L (1)	S (3)	S (3)	M (2)	L (1)	S (3)
CO2	L (1)	M (2)	M (2)	S (3)	M (2)	M (2)	L (1)	S (3)	L (1)	S (3)
CO3	S (3)	L (1)	S (3)	M (2)	S (3)	L (1)	M (2)	L (1)	M (2)	M (2)
CO4	M (2)	M (2)	M (2)	L (1)	M (2)	-	S (3)	M (2)	S (3)	L (1)
CO5	M (2)	L (1)	L (1)	S (3)	L (1)	M (2)	M (2)	M (2)	M (2)	M (2)
W.AV	1.8	1.6	1.8	2	1.6	1.4	2	1.8	1.6	2

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L (1)	M (2)	S (3)	L (1)	S (3)
CO2	L (1)	M (2)	M (2)	S (3)	M (2)
CO3	M (2)	L (1)	M (2)	L (1)	M (2)
CO4	M (2)	M (2)	L (1)	S (3)	M (2)
CO5	M (2)	M (2)	L (1)	S (3)	M (2)
W.AV	1.4	1.6	1.6	2	2

S –Strong (3), M-Medium (2), L- Low (1)

Semester – II					
Core - 7	Course Code 551202	Compiler Design	T	Credits:4	Hours:4

Unit-I	
Objective 1	To acquire knowledge on form all language theory and represent tokens of a language using regular expressions

Introduction To Lexical Analysis: Overview of Language Processing, The Structure of Compiler design, Parameter passing mechanism – Symbol table-The role of the lexical analyzer – Input buffering -Specification of tokens-Recognition of tokens–Finite automata–NFA–DFA-Regular expression to automata, Transition Diagram.

Outcome 1	Learners able to design new lexical analyzer for a new language	**K2**

Unit - II	
Objective 2	To understand syntax analysis and different parsing techniques

Syntax Analysis: The role of the parser – Parse tress – Derivation - Context-free grammars (CFG) Examples - Writing a grammar - Top down Parsing; Predictive parsing -Bottom-up Parsing–Shift Reduce Parsing-LR parsers- LALR parsers-Limitations of syntax Analyzer.

Outcome 2	Learners able to design grammar for a language and parse it	**K2**

Unit - III	
Objective 3	To Understand Semantic Analysis And Translation Of Source Code To Intermediate Code

Semantic Analysis: Inherited and Synthesize data attributes – Dependency graphs – Ordering the evaluation of attributes – S-attributed definitions –L-attributed definitions – Applications of Syntax Directed translation – Syntax Directed translations schemes – Storage organization– Stack allocation of space.

Outcome 3	Learners able to do semantic analysis using attribute definitions	**K3**

Unit - IV	
Objective 4	To understand intermediate code generation for various dialects of a language

Intermediate Code Generation: Variants of Syntax trees – Three Address code – Various Code Optimizations – Basic Blocks - Types and Declarations - Translation of Expressions–Type checking-Control flow-Backpatching-Switch Statements- Procedure calls.

Outcome 4	Learners able to identify the importance of intermediate code generation	**K3**

Unit - V	
Objective 5	To learn various techniques in code generation and sources of code optimization

Code Generation and Code Optimization: Issues in the design of a code generator -The target language–Address in the Target Code–Basic Block and Flowgraphs –Optimization of Basic Blocks-A simple code generator–Peephole Optimization.

Outcome 5	Learners able to do code optimization using various techniques of optimization	**K4**

Suggested Readings:

Alfred V. Aho, Monica S. Lam, Ravi Sethi and Jeffrey D. Ullman.(2009). Compilers-Principles, Techniques and Tools, Second Edition, Pearson Education Asia.

Fischer Leblanc. (1988)Crafting Compiler, Benjamin Cummings, Menlo Park,1988 .

Kennath C. Louden. (2004). Compiler Construction Principles and Practice, Vikas publishing House.

Allen I. Holub.(2001). Compiler Designing C , Prentice Hall of India.

S. Godfrey Winster, S. Aruna Devi, R. Sujatha. (2019). Compiler Design, Yesdee Publishers, Third Reprint.

Online resources

https://www.dbscience.org/wp-content/uploads/2020/03/ALSUdragonbookcompilers.pdf
https://www.guru99.com/compiler-design-tutorial.html

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. T. Meyyappan

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	L(1)	M(2)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
CO2	L(1)	L(1)	M(2)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
CO3	M(2)	M(2)	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
CO4	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
CO5	L(1)	L(1)	L (1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
W.AV	1.8	1.8	1.4	1.2	2	2	2	1	1	1

S–Strong(3), M-Medium(2), L-Low(1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	L(1)	L(1)	L(1)
CO2	M(2)	M(2)	L(1)	L(1)	L(1)
CO3	M(2)	M(2)	L(1)	L(1)	L(1)
CO4	M(2)	M(2)	L(1)	L(1)	L(1)
CO5	M(2)	M(2)	M(2)	M(2)	M(2)
W. AV	2.2	2.2	1.2	1.2	1.2

S–Strong(3), M-Medium(2), L-Low(1)

I - Semester					
Core - 8	**Course Code 551203**	**Functional Programming Using Python**	**T**	**Credits:4**	**Hours: 4**

Unit– I		
Objective 1	Understand the basics of Python language	
Introduction–Programming Paradigms–What is Functional Programming? – Characteristics, Advantages and Disadvantages of functional programming – Function as objects – Storing functions – Redefining Function – Functions as parameters – Sorted functions–Lambda Functions–Functions as return values–Function versions of standard operators		
Outcome 1	Able to understand the characteristics and appreciate the use of functional programming concepts in Python.	**K1**
Unit– II		
Objective 2	Understand mutable and immutable objects in Python	
Mutability in Python – Problem with mutable objects – Defensive Copying – Changing immutable objects – Using slices, list comprehensions, Loop – Converting data to a list –Problems with immutable objects		
Outcome 2	Able to use mutability features to change mutable and immutable objects	**K2**
Unit– III		
Objective 3	Understand the features of functional programming and its pros and cons	
Recursion: Factorials, recursion limits, Tail recursion, in efficient recursion, Memorization, Flattening Lists –Less recursive solution		
Outcome 3	Able to use closures instead of classes or lambda	**K4**
Unit– IV		
Objective 4	Designing solution to problems using functional programming concepts	
Closures–Inner functions–Returning an inner function–Anonymous function–Map–Incrementing the elements in a list–using closure in place of lambda–Composing		
Outcome 4	Able to transform and combine functions to do analytics with map-reduce	**K4**
Unit– V		
Objective 5	Understanding and creation of composition functions	
Functions: Advantages, using closure instead of classes, using classes instead of closures–Closure inspection		
Outcome 5	Able to use functors, libraries and tools in Python for effective problem solving	**K5**

Suggested Readings:

Martin McBride. (2019). *Functional Programming in Python*, Axle soft Ltd,1stedition.

David Mertz. (2019). *Functional Programming in Python*, Shroff/O'Reilly Publishers, First Edition, ISBN-10:9352138597, ISBN-13:978-9352138593

Steven F. Lott. (2018). *Functional Python Programming: Discover the power of functional programming, generator functions, lazy evaluation, the built-in iter tools library, and monads*, Packt PublishingLimited,2ndEdition, ISBN-10:1788627067, ISBN:13-978-1788627061

Martin C. Brown, *Python: The Complete Reference*, McGraw Hill Education, Fourth Edition, ISBN-10:9789387572942, ISBN-13:978-938757294

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*
				Course Designed by: Dr. A. Padmapriya	

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L (1)	L (1)	L (1)	L (1)	L (1)	M (2)	M (2)	L(1)	M (2)	S (3)
CO2	L (1)	M (2)	L (1)	S (3)	M(3)	M (2)	L (1)	L (1)	L (1)	L (1)
CO3	L (1)	M (2)	L (1)	M (2)	L (1)	S (3)	M (2)	S (3)	L (1)	L (2)
CO4	L (1)	S(3)	L (1)	M (2)	M (2)	L (1)	L (1)	L (1)	M (2)	M (2)
CO5	M (2)	M (2)	M (2)	L (1)	L(1)	M (2)	L (1)	M (2)	L (1)	L (1)
W.AV	1.2	2	1.2	1.8	1.6	2	1.4	1.6	1.4	1.8

S –Strong (3), M-Medium (2), L-Low (1)

Course outcome VS Programme Specific Outcome

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L (1)	M (2)	L (1)	S (3)	L (1)
CO2	L (1)	L (1)	L (1)	L (1)	L (1)
CO3	M (2)	M (2)	M (2)	L (1)	L (1)
CO4	M (2)	L (1)	L (1)	M (2)	L (1)
CO5	L (1)	L (1)	L (1)	L (1)	M (2)
W.AV	1.6	1.4	1.2	1.6	1.2

S –Strong (3), M-Medium (2), L-Low (1)

		II – Semester			
Core 9	**Course Code 551204**	**Wireless Sensor Networks**	**T**	**Credits: 4**	**Hours: 4**
		Unit– I			
Objective: 1	To understand the Wireless Networks, Protocol Stack and Standards.				
Wireless Lan - Introduction-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					
Outcome 1	Understand the fundamentals of WSN				**K4**
		Unit – II			
Objective 2	To get familiarize about Fundamentals of 3G Services, Its Protocols and Applications.				
Wireless Wide Area Network - Overview of UTMS Terrestrial Radio Access Network-UMTS Core Network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS- GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High Speed Downlink Packet Access (HSDPA)- LTE Network Architecture and Protocol.					
Outcome 2	Design applets embedded on web pages and will realize the power of java programmingin web				**K5**
		Unit – III			
Objective 3	To learn about routing protocols in WSN				
Routing And Data Gathering Protocols Routing Challenges and Design Issues in Wireless Sensor Networks, Flooding and gossiping – Data centric Routing – SPIN – Directed Diffusion – Energy aware routing - Gradient-based routing - Rumor Routing – COUGAR – ACQUIRE – Hierarchical Routing - LEACH, PEGASIS – Location Based Routing – GF, GAF, GEAR, GPSR – Real Time routing Protocols – TEEN, APTEEN, SPEED, RAP - Data aggregation - data aggregation operations - Aggregate Queries in Sensor Networks - Aggregation Techniques – TAG, Tiny DB					
Outcome 3	Able to use efficient routing protocols in WSN				**K6**

Unit – IV	
Objective 4	To study different types of embedded OS for WSN
Embedded Operating Systems: Operating Systems for Wireless Sensor Networks – Introduction - Operating System Design Issues - Examples of Operating Systems – TinyOS – Mate – MagnetOS – MANTIS - OSPM - EYES OS – SenOS – EMERALDS – PicOS – Introduction to Tiny OS – NesC – Interfaces and Modules- Configurations and Wiring - Generic Components -Programming in Tiny OS using NesC, Emulator TOSSIM.	

Outcome 4	Able to choose suitable embedded OS for WSN application	**K5**

Unit – V		
Objective 5	To explore real world applications of WSN	
Applications of WSN: WSN Applications - Home Control - Building Automation - Industrial Automation - Medical Applications - Reconfigurable Sensor Networks - Highway Monitoring - Military Applications - Civil and Environmental Engineering Applications - Wildfire Instrumentation - Habitat Monitoring - Nanoscopic Sensor Applications – Case Study: IEEE 802.15.4 LR-WPANs Standard - Target detection and tracking - Contour/edge detection - Field sampling.		
Outcome 5	Implement Different Type of Applications for Smart Phones and Mobile Devices withLatest Network Strategies	**K4**

Suggested Readings:

Kazem Sohraby, Daniel Minoli and Taieb Znati. (2007). *Wireless Sensor Networks Technology, Protocols, and Applications*, John Wiley & Sons.

Holger Karland Andreas Willig. (2005). *Protocols and Architectures for Wireless Sensor Networks*, John Wiley & Sons, Ltd.

K. Akkayaand M. Younis. A survey of routing protocols in wireless sensor networks, Elsevier AdHoc Network Journal, Vol. 3, no. 3, pp.325-349

Philip Levis, *Tiny. OS Programming*

Anna Ha´c, *Wireless Sensor Network Designs*, John Wiley & Sons Ltd,

Online Resources

https://mrajacse.files.wordpress.com/2014/09/wireless-sensor-networks.pdf

https://www.kth.se/social/files/5431a388f276540a05ad2514/An_Introduction_WSNS_V1.8.pdf

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. A. Padmapriya

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	S(3)	S(3)	L(1)	L(1)	L(1)	M(2)	M(2)	M(2)
CO2	M(2)	L(1)	M(2)	L(1)	L(1)	S(3)	L(1)	M(2)	L(1)	M(2)
CO3	M(2)	S(3)	M(2)	M(2)	L(1)	S(3)	M(2)	S(3)	M(2)	M(2)
CO4	L(1)	L(1)	S(3)	L(1)	M(2)	S(3)	M(2)	M(2)	M(2)	L(1)
CO5	S(3)	S(3)	L(1)	L(1)	M(2)	S(3)	M(2)	M(2)	L(1)	L(1)
W.AV	2.2	2	2.2	1.6	1.4	2.6	1.6	2.2	1.6	1.6

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	M(2)	L(1)	M(2)	M(2)
CO2	L(1)	S(3)	S(3)	M(2)	M(2)
CO3	M(2)	M(2)	M(2)	M(2)	L(1)
CO4	M(2)	S(3)	S(3)	S(3)	M(2)
CO5	M(2)	M(2)	L(1)	M(2)	M(2)
W.AV	**2**	**2.4**	**2**	**2.2**	**1.8**

S –Strong (3), M-Medium (2), L- Low (1)

Core 10	Course Code 551205	Machine Learning and Functional Programming Lab	P	Credits: 4	Hours: 8
Objectives	➢ To implement FIND – S, ID3, Backpropagation machine learning algorithms ➢ To implement Naïve Bayes, K-Nearest Neighbour classification algorithms ➢ To solve simple problems using functional programming in Python ➢ To solve complex problems using functional programming in Python ➢ To solve string related problems in Python				

Machine Learning Exercises:

1. FIND – S Algorithm.
2. Candidate-Elimination Algorithm
3. Decision tree based ID3 algorithm.
4. Backpropagation algorithm
5. Naïve Bayesian classifier.
6. EM algorithm
7. k-Nearest Neighbour algorithm
8. Weighted Regression Algorithm

Advanced Java Programming Exercises:

1. Write a Python function to find the Max of three numbers.
2. Write a Python function to sum all the numbers
   in a list. Sample List : (8, 2, 3, 0, 7)
   Expected Output : 20
3. Write a Python function to multiply all the
   numbers in a list. Sample List : (8, 2, 3, -1, 7)
   Expected Output : -336
4. Write a Python program to reverse a
   string. Sample String :
   "1234abcd" Expected
   Output : "dcba4321"
5. Write a Python function to calculate the factorial of a number (a non-negative
   integer). The function accepts the number as an argument.
6. Write a Python function to check whether a number falls in a given range.
7. Write a Python function that accepts a string and calculate the number of upper
   case letters and lower case letters.
   Sample String : 'The quick Brow
   Fox'Expected Output :
   No. of Upper case
   characters : 3 No. of Lower
   case Characters : 12

8. Write a Python function that takes a list and returns a new list with unique elements of the firstlist.
   Sample List : [1,2,3,3,3,3,4,5]
   Unique List : [1, 2, 3, 4, 5]

9. Write a Python function that takes a number as a parameter and check the number is prime ornot.

10. Write a Python program to print the even numbers from a given list.Sample List : [1, 2, 3, 4, 5, 6, 7, 8, 9]
    Expected Result : [2, 4, 6, 8]

11. Write a Python function to check whether a number is perfect or not.
    According to Wikipedia : In number theory, a perfect number is a positive integer that is equal to the sum of its proper positive divisors, that is, the sum of its positive divisors excluding the number itself (also known as its aliquot sum). Equivalently, a perfect number is a number that is half the sum of all of its positive divisors (including itself).Example : The first perfect number is 6, because 1, 2, and 3 are its proper positive divisors, and 1 + 2 + 3 = 6. Equivalently, the number 6 is equal to half the sum of all its positive divisors: (1 + 2 + 3 + 6) / 2 = 6. The next perfect number is 28 = 1 + 2 + 4 + 7 + 14. This is followed by the perfect numbers 496 and 8128.

12. Write a Python function that checks whether a passed string is palindrome or not.
       i. Note: A palindrome is a word, phrase, or sequence that reads the same backward asforward, e.g., madam or nurses run.

13. Write a Python function that prints out the first n rows of Pascal's triangle.
     b. Note : Pascal's triangle is an arithmetic and geometric figure first imagined by Blaise Pascal.Sample Pascal's triangle :
     c. Each number is the two numbers above it added together

14. Write a Python function to check whether a string is a pangram or not.
     d. Note : Pangrams are words or sentences containing every letter of the alphabet at least once.For example : " The quick brown fox jumps over the lazy dog "

15. Write a Python program that accepts a hyphen-separated sequence of words as input and prints the words in a hyphen-separated sequence after sorting them alphabetically.
     e. Sample Items : green-red-yellow-black-white Expected
        Result : black-green-red-white-yellow

16. Write a Python function to create and print a list where the values are square of numbers between 1and 30 (both included).

17. Write a Python program to make a chain of function decorators (bold, italic, underline etc.) inPython.

18. Write a Python program to execute a string containing Python code.
19. Write a Python program to access a function inside a function.
20. Write a Python program to detect the number of local variables declared in a function.Sample Output:
    f. 3
21. Write a Python program that invoke a given function after specific milliseconds.Sample Output:
Square root after specific
milliseconds:4.0
10.0
158.42979517754858

Outcome	
	➢ Able to solve simple machine learning problems ➢ Able to solve complex machine learning problems ➢ Able to classify objects using classifier algorithms ➢ Able to solve simple problems using functional programming in Python ➢ Able to solve string related complex problems using functional programming in Python

Online Resources

https://www.toptal.com/machine-learning/machine-learning-theory-an-introductory-primer
https://machinelearningmastery.com/

K1-Remember	K2-Understand	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Designed by: Dr. T. Meyyappan

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)
CO2	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)
CO3	M(2)	S(3)	M(2)	L(1)	S(3)	L(1)	S(3)	S(3)	L(1)	M(2)
CO4	S(3)	M(2)	S(3)	M(2)	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)
CO5	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)
W.AV	2.6	2.6	2.4	2	2.4	2.2	2.4	2.2	1.6	2.4

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	S(3)	S(3)	S(3)
CO2	M(2)	L(1)	S(3)	M(2)	L(1)
CO3	M(2)	M(2)	M(2)	M(2)	L(1)
CO4	L(1)	S(3)	S(3)	S(3)	M(2)
CO5	M(2)	M(2)	M(2)	M(2)	M(2)
W.AV	**2**	**2.2**	**2.6**	**2.4**	**1.8**

S –Strong (3), M-Medium (2), L- Low (1)

III – Semester					
Core 11	**Course Code 551301**	**Advanced Web Technology**	**T**	**Credits: 4**	**Hours: 4**

Unit– I	
Objective 1	To learn the features of HTML to design web pages

Introduction to Web Technology: Hypertext Markup Language and its components, HTML tags and attributes, Text formatting tags, List tags, Image tags, HTML tables, HTML Forms, Document Object Model (DOM), Cascading Style Sheets – Inline Style, Embedded Style, External Style Sheet, Imported Style Sheet, Ruleset, @ rule, Contextual Selector, Attribute Selector, CSS Properties, JavaScript - Data types, Operators, Variables, length, substring, Conditional Statements - if, Loops - for, & Functions, HTML DOM and JavaScript - Finding HTML Elements, Changing HTML elements, DOM events – Introduction to React Native – Building Native mobile apps with JavaScript

Outcome 1	Understand the fundamentals of WSN	**K2**

Unit – II	
Objective 2	To study object-oriented programming with PHP

Object oriented programming using PHP and Databases: Introduction - Creating a Class - Creating an Object - Introspection- Serialization- Inheritance (Extending a class)-. Constructors and Destructors - Interfaces-. Encapsulation- Web Techniques- Introduction - Variables- Server Information - Processing Forms- Setting Response Headers- Maintaining State - Using PHP to Access a Databases-MySql Database Function -. Relational Databases and SQL - Sample Application.

Outcome 2	Design applets embedded on web pages and will realize the power of java programmingin web	**K4**

Unit – III	
Objective 3	To understand the features of XML and AJAX-PHP framework

XML and AJAX: Introduction to XML - XML Document Structure- PHP and XML- XML Parser- The XML DOM (XML Document Object Model) -SimpleXML- Changing a Value with SimpleXML - AJAX- AJAX Web Application Model- AJAX-PHP Framework - Performing AJAX Validation- Handling XML Data Using PHP and AJAX-Connecting Database Using PHP and AJAX.

Outcome 3	Able to use efficient routing protocols in WSN	**K4**

Unit – IV	
Objective 4	To understand the features of Node JS

Node JS : Introduction – Modulus – HTTP Modules – File System – URL Module – NPM – Events – Uploaded Modules - Email - Working with NodeJS and MySQL to access Databases

Outcome 4	Able to choose suitable embedded OS for WSN application	**K4**

Unit – V	
Objective 5	To learn the features of Angular JS to create Httpservices

Introduction to Angular: What is Angular- Why is Angular- Type Script- Difference between Angular JS and Angular- Setting up Angular Environment- Angular Features and Advantages- Disadvantages Core Concepts of Angular: Modules - Ngmodule- Declarations- Imports-

Providers- Bootstrap – Component: Creating the Component - Template- Class- Metadata- Angular Routing- Angular Forms: Template Driven Form- Reactive Form- Component Communication: Parent Communication And Child Communication- Service:What Is Service- Httpservice- How To Create Service		
Outcome: 5	Implement Different Type of Applications for Smart Phones and Mobile Devices withLatest Network Strategies	**K5**

Suggested Readings

Kognet. (2009). *Web Technologies: HTML, JAVA SCRIPT, PHP, JAVA, JSP, ASP.NET, XML and AJAX-Black Book*: Kindle Edition.

Bayross, I. (2005).*Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP*(4thed.). bpb Publications.

Ethan Brown. (2019). *Web Development with Node and Express: Leveraging the Java Script Stack* 2nd Edition, Oreilly Publication.

Nate Murray, Felipe Coury, Ari Lerner, and Carlos Taborda (2020), *The Complete Guide to Angular,* Fullstack. Io publications

Jason Gilmore. (2010). *Beginning PHP and My SQL from Novice to Professional*, Fourth Edition, A press Publications.

Porika, S. , & Kishore, P. (2015).*Web Technologies and Applications.* BS Publications.

Steven A. Gabarro. (2006). *Web Application Design and Implementation : Apache2, PHP5,MySQL, JavaScript, and Linux/UNIX*, Wiley Publications.

Nimbalkar, A. B., & Sakherkar, S. R. *Advanced Web Technologies*. Nirali Prakasan Publishers.

Lane,D., & Williams, H.E. Web Database *Application with PHP and MySQL*(2nded.).

Deital, & Deital.(2000).*XML How to program*. Pearson Education.

Bonnie Eisenman(2016), *Learning React Native*, O'Reilly Media, Inc

Jeffery C Jackson. (2009). *Web Technologies–A Computer Science Perspective*, Pearson Prentice Hall.

Deitel. (2011). *Internet and World Wide Web–How to Program*, Pearson Prentice Hall.

Online Resources

https://www.geeksforgeeks.org/web-technology/
https://www.startertutorials.com/ajwt/res/notes/AJWTnotes.pdf

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*
					Course Designed by: Dr. A. Padmapriya

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	M(2)	M(2)	M(2)	S(3)	L(1)	L(1)	L(1)	M(2)	M(2)	S(3)
CO2	M(2)	L(1)	M(2)	S(3)	L(1)	M(2)	S(3)	M(2)	S(3)	M(2)
CO3	M(2)	S(3)	M(2)	M(2)	S(3)	S(3)	M(2)	S(3)	M(2)	L(1)
CO4	S(3)	S(3)	S(3)	L(1)	S(3)	M(2)	L(1)	M(2)	M(2)	M(2)
CO5	S(3)	L(1)	S(3)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)	L(1)
W.AV	2.4	2	2.4	2.2	3	2.2	1.8	2.2	2.2	1.8

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	M(2)	S(3)	M(2)	M(2)
CO2	S(3)	S(3)	M(2)	M(2)	S(3)
CO3	M(2)	M(2)	M(2)	L(1)	S(3)
CO4	M(2)	M(2)	S(3)	S(3)	M(2)
CO5	L(1)	L(1)	S(3)	M(2)	M(2)
W.AV	2.2	2	2.6	2	2.4

S –Strong (3), M-Medium (2), L- Low (1)

Semester III					
Core 12	**Course Code 551302**	**IOT and Robotics**	**T**	**Credits: 4**	**H/W: 4**
Unit– I					
Objective 1	To understand the characteristics and challenges of IoT				
Genesis of IoT – IoT and Digitization – IoT Impact – IoT Challenges – IoT Network Architecture and Design – Drivers – IoT Architecture – IoT Functional Stack – IoT Data Management and Compute Stack					
Outcome 1	Appreciate the need for sophistication with IoT				**K2**
Unit– II					
Objective 2	To learn the layers and things of IoT				
The "Things" of IoT – Sensors, Actuators and Smart Objects – Sensor Networks – Connecting Smart Objects – Communication Criteria – IoT Access Technologies – IEEE 802.15.4 – Standardization and Alliances – Physical Layer – MAC Layer – Topology – Security – Competitive Technologies					
Outcome 2	Able to use sensors and formulate communication criteria for an application				**K1**
Unit– III					
Objective 3	To understand the protocols of IoT				
IP as IoT Network Layer – Key advantages of Internet Protocol – Adoption or Adaptation of the Internet Protocol – Need for Optimization – Constrained nodes – Constrained Networks – IP Versions – Optimization IP for IoT – Profiles and Compliances					
Outcome 3	Adopt existing protocols for IoT application				**K4**
Unit– IV					
Objective 4	To learn the fundamentals of Robotics				
Fundamentals of Robotics- Introduction – Automation and Robotics – Brief History – Robotics Market and Future Prospects- Programming and Applications – Robot Anatomy					
Outcome 4	Appreciate the application of Robots and its prospects				**K5**
Unit– V					
Objective 5	To understand the working principle of Robots and its applications				
Work volume – Robot Drive systems – Control systems and Dynamic performance – Precision of movement – End effects – Robotics sensors – Programming and Working control – Robot Applications					
Outcome 5	Able to propose a design a robot for specific application				**K6**

Suggested Readings:

Hanes, D., Salgueiro, G., Grossetete, P., Barton, R., &Henry. (2017). *IoT fundamentals: Networking technologies, protocols, and use cases for the internet of things*. CiscoPress.

Mikell P Groover. (2008). *Industrial Robotics Book*, Tata McGraw Hill.

Raj, P., & Raman, A. C. (2017). *The Internet of Things: Enabling technologies, platforms, and use cases*. Auerbach Publications.

Kranz, M. (2016). *Building the internet of things: Implement new business models, disrupt competitors, transform your industry*. JohnWiley & Sons.

McEwen, A., & Cassimally, H. (2013). *Designing the internet of things*. JohnWiley & Sons.

Robin R. Murphy. (2000). *Introduction to AI Robotics*, *ABrad ford Book*, The MIT Press Cambridge. ISBN0-262-13383-0

Online Resources

https://www.analyticssteps.com/blogs/internet-robotic-things-robotics-iot

https://www.techopedia.com/definition/28247/internet-of-things-

K1-Remember	K2-Understand	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Designed by: Dr. A. Padmapriya

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S (3)	L (1)	M (2)	M (2)	L (1)	M (2)	S (3)	L (1)	S (3)	S (3)
CO2	M (2)	M (2)	S (3)	S (3)	M (2)	L (1)	L (1)	L (1)	S (3)	M (2)
CO3	L (1)	S (3)	M (2)	L (1)	S (3)	S (3)	M (2)	M (2)	M (2)	L (1)
CO4	-	M (2)	L (1)	M (2)	M (2)	M (2)	S (3)	S (3)	L (1)	M (2)
CO5	M (2)	L (1)	S (3)	M (2)	L (1)	M (2)	M (2)	M (2)	M (2)	L (1)
W.AV	1.4	1.8	2	1.8	1.6	1.8	2	1.6	2	1.6

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S (3)	S (3)	L (1)	L (1)	M (2)
CO2	M (2)	M (2)	L (1)	S (3)	M (2)
CO3	M (2)	M (2)	M (2)	L (1)	L (1)
CO4	L (1)	M (2)	M (2)	S (3)	M (2)
CO5	L (1)	M (2)	M (2)	S (3)	M (2)
W.AV	1.6	2	1.4	2	1.6

S –Strong (3), M-Medium (2), L- Low (1)

Semester - III					
Core 13	**Course Code 551303**	**Data Analytics**	**T**	**Credits: 4**	**Hours: 4**
Unit– I					
Objective 1		To understand the perspectives and architecture of analytics			
Introduction to Data Analytics: Structures – Analyst Perspective on Data Repositories - State of the Practice in Analytics – BI Versus Data Science - Current Analytical Architecture.					
Outcome 1		Gain knowledge of data analytics and its life cycle			**K1**
Unit– II					
Objective 2		To understand various techniques of data analysis			
Drivers of Big Data – Big Data Ecosystem - Data Analytics Lifecycle – Data Discovery – Data Preparation – Model Planning – Model Building – Communicate Results – Operationalize.					
Outcome 2		Able to apply various data analysis techniques			**K2**
Unit– III					
Objective 3		To understand stream data model and its architecture in mining data streams			
Data Analysis: Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics - Rule induction					
Outcome 3		Able to perform real time analytics with data streams			**K2**
Unit– IV					
Objective 4		Be exposed to big data environment and its components			
Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.					
Outcome 4		Able to perform big data analytics with its framework and tools			**K2**
Unit– V					
Objective 5		To learn the analytic methods for unstructured data			
Mining Data Streams: Introduction to Streams Concepts – Stream data model and architecture - Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream- Realtime Analytics Platform (RTAP) applications.					
Outcome 5		Able to perform big data analytics on unstructured data			**K4**

Suggested readings:

Noreen Burlingame.(2012). *The little book on BigData*, NewStreet publishers.

Anil Maheshwari. (2017). *Data Analytics*, McGraw Hill Education.

Norman Matloff. (2011). *The Art of R Programming: A Tour of Statistical Software Design*, Starch Press; 1edition.

Michael Berthold, David J. Hand. *(2007). Intelligent Data Analysis*, Springer.

Anand Rajaramanand Jeffrey David Ullman. (2012). *Mining of Massive Datasets*, Cambridge University Press.

Bill Franks. (2012). *Taming the BigData Tidal Wave:Finding Opportunities in Huge Data Streams with advanced analytics*, John Wiley & sons.

Glenn J. Myatt, *Making Sense of Data*, John Wiley &Son Pete Warden. (2011). BigData Glossary, O"Reilly.

Jiawei Han, Micheline Kamber. (2008). *Data Mining Concepts and Techniques*, Second Edition, Elsevier, Reprinted.

Online Resources

http://www.johndcook.com/R_language_for_programmers.html.
http://bigdatauniversity.com/
http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. S. Santhoshkumar

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L (1)	L (1)	L (1)	M (2)	M (2)	L (1)	L (1)	M (2)	M (2)	S (3)
CO2	L (1)	M (2)	L (1)	M (2)	S (3)	S (3)	M (2)	L (1)	L (1)	L (1)
CO3	L (1)	L (1)	L (1)	L (1)	M (2)	M (2)	M (2)	L (1)	L (1)	M (2)
CO4	L (1)	L (1)	L (1)	M (2)	M (2)	L (1)	S (3)	L (1)	L (1)	M (2)
CO5	M (2)	M (2)	M (2)	M (2)	S (3)	L (1)	M (2)	M (2)	L (1)	S (3)
W.AV	1.2	1.4	1.2	1.8	2.4	1.6	2	1.4	1.2	2.2

S –Strong (3), M-Medium (2), L-Low (1)

Course outcome VS Programme Specific Outcome

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M (2)	M (2)	L (1)	M (2)	L (1)
CO2	L (1)	L (1)	L (1)	L (1)	M (2)
CO3	L (1)	M (2)	M (2)	L (1)	L (1)
CO4	M (2)	M (2)	L (1)	L(1)	M (2)
CO5	L (1)	L (1)	L (1)	S (3)	L (1)
W.AV	**1.4**	**1.6**	**1.2**	**1.6**	**1.4**

S –Strong (3), M-Medium (2), L-Low (1)

III – Semester					
Core 14	Course Code 551304	Deep Learning	T	Credits: 4	Hours: 4

Unit– I		
Objective 1	To understand the basics of neural network	
Basics of Neural Networks: Basic Concept of Neurons – Perceptron Algorithm – Feed Forward and Backpropagation Networks.		
Outcome 1	Good understanding of core concepts in neural network	**K4**

Unit – II		
Objective 2	To learn the concept of transfer learning and its applications	
Convolutional Neural Networks: CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning – Recurrent and Recursive Nets – Recurrent Neural Networks – Deep Recurrent Networks – Recursive Neural Networks – Applications.		
Outcome 2	Able to form neural network layers for training and testing	**K4**

Unit – III		
Objective 3	To understand the principle behind feedforward network	
Feedforward Networks: Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, autoencoders.		
Outcome 3	Able to use feed forward network with multilayer perceptrons	**K4**

Unit – IV		
Objective 4	To understand the concept of Recurrent Neural Network	
Recurrent Neural Networks: Bidirectional RNNs - Deep Recurrent Networks Recursive Neural Networks - The Long Short-Term Memory and Other Gated RNNs		
Outcome 4	Able to form RNN and its variants	**K3**

Unit – V		
Objective 5	To study various applications of deep learning	
Applications of Deep Learning: Images segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative adversarial networks – Video to Text with LSTM models – Attention models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.		
Outcome 5	Better insight on the applications of Deep Learning	**K5**

Suggested Readings:

Ian J. Goodfellow, Yoshua Bengio, Aaron Courville. (2017). *Deep Learning*, MIT Press.

Francois Chollet. (2018). *Deep Learning with Python*, Manning Publications.

Bengio, Yoshua. (2009). *Learning deep architectures for AI. Foundations and trends in Machine Learning*2.1:1127.

N. D. Lewis. (2016). *Deep Learning Made Easy with R: A Gentle Introduction for Data Science*

Nikhil Buduma, *Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithm*, O'Reilly publications.

Tariq Rashid, *Makey our own neural network*

Online Resources

https://www.geeksforgeeks.org/introduction-deep-learning/

https://www.techtarget.com/searchenterpriseai/definition/deep-learning-deep-neural-network

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*
					Course Designed by: Dr. T. Meyyappan

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	S(3)	S(3)	L(1)	M(2)	M(2)	M(2)	M(2)	S(3)
CO2	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)	S(3)	L(1)	M(2)	M(2)
CO3	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	M(2)	L(1)	M(2)	M(2)	M(2)	L(1)
CO5	S(3)	S(3)	M(2)	S(3)	M(2)	S(3)	M(2)	M(2)	L(1)	M(2)
W.AV	2.6	2.4	2.2	2.8	1.8	2.2	2.2	2	1.8	2.2

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	S(3)	M(2)	M(2)	S(3)
CO2	L(1)	M(2)	S(3)	S(3)	S(3)
CO3	S(3)	M(2)	S(3)	M(2)	L(1)
CO4	S(3)	S(3)	S(3)	S(3)	M(2)
CO5	M(2)	M(2)	L(1)	M(2)	S(3)
W.AV	2.2	2.4	2.4	2.4	2.4

S –Strong (3), M-Medium (2), L- Low (1)

Core 15	Course Code 551305	Lab – III: Advanced Web Technology and Data Analytics Lab	P	Credits: 4	Hours: 8
Objectives	➢ To design web pages with CSS and HTML ➢ To design authentication web page ➢ To perform session tracking with PHP ➢ To perform file management operations in Hadoop and Map Reduce for data analytics ➢ To create XML data documents for data exchange				

Advanced Web Technology Exercises:

1. Creating web pages with advanced layouts and positioning with CSS and HTML.
2. Develop and demonstrate the usage of inline, internal and external style sheet using CSS
3. Perform validations in a web page using JavaScript. For example
   - ☐ First Name (Name should contains alphabets and the length should not be less than 6 characters).
   - ☐ Password (Password should not be less than 6 characters length).
   - ☐ E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
   - ☐ Mobile Number (Phone number should contain 10 digits only).
   - ☐ Last Name and Address (should not be Empty).
4. Develop and demonstrate JavaScript with POP-UP boxes and functions for the following
   - ☐ **Input**: Click on Display Date button using onclick( ) function **Output**: Display date in thetextbox
   - ☐ **Input**: A number n obtained using prompt **Output**: Factorial of n number using alert
   - ☐ **Input**: A number n obtained using prompt **Output**: A multiplication table of numbers from 1 to10 of n using alert
   - ☐ **Input**: A number n obtained using prompt and add another number using confirm **Output**: Sumof the entire n numbers using alert.
5. Creation of authentication web page
6. Implementation of Rollover menus in JavaScript
7. Implementation of Cookies and Session in PHP
8. Implementation of Session in PHP
9. Using PHP and MySQL, develop a program to create and accept book information
10. Design an XML document to store information about students
11. Create an application that loads a text string into an XML DOM object, and extracts the info from it withJavaScript.
12. Create a simple XMLHttpRequest, and retrieve data from a TXT file.
13. Create an XMLHttpRequest to retrieve data from an XML file and display the data in an HTML table
14. Developing simple applications using node.js
15. Programming with AngularJS, Node JS and MySQL to access database

Data Analytics Lab Exercises:	
1. (i)Perform setting up and Installing Hadoop with operating mode	
2. (i) Implement the following file management tasks in Hadoop:	
• Adding files and directories	
• Retrieving files	
• Deleting files	
(ii) Benchmark and stress test an Apache Hadoop cluster	
3. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.	
• Find the number of occurrences of each word appearing in the input file(s)	
• Performing a MapReduce Job for word search count (look for specific keywords in a file)	

Outcome	☐ Able to design useful websites with CSS and HTML
	☐ Able to design and implement server-side programming with JavaScript and PHP.
	☐ Able to use cookies and session management for security
	☐ Able to use data analytic tool HADOOP and perform file management
	☐ Able to use MAP REDUCE, PIG-LATIN and Hive to handle unstructured data

Online Resources

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*
				Course Designed by: Dr. T. Meyyappan	

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	M(2)	M(2)	S(3)	L(1)	M(2)	M(2)	M(2)	M(2)	S(3)
CO2	L(1)	L(1)	M(2)	L(1)	L(1)	L(1)	M(2)	M(2)	L(1)	M(2)
CO3	M(2)	S(3)	L(1)	M(2)	M(2)	S(3)	S(3)	S(3)	L(1)	L(1)
CO4	M(2)	M(2)	S(3)	M(2)	M(2)	L(1)	S(3)	M(2)	M(2)	M(2)
CO5	S(3)	M(2)	L(1)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)
W.AV	2.2	2	1.8	2	1.8	1.8	2.4	2.2	1.6	2

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	M(2)	S(3)	S(3)	S(3)
CO2	M(2)	S(3)	L(1)	M(2)	L(1)
CO3	L(1)	M(2)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	S(3)	S(3)	M(2)
CO5	M(2)	M(2)	M(2)	L(1)	M(2)
W.AV	1.6	2.2	2.2	2.2	2

S –Strong (3), M-Medium (2), L- Low (1)

Semester IV					
Core 16	Course Code 551401	**Project Work or Internship Programme**	**P**	Credits: 15	Hours: 30

I - Semester					
*DSE 1	**Course Code 551501**	**A. Web Services**	**T**	**Credits:3**	**Hours:3**
Unit– I					
Objective 1	To acquire the knowledge on distributed services and industry standards				
Overview of Distributed Computing- Introduction to web services – Industry standards, Technologies and concepts underlying web services – their support to web services. Applications that consume web services.					
Outcome 1	Acquire the knowledge on distributed services and industry standards				**K1**
Unit– II					
Objective 2	To understand XML and SOAP protocols in locating remove web services				
XML – its choice for web services – network protocols to back-end databases- technologies- SOAP, WSDL – exchange of information between applications in distributed environment locating remote web services – its access and usage. UDDI specification – an introduction.					
Outcome 2	Understand XML and SOAP protocols in locating remove web services				**K2**
Unit– III					
Objective 3	To learn the fundamentals of web services and its features				
A brief outline of web services – conversation – static and interactive aspects of system interface and its implementation, work flow – orchestration and refinement, transactions, security issues – the common attacks – security attacks facilitated within web services quality of services – Architecting of systems to meet users requirement with respect to latency, performance, reliability, QOS metrics, Mobile and wireless services – energy consumption, network bandwidth utilization, portals and services management.					
Outcome 3	Understand servers and deployment of web services				**K4**
Unit– IV					
Objective 4	To understand real world enterprise applications				
Building real world enterprise applications using web services – sample source codes to develop web services – steps necessary to build and deploy web services and client applications to meet customer s requirement – Easier development, customization, maintenance, transactional requirements, seamless porting to multiple devices and Platforms.					
Outcome 4	Design collaborating web services according to a specification				**K2**
Unit– V					
Objective 5	To understand servers and deployment of web services				
Deployment of Web services and applications onto Tomcat application server and axis SOAP server (both are free wares) – Web services platform as a set of enabling technologies for XML based distributed computing.					
Outcome 5	Implement an application that uses multiple web services in a realistic business scenario				**K6**

Suggested readings:

Sandeep Chatterjee, James Webber, (2003). *Developing Enterprise Web Services: An Architects Guide*, Prentice Hall.
    Heather Williamson, *XML: The Complete Reference*, Tata McGraw-Hill Education India.
    Martin Kalin, *Java Web Services: Upand Running*, O'Reilly Publishers.

Online Resources
https://www.geeksforgeeks.org/what-are-web-services/ https://www.freecodecamp.org/news/how-to-interact-with-web-services-using-python/

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. S. Santhoshkumar

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L (1)	M (2)	M (2)	S (3)	M (2)	L (1)	M (2)	M (2)	M (2)	L (1)
CO2	M (2)	L (1)	M (2)	L (1)	L (1)	S (3)	L (1)	M (2)	M (2)	M (2)
CO3	L (1)	L (1)	L (1)	M (2)	M (2)	L (1)	L (1)	S (3)	L (1)	M (2)
CO4	M (2)	L (1)	L (1)	M (2)	L (1)	L (1)	L (1)	L (1)	M (2)	S (3)
CO5	S (3)	M (2)	M (2)	S (3)	M (2)	L (1)	L (1)	M (2)	M (2)	M (2)
W.AV	1.8	1.4	1.6	2.2	1.6	1.4	1.2	2	1.8	2

S –Strong (3), M-Medium (2), L-Low (1)

Course outcome VS Programme Specific Outcome

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M (2)	M (2)	L (1)	M (2)	L (1)
CO2	M (2)	L (1)	L (1)	L (1)	M (2)
CO3	L (1)	S (3)	M (2)	L (1)	L (1)
CO4	M (2)	M (2)	L (1)	M (2)	L (1)
CO5	L (1)	L (1)	L (1)	L (1)	L (1)
W.AV	1.6	1.8	1.2	1.4	1.2

S –Strong (3), M-Medium (2), L-Low (1)

I–Semester					
*DSE 1	**Course Code 551502**	**B. Mobile Application Development**	**T**	**Credits:3**	**Hours:3**

Unit-I		
Objective 1	To facilitate students to recognize the concepts of mobile application platforms	
Preliminary Considerations- Why You Might Be Here - Cost of Development -Importance of Mobile Strategies in the Business World-Why is Mobile Development Difficult? -Mobile Development Today-Mobile Myths Third-Party Frameworks. **Diving Into Mobile: App or Website?** Mobile Web Presence-Mobile Applications–Marketing-Your App as a Mobile Web App		
Outcome 1	Learners understand the fundamental concepts Mobile Application development	**K2**

Unit-II		
Objective 2	To understand Android development practices	
Android Development- Why Target Android? - Who Supports Android? – Android as Competition to Itself - Getting the Tools You Need - Connecting to the Google Play -Android Development Practices-Building the Derby App in Android		
Outcome 2	Students able to build mobile application for ANDROID	**K4**

Unit-III		
Objective 3	To understand the features of IOS projects and design of IOS Applications	
Ios Development- The iPhone Craze - Getting the Tools You Need - iOS Project -Debugging iOS Apps - Objective-C Basics - Hello World App - Building the Derby App in iOS-Other Useful iOS Things **Windows Development-**New Kid on the Block-Getting the Tools You Need-Windows Phone 7 Project – Building the Derby App in Windows Phone 7 – Distribution -Other Useful Windows Phone Things		
Outcome 3	Students learn to build Derby App using IOS development	**K4**

Unit-IV		
Objective 4	To learn to use PhoneGap and Titanium tools	
Appcelerator Titanium Development- Why Use Titanium? - Who is Using Titanium? - Getting the Tools You Need - Connecting Titanium to the Markets – Building the Derby Appin Titanium **Phonegap Development-** History of PhoneGap - Why Use PhoneGap? - Who is Using Phone Gap? -Differences between Phone Gap and HTML 5- Getting the Tools You Need-Phone Gap Project-Building the Derby App in Phone Gap		
Outcome 4	Learners obtain knowledge to design apps using Phone Gap and Titanium tools	**K4**

Unit-V		
Objective 5	To understand the features of MONO framework	
Mono Touch and Mono for Android- The Mono Framework- Getting the Tools You Need - Getting to Know Mono Develop - Mono Projects - Building the Derby App with Mono -Other Useful Mono Touch/Mono Features		
Outcome 5	Learners acquire knowledge to design Mono Projects	**K5**

Suggested Readings:

(JeffMc Wherter, (2012). *Professional Mobile Application Development* Paperback.
 Pradeep Kothari, *Android Application Development Black Book*, Dream Tech
Lee, W. M. (2012). Beginning android 4 application Development. John Wiley & Sons
Darcey, L., & Conder, S. (2012). Android Wireless Application Development Volume I: Android
Essentials. Addison-Wesley.)

Online resources

https://download.e-bookshelf.de/download/0000/6567/87/L-G-0000656787-0007218801.pdf

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. A. Padmapriya

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	L(1)	M(2)	L(1)	S (3)	M(2)	M(2)	L(1)	L(1)
CO2	L(1)	L(1)	M(2)	L(1)	L(1)	S(3)	M(2)	M(2)	L(1)	L(1)
CO3	M(2)	M(2)	L(1)	L(1)	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	L(1)	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)
CO5	L(1)	L(1)	L(1)	L(1)	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)
W.AV	1.8	1.8	1.4	1.2	1.6	3	2.6	2	1.6	1.6

S–Strong(3), M-Medium(2), L-Low(1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	M(2)	M(2)
CO2	M(2)	M(2)	M(2)	M(2)	M(2)
CO3	M(2)	M(2)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	S(3)	M(2)
CO5	M(2)	M(2)	S (3)	S(3)	S(3)
W.AV	2.2	2.2	2.2	2.4	2.2

S–Strong(3), M-Medium(2), L-Low(1)

		I - Semester			
*DSE 1	Course Code 551503	C. Sustainability Computing	T	Credits:3	Hours: 3
		Unit– I			
Objective 1		To understand the concepts of sustainability computing			
Concept Of Sustainability - Is humanity's path unsustainable? - Components of a sustainability transition – Quantifying sustainability - Linking industrial ecology activities to Industrial Ecology and Sustainable Engineering Concepts - From contemporaneous Thinking to forward thinking-The greening of engineering-Linking industrial activity with environmental and social sciences- The challenge of quantification and rigor - Key questions of industrial ecology and sustainable engineering.					
Outcome 1		Able to identify the key questions of industrial ecology			K2
		Unit– II			
Objective 2		To understand the process life cycle of sustainable engineering			
Sustainable Engineering-Sustainable Engineering-Engineering and the industrial sequence-Green chemistry-Green engineering-The process design challenge-Pollution prevention - The process life cycle - Green technology and sustainability **Technological Product Development-**The product development challenge-Conceptual tools for product designers					
Outcome 2		Able to cope up with the design challenges of sustainable engineering			K3
		Unit– III			
Objective 3		To understand features of industrial ecosystems and technological systems			
Analysis Of Technological Systems – Systems Analysis-The systems concept-The adaptive cycle - Holarchies. **Industrial Ecosystems –** Ecosystems and food chains – Food webs - Industrial symbiosis Designing and developing symbiotic industrial ecosystems -Uncovering and stimulating industrial ecosystems-Island biogeography and island industry geography					
Outcome 3		Able to propose a design for industrial ecosystems			K4
		Unit–IV			
Objective 4		To understand the corporate and economic benefits of industrial ecology			
Industrial Ecology and Sustainable Engineering In Developing Economies - The three groupings - RDC/SDC dynamics and perspectives – Industrial ecology and sustainable engineering practice in LDCs - Thoughts on development in LDCs. **Industrial Ecology and Sustainability in The Corporation-**The manufacturing sector, industrial ecology, and sustainability - The service sector, industrial ecology, and sustainability-Environment and sustainability as strategic-The corporate economic benefits of environment and sustainability-Implementing industrial ecology in the corporation.					
Outcome 4		Able to propose practices for industrial ecology for the benefits of various sectors in industries			K6
		Unit–V			
Objective 5		To understand global warming and principles of ESEM in achieving sustainability			
Sustainable Engineering in Government And Society–Ecological engineering- Earth systems engineering and management- Regional scale ESEM: The Florida Everglades - Global scale ESEM: Stratospheric ozone and CFCs- Global scale ESEM: Combating global warming-The principles of ESEM-Facing the ESEM question- Proactive Industrial Ecology.					
Outcome 5		Ascertain the scaling of sustainability at global level and achieve proactive industrial ecology in various sectors			K5

Suggested Readings:

Graedel, T. E. and Allenby.p.cm, (2010). *Industrial ecology and sustainable engineering*, Prentice Hall.

Alin Gales, Michael Schaefer, Mike Ebbers, (2011). *Green Data Center: steps for the Journey*, Shroff / IBMre book.

John Lamb, (2009). *The Greening of IT*, Pearson Education.

Jason Harris, (2008). *Green Computing and Green IT-Best Practice son regulations & industry*, Lulu.com.

Carlspeshocky, (2010). *Empowering Green Initiatives with IT*, John Wiley & Sons, 2010.

Wu Chun Feng(editor), *Green computing: Large Scale energy efficiency*, CRC Press

Online Resources

https://davidmytton.blog/sustainable-computing/

https://sustainablecomputing.umich.edu/

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. S. Santhoshkumar

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L (1)	S (3)	S (3)	L (1)	S (3)	M (2)	M (2)	L (1)	S (3)	M (2)
CO2	M (2)	M (2)	M (2)	L (1)	S (3)	L (1)	S (3)	M (2)	L (1)	S (3)
CO3	S (3)	L (1)	L (1)	M (2)	M (2)	S (3)	M (2)	S (3)	M (2)	L (1)
CO4	M (2)	-	M (2)	S (3)	L (1)	M (2)	L (1)	M (2)	S (3)	M (2)
CO5	L (1)	M (2)	L (1)	M (2)	M (2)	M (2)	S (3)	L (1)	M (2)	M (2)
W.AV	1.8	1.4	1.6	1.6	2	1.8	2	1.6	2	1.8

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L (1)	L (1)	S (3)	M (2)	S (3)
CO2	L (1)	S (3)	M (2)	M (2)	M (2)
CO3	M (2)	L (1)	M (2)	L (1)	M (2)
CO4	M (2)	S (3)	L (1)	M (2)	M (2)
CO5	M (2)	S (3)	L (1)	M (2)	M (2)
W.AV	1.4	2	1.6	1.6	2

S –Strong (3), M-Medium (2), L- Low (1)

II- Semester					
*DSE 2	**Course Code 551504**	**A. R Programming**	**T**	**Credits:3**	**H/W: 3**

Unit - I	
Objective 1	To learn the Fundamentals of R Programming language.
Introduction to R - Why R? – Advantages of R over Other Programming Languages - RStudio: R command Prompt, R script file, comments –Handling Packages in R: Installing a R Package, Few commands to get started: installed. packages(), package Description(), help(), find. package(), library() - Input and Output – Entering Data from keyboard – Printing fewer digits or more digits– Special Value functions: NA and Inf	
Outcome 1	Learners understand the fundamentals like how to install and work on R Language. **K1**

Unit - II	
Objective 2	To understand the datatypes, operators and control constructs of R language.
R Data Types: Vectors, Lists, Matrices, Arrays, Factors, Data Frame – R - Variables, Datatypes- Finding Variablels(), Deleting Variables – R Operators: Arithmetic Operators, Relational Operators, Logical Operator, Assignment Operators, Miscellaneous Operators – R Decision Making: if statement, if – else statement, if – else if statement, switch statement – R Loops: repeat loop, while loop, for loop–Loop control statement: break statement, next statement.	
Outcome 2	Learners acquire knowledge with essential programming concepts in R. **K2**

Unit–III	
Objective 3	To learn the built and functions and manipulation of text data.
R-Functions- function definition, Built in functions-user-defined function, calling a function with and without arguments- R-Strings – Manipulating Text in Data–String Functions - R Vectors – Sequence vector, rep function, vector access, vector names, vector math, vector recycling, vector element sorting - R List – Creation and Manipulation of Lists - Merging Lists – Converting List to Vector – R Matrices–Matrix Arithmetic Computations – R Arrays – Naming Columns and Rows – Manipulating Array Elements – R Factors – creating factors, generating factor levels gl().	
Outcome 3	Learners gain knowledge on essential functionalities in R. **K3**

Unit–IV	
Objective 4	To understand data Frame feature of R programming language.
Data Frames–Creating and understanding Data in Data Frame– Applying functions on Data Frames – Extracting Data from Data Frame - Expanding Data Frame -Adding and Joining Rows and Columns - rbind() and cbind() – Merging Data frames merge() – Melting and Casting - data melt(), cast() - Loading and handling Data in R - Working Directory –getwd(), setwd(), dir() - R-CSV Files - Input as a CSV file -Reading a CSV File, Analyzing the CSV File-summary(), min(), max(), range(), mean(), median(), apply() -Writing in to a CSV File -Reading data from Excel file.	
Outcome 4	Learners understand how to classify and analyse data in various formats using R. **K4**

	Unit–V	
Objective 5	To gain proficiency in using R to perform descriptive statistics and create meaningful data visualizations.	

Descriptive Statistics: Data Range, Frequencies, Mode, Mean and Median: Mean Applying Trim Option, Applying NA Option, Median - Mode - Standard Deviation – Correlation -potting Problems in Data with Visualization: visually Checking Distributions for a single variable- R–Pie Charts: Pie Chart title and Colors–Slice Percentages and Chart Legend, 3D Pie Chart– R Histograms – Density Plot- R – Bar Charts: Bar Chart Labels, Title and Colors.

Outcome 5	Learners evaluate statistical analysis and generate charts using R.	**K6**

Suggested Readings:

Sandip Rakshit. (2017). *R Programming for Beginners*, McGraw Hill Education (India), ISBN:978-93-5260-455-5

Seema Acharya. (2018). *Data Analytics using R*, McGraw Hill Education (India), ISBN:978-93-5260-524-8.

Andriede Vries, JorisMeys. (2015). *R for Dummies* A Wiley Brand,2ndEdition, John Wiley and Sons, Inc, ISBN:978-1-119-05580-8

Online Resources

https://www.geeksforgeeks.org/learn-r-programming/
https://www.programiz.com/r

K1-Remember	K2-Understand	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Designed by: Dr. T. Meyyappan

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	M(2)	L(1)	S(3)	S(3)	L(1)	S(3)	S(3)	L(1)	M(2)
CO2	M(2)	L(1)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	L(1)	M(2)
CO3	L(1)	L(1)	M(2)	M(2)	M(2)	S(3)	S(3)	S(3)	L(1)	S(3)
CO4	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)	M(2)	M(2)	S(3)	S (3)
CO5	S(3)	S(3)	M(2)	S(3)	M(2)	S(3)	S(3)	S (3)	S(3)	S (3)
W. AV	2	2	1.8	2	2.6	2.4	2.8	2.8	1.8	2.6

S–Strong (3), M-Medium (2), L-Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	S(3)	L(1)
CO2	M(2)	S(3)	S(3)	S(3)	L(1)
CO3	S(3)	S(3)	S(3)	M(2)	M(2)
CO4	M(2)	M(2)	S(3)	M(2)	L(1)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2.6	2.8	2.8	2.6	1.6

S–Strong(3), M-Medium(2), L-Low(1)

II – Semester					
*DSE -2	**Course Code 551505**	**B. Cloud Computing**	**T**	**Credits:3**	**H/W: 3**
Unit– I					
Objective 1	To facilitate students to understand the concepts of cloud computing basics				
Computing Basics: Cloud computing definition- Characteristics- Benefit-Challenges-Distributed Systems- Virtualization-Service-oriented computing - Utility-oriented computing-Building Cloud Computing environments - computing platforms & technologies – Cloud Models – Cloud Service Examples - Cloud Based Services & Applications - Cloud concepts and Technologies.					
Outcome 1	Completing this course should provide a good understanding of cloud computing			**K1**	
Unit– II					
Objective 2	To learn about virtualization and cloud services				
Virtualization, Cloud Services and Platforms: Virtualization: Virtualization - Characteristics – taxonomy – types – Pros and Cons - Examples Architecture: Reference model- types of clouds-Compute Service - Storage Services - Cloud Database Services – Application Services -Content Delivery Services – Analytics Services – Deployment and Management Service -Identity and Access Management Services – Open Source Private Cloud Software					
Outcome 2	Gives a systematic knowledge of the fundamental technologies, architecture, and security			**K3**	
Unit– III					
Objective 3	To acquire knowledge in designing and developing cloud applications				
Cloud Application Design And Development: Design consideration-Reference Architecture for Cloud Application – Cloud Application Design Methodologies - Data Storage Approaches-Development in Python: Design Approaches – Application: Image Processing – Document Storage -Map Reduce- Social Media Analytics.					
Outcome 3	Understand the services offered by cloud computing environment.			**K4**	
Unit–IV					
Objective 4	To understand how Python is used in Clouds				
Python For Cloud: Introduction - Installing Python - Data types & Data Structures – Control Flow-Functions – Modules – Packages – File Handling – Date / Time Operations – Classes -Python for Cloud: Amazon Web Services – Google Cloud Platform – Windows Azure – Map Reduced – Packages of Interest–Designing a RESTful Web API.					
Outcome 4	Learn how Python relates to clouds			**K5**	

	Unit–V	
Objective 5	To understand different clouds and cloud security	
Big Data Analytics, Multimedia Cloud & Cloud Security: BigData Analytics: Clustering Big data - Classification of Big Data – Recommendation systems. Multimedia Cloud: Case Study: Live Video Stream App - Streaming Protocols – Case Study: Video Transcoding App - Cloud Security: CSA Cloud Security Architecture – Authentication Authorization – Identity and Access Management-Data Security-Key Management- Auditing – Cloud for Industry, Healthcare & Education.		
Outcome 5	Identify the importance of Big data analytics, multimedia cloud and cloud security	**K6**

Suggested Readings

Buyya, Vecciola and Selvi.(2013). *Mastering Cloud Computing: Foundations and Applications Programming*, Tata McGrawHill.

Arshdeep Bahga,Vijay Madisetti.(2016).*Cloud Computing: A Hands–On Approach*, Universities press(India) Pvt. limited.

Ritting house and Ransome, (2016). *Cloud Computing: Implementation, Management, and Security*, CRC Press, 2016.

Michael Miller. (2008). *Cloud Computing Web based application that change the way you work and collaborate online*. Pearson edition.

Kris Jamsa. (2012).*Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More*, Jones & Bartlett Learning,

Online Resources
https://geeksforgeeks.org/cloud-computing/
https://www.javatpoint.com/cloud-computing

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. A. Padmapriya

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L (1)	S (3)	L (1)	S (3)	M (2)	M (2)	M (2)	L (1)	S (3)	S (3)
CO2	M (2)	L (1)	L (1)	S (3)	S (3)	S (3)	L (1)	M (2)	M (2)	M (2)
CO3	S (3)	M (2)	M (2)	M (2)	L (1)	M (2)	S (3)	S (3)	L (1)	-
CO4	M (2)	S (3)	S (3)	L (1)	M (2)	L (1)	M (2)	M (2)	M (2)	L (1)
CO5	L (1)	M (2)	M (2)	M (2)	M (2)	S (3)	M (2)	L (1)	L (1)	M (2)
W.AV	**1.8**	**2**	**1.6**	**2**	**1.8**	**2**	**1.8**	**1.6**	**1.6**	**1.4**

S –Strong (3), M-Medium (2), L- Low (1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L (1)	S (3)	M (2)	L (1)	S (3)
CO2	S (3)	M (2)	M (2)	L (1)	M (2)
CO3	L (1)	M (2)	L (1)	M (2)	M (2)
CO4	S (3)	L (1)	M (2)	M (2)	M (2)
CO5	S (3)	L (1)	M (2)	M (2)	M (2)
W.AV	2	1.6	1.6	1.4	2

S –Strong (3), M-Medium (2), L- Low (1)

II - Semester					
*DSE-2	**Course Code 551506**	**C. Software Testing**	**T**	**Credits: 3**	**Hours: 3**

Unit-I		
Objective 1	To understand the goals and levels of software testing.	
Introduction: Introduction to software testing-Goals of software testing-Software testing foundations-Software testing activities-Testing levels based on software activity-Coverage Criterion-Module driven test design.		
Outcome 1	Learners understand the software testing activities.	**K2**
Unit - II		
Objective 2	To understand the phases of software project and models.	
Software development life cycle models: Phases of software project - Quality, Quality assurance and Quality Control -Verification and Validation-Waterfall Model-Prototyping and rapid application development model-Spiral or iterative model-The VModel. Comparison of various lifecycle models.		
Outcome 2	Students will be able to evaluate different testing models.	**K4**
Unit - III		
Objective 3	To learn various types of testing.	
Types of testing: White box testing-Static Testing-Structural Testing-Black box testing-Domain Testing-Integration Testing-Top-down integration - Bottom up integration-Scenario testing-System and Acceptance testing– Performance testing.		
Outcome 3	Students gain knowledge to perform various types of testing upon software product.	**K3**
Unit - IV		
Objective 4	To be able to develop test plan for Web and GUI applications.	
Practical Considerations: Regression Testing – Integration and Testing–Test process-Test plans–Identifying correct outputs. Testing Object-oriented software–Testing Web applications and Web services–Testing GUI–Real-time software and Embedded software.		
Outcome 4	Learners can test web and GUI applications.	**K5**
Unit - V		
Objective 5	To understand test management and planning.	
Common People issues in Testing: Perceptions and Misconceptions about Testing–Comparing between Testing and Development Functions – Career paths for Testing Professionals – Role of the Ecosystem and Call for action-Test Management and Automation: Planning Management – Process–Reporting–Best Practices–Software Test Automation– Case Study : Selenium		
Outcome 5	Learner scan choose career path as testing professional.	**K5**

Suggested Readings:

Ammann, Offut, J. *Introduction to software testing*(2nded.). Cambridge University press.

Desikan, S.,& Ramesh, G. *Software testing, Principles and practices.* Pearson education.

Beizer, B. *Software Testing Techniques*. Dream Tech publications.

Chauhan, N. *Software Testing*. Oxford University Press.

Nageshwararao, P. *Software Testing Concepts*. Dreamtech Press.

K1-Remember	K2-Understand	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Designed by: Dr. T. Meyyappan

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	M(2)	L(1)	L(1)	L(1)
CO2	L(1)	L(1)	S(3)	L(1)	L(1)	L(1)	S(3)	L(1)	L(1)	L(1)
CO3	L(1)	M(2)	S(3)	L(1)	M(2)	L(1)	S(3)	L(1)	M(2)	M(2)
CO4	M(2)	S(3)	S(3)	L(1)	M(2)	L(1)	S(3)	M(2)	M(2)	M(2)
CO5	L(1)	M(2)	M(2)	L(1)	L(1)	L(1)	S(3)	S(3)	S(3)	S(3)
W.AV	1.2	1.8	2.4	1	1.4	1	2.8	1.6	1.8	1.8

S–Strong(3), M-Medium(2), L-Low(1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	L(1)	M(2)	M(2)	L(1)
CO2	L(1)	L(1)	M(2)	M(2)	L(1)
CO3	L(1)	M(2)	M(2)	M(2)	M(2)
CO4	M(2)	S(3)	S(3)	S(3)	M(2)
CO5	M(2)	S(3)	S(3)	S(3)	M(2)
W.AV	1.4	2	2.4	2.4	1.6

S – Strong(3), M - Medium(2), L - Low(1)

		Semester - III			
*DSE 3	**Course Code 551507**	**A. Cyber Security**	**T**	**Credits: 3**	**Hours: 3**

Unit-I	
Objective 1	To understand different types of cyber crime and cyber criminals

Introduction To Cyber Crime: Definition and Origins of the Word Cybercrime and Information Security- Who are Cybercriminals? – Classifications of Cybercrimes - Cybercrime: The Legal Perspectives-Cybercrimes: An Indian Perspective – Cybercrime and the Indian ITA 2000 - A Global Perspective on Cybercrimes - Cybercrime Era: Survival Mantra for the Netizens

Outcome 1	Learners understand the fundamental concepts of Cyber Security	**K2**

Unit - II	
Objective 2	To gain the knowledge of cyber crimes are planned and targeted

Cyber Offenses: Introduction - How Criminals Plan the Attacks - Social Engineering –Cyberstalking - Cybercafe and Cybercrimes - Botnets: The Fuel for Cybercrime – Attack Vector -Cloud Computing

Outcome 2	Students able to explore the methods of Cyber crime	**K3**

Unit - III	
Objective 3	To learn Different forms of cyber crimes

Cybercrime: Introduction- Proliferation of Mobile and Wireless Devices-Trends in Mobility - Credit Card Frauds in Mobile and Wireless Computing Era - Security Challenges Posed by Mobile Devices - Registry Settings for Mobile Devices - Authentication Service Security- Attacks on Mobile / Cell Phones – Mobile Devices: Security Implications for Organizations - Organizational Measures for Handling Mobile - Organizational Security Policies and Measures in Mobile Computing Era-Laptops

Outcome 3	Students gain knowledge of cyber-attacks on digital transactions	**K3**

Unit - IV	
Objective 4	To study how cyber crimes are carried out by cyber criminals

Tools And Methods Used In Cybercrime: Introduction - Proxy Servers and Anonymizers – Phishing - Password Cracking - Keyloggers and Spywares - Virus and Worms – Trojan Horses and Backdoors–Steganography – DoS and DDoS Attacks-SQL Injection – Buffer Overflow-Attack son Wireless Networks

Outcome 4	Learners handle tools to combat cyber attacks	**K4**

Unit - V	
Objective 5	To explore the laws governing Cyber Security

Cybercrimes And Cybersecurity: The Legal Perspectives – Introduction - Cybercrime and the Legal Landscape around the World - Why Do We Need Cyberlaws: The Indian Context -The Indian IT Act-Challenges to Indian Law and Cyber crime Scenario in India-Consequences of Not Addressing the Weakness in Information Technology Act – Digital Signatures and the Indian IT Act - Amendments to the Indian IT Act – Cyber crime   and Punishment Cyberlaw, Technology and Students: Indian Scenario. Careers in Cybersecurity: Introduction- IT Security Organization – Career Paths in Cybersecurity-Cybersecurity Certifications -Guide Path

Outcome 5	Learners familiarize with cyberlaws in India governing digital transactions	**K4**

Suggested Readings

Nina Godbole, Sunit Belapure (2013) Cyber Security, Wiley India Pvt. Ltd. New Delhi

Pfleeger ,C. P., Pfleeger, S. L. Analyzing Computer Security. Pearson Education. India.

Godbole, N. (2009).Information Systems Security : Metrics Frameworks and Best Practices .Wiley India. New Delhi

Marther, T., Kumaraswamy,S.,& Latif, S.(2009).Cloud Security and Privacy: An Enterprise Perceptive on Risk and Compliance. O'Reilly.

Dieter Gollmann.(2006).Computer Security.2nd edition. John Wiley & Sons

Tripathi, S. P.,Goel, R. Shukla, P. V. Introduction to Information Security and Cyber Laws. Dreamtech Press.

Chander, Harish, Cyber Laws and IT Protection. PHI Learning Private Limited. New Delhi

Online resources

https://www.uou.ac.in/sites/default/files/slm/Introduction-cyber-security.pdf

https://ptgmedia.pearsoncmg.com/images/9780132789462/samplepages/0132789469.pdf

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. A. Padmapriya

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	L(1)	M(2)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
CO2	L(1)	L(1)	M(2)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
CO3	M(2)	M(2)	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
CO4	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
CO5	L(1)	L(1)	L(1)	L(1)	M(2)	M(2)	M(2)	L(1)	L(1)	L(1)
W.AV	1.8	1.8	1.4	1.2	2	2	2	1	1	1

S–Strong(3), M-Medium(2), L-Low(1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	M(2)	L(1)
CO2	M(2)	M(2)	M(2)	M(2)	L(1)
CO3	M(2)	M(2)	M(2)	M(2)	L(1)
CO4	M(2)	M(2)	M(2)	M(2)	L(1)
CO5	M(2)	M(2)	M(2)	M(2)	M(2)
W.AV	**2.2**	**2.2**	**2**	**2**	**1.2**

S–Strong(3), M-Medium(2), L-Low(1)

III - Semester					
*DSE-3	**Course Code 551508**	**B. Digital Marketing**	**T**	**Credits:3**	**Hours:3**

Unit– I	
Objective 1	To learn the Fundamentals of Digital Marketing

Understanding Digital Marketing - Traditional vs Digital Marketing - How Digital Marketing Works - Case Study - Creating a Content Marketing Framework

Outcome 1	Understand the principle behind digital marketing	**K2**

Unit– II	
Objective 2	To learn the techniques of content marketing

Content Marketing - Turning Prospect Visitors into Customers - Techniques of Content Marketing

Outcome 2	Learn to convert the visitors to prospective customers and grab business opportunities.	**K2**

Unit– III	
Objective 3	To learn to design digital advertising in social media

Smart Content Development Tool - Content Marketing Plan - Measuring Content Marketing Success Digital Advertising - Paid Traffic

Outcome 3	Designing digital advertisements for successful social media marketing	**K3**

Unit– IV	
Objective 4	Understand how email marketing works

Digital Advertising Implementation- Five elements of High Performing Advertisement Campaigns - Metrics to measure digital advertising campaign

Outcome 4	Performing digital marketing through email and search marketing strategies	**K4**

Unit– V	
Objective 5	Learn to measure the metrics of digital marketing

Critical Components of Social Media Marketing - Key components of Social Media Account - Social Media Success metrics - Case Study

Outcome 5	Incorporating key metrics to achieve successful digital marketing	**K6**

Suggested Readings:

Digital Marketing Essentials You Always Wanted to Know,1st Edition, 2020, Vibrant Publishers ASIN:B08DXQXXY7

Diamond, S. (2022). *Digital marketing all-in-one for dummies*. John Wiley & Sons.

Dave Chaffey, Fiona Ellis-Chadwick. (2019). *Digital Marketing*, 7thEdition, PEARSON

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	L (1)	L (1)	M (2)	M (2)	M (2)	M (2)	M (2)	M (2)	L (1)	S (3)
CO2	M (2)	M (2)	L (1)	M (2)	S (3)	L (1)	M (2)	L (1)	S (3)	L (1)
CO3	L (1)	L (1)	M (2)	S (3)	M (2)	L (1)	L (1)	L (1)	M (2)	L (1)
CO4	L (1)	M (2)	L (1)	L (1)	M (2)	L (1)	M (2)	L (1)	L (1)	M (2)
CO5	L (1)	L (1)	M (2)	M (2)	S (3)	M (2)	M (2)	L (1)	L (1)	M (2)
W.AV	**1.2**	**1.4**	**1.6**	**2**	**2.4**	**1.4**	**1.8**	**1.2**	**1.6**	**1.8**

S –Strong (3), M-Medium (2), L-Low (1)

Course outcome VS Programme Specific Outcome

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M (2)	M (2)	M (2)	L (1)	L (1)
CO2	L (1)	L (1)	M (2)	M (2)	L (1)
CO3	S (3)	L (1)	L (1)	L (1)	M (2)
CO4	M (2)	M (2)	M (2)	L (1)	L (1)
CO5	L (1)	L (1)	L (1)	L (1)	L (1)
W.AV	**1.8**	**1.4**	**1.6**	**1.2**	**1.2**

S –Strong (3), M-Medium (2), L-Low (1)

III - Semester					
*DSE -3	Course Code 551509	C. Block Chain Technology	T	Credits: 3	Hours: 3

UNIT I	
Objective 1	To introduce the block chain technology and platforms of decentralization

Introduction: Introduction to blockchain – Types of blockchain–CAP theorem and blockchain benefits and limitations of blockchain - Decentralization – Decentralization using blockchain – Methods of Decentralization – Routes to Decentralization – Blockchain and full ecosystem Decentralization – Smart Contract – Decentralization Organizations– Decentralization applications – Platforms of Decentralization.

Outcome 1	Explore both the conceptual as well as application aspects of Block chain.	**K6**

UNIT II	
Objective 2	To learn the cryptographic principles

Cryptography & Technical Foundation- Cryptography and Technical Foundations – Introduction – Cryptographic primitives – Asymmetric Cryptography – Public and Private keys – Financial marketing and trading.

Outcome 2	Understand the fundamental design and architectural primitives of Blockchain	**K2**

UNIT III	
Objective 3	To learn the transactions in bit coin

Bitcoin-Bitcoin–Transactions–Blockchain–AlternativeCoins–bitcoinlimitations–Namecoin–Litecoin– Primecoin.

Outcome 3	Describe security aspects of blockchain technology	**K1**

UNIT IV	
Objective 4	To learn about smart contracts and Ethereum

Smart Contracts & Ethereum-Smart Contracts – Ethereum 101 – Introduction – Ethereum blockchain– Elements of Ethereum blockchain– Pre-complied contracts– Accounts–Block–Ether–Messages–Mining–Clients and Wallets–Trading and investment–The Ethereum network–Applications developed on Ethereum –Scalability and security issues.

Outcome 4	Develop smart contract applications in Ethereum	**K3**

UNIT V	
Objective 5	To explore the challenges faced by blockchain technology

Alternative Blockchains–Alternative Blockchains–Blockchains–Platforms–Blockchain-Outside of Currencies – Internet of Things – Government – Health – Finance –Scalability and other challenges–Scalability–Privacy–Security.

Outcome 5	Identify scalability and privacy issues of blockchain and alternatives to blockchain technology	**K3**

Suggested readings:

Bsahir, I. (2017). Mastering Blockchain - *Master the theoretical and technical foundations of Block chain technology and explore future of Block chain technology*. Create Space Independent Publishing Platform.

Narayanan, Bonneau, Felten, Miller, &Goldfeder. *Bitcoin and Cryptocurrency Technologies– A Comprehensive Introduction*. Princeton University Press

Thompson, J.(2017). *Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming*. Create Space Independent Publishing Platform.

Bashir, I. *Mastering Blockchain : Distributed ledger technology, decentralization, and smar*

Grincalaitis, M. *Mastering Ethereum: Implement Advanced Blockchain Applications Using Ethereum-supported Tools, Services, and Protocols*. Packt Publishing.

Online Resources

https://www.simplilearn.com/tutorials/blockchain-tutorial/blockchain-technology

https://www.synopsys.com/glossary/what-is-blockchain.html

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. T. Meyyappan

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	L(1)	L(1)	S(3)	S(3)	L(1)	L(1)	M(2)	L(1)	M(2)
CO2	M(2)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	M(2)	L(1)	L(1)
CO3	S(3)	S(3)	L(1)	S(3)	S(3)	L(1)	L(1)	S(3)	L(1)	L(1)
CO4	M(2)	M(2)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	L(1)
CO5	L(1)	L(1)	M(2)	S(3)	S(3)	M(2)	S(3)	S(3)	L(1)	L(1)
W. Avg	2.2	2	2	3	3	1.8	2.2	2.4	1.2	1.2

S-Strong(3), M-Medium(2), L-Low(1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	L(1)	M(2)	M(2)	M(2)
CO2	M(2)	L(1)	M(2)	L(1)	M(2)
CO3	S(3)	L(1)	L(1)	M(2)	L(1)
CO4	M(2)	M(2)	L(1)	L(1)	L(1)
CO5	L(1)	L(1)	L(1)	L(1)	L(1)
W. Avg	2	1.2	1.4	1.4	1.4

S-Strong(3),   M-Medium(2),   L-Low(1)

Semester- II					
NME1	**Course Code**	**Office Automation**	**T**	**Credits: 2**	**Hours: 3**

Unit-I	
Objective 1	To Learn to work with windows and offices of software suite to automate office activities

Introduction: Working with Windows – Office Programs – Title Bar – Status Bar - Menu Bar and Tool Bars - Using the Office Assistant – Using the Help Window – Creating Short Cut Icon– Starting a program and opening a document – Saving and Naming a document – Using Favorite Folders – Closing, Deleting and Undeleting a Document Renaming – Copying and Moving a Document – Finding the Document

Outcome 1	Learners able to work with windows and packages in Office software suite	**K2**

Unit - II	
Objective 2	To Learn to create and format documents using Word Processor

Word: Working with word documents – Moving, correcting and Inserting Text – Printing a Document – Editing, Selecting and Editing Text – Formatting – Changing Margins – Line Spacing – Text Alignment – Font and Font Size – Indenting – Inserting – Page numbers and Breaks – Using Tables and Graphics – Creating Tables – Auto Formatting Table text

Outcome 2	Learners able to create documents with tables, graphics and formatting with page layout features	**K3**

Unit - III	
Objective 3	To create and format workbooks using Excel

Excel: Building a Worksheet – Selecting Worksheet Items – Using Auto fill – Adding and Removing Rows and Columns – Copying and Moving Information – Creating and copying Formulas – Naming Ranges – Using functions-Improving the Appearance of Worksheet –Changing column width– Formatting Text and Numbers–Using AutoFormat–Spell checking–Using Chart Wizard–Creating, Enhancing and Printing a chart

Outcome 3	Learners able to create worksheets to perform What-If Analysis and presentation graphics	**K3**

Unit - IV	
Objective 4	To create databases and query them using Access

Access: Creating a New Data Base – Creating and Saving a Table – Primary key creating –Adding, Editing and Deleting fields – Changing the view and moving fields – Data entry andediting–Adding, Inserting and Deleting records–Adjusting Column width – Hiding Column – Finding Records – Sorting records – Creating, Saving and Editing a query – Forms – Autoform –Using Report Wizard – Creating and Printing Reports.

Outcome 4	Learners able to create databases, tables, queries, forms and reports	**K4**

Unit - V	
Objective 5	To create slides and make presentation using PowerPoint
MS PowerPoint and Integrating Office Applications: Power Point Presentation – Integrating Office Applications – Merging an Access Report from an excel list – Creating power point Presentation from a word outline- Creating a Word handout from a PowerPoint binder-Starting outlook – Outlook window-Using menus, dialogue boxes–Existing Outlook.	
Outcome 5	Learners able to create slide show for business / education presentation with Text, Tables, Charts and animations	**K4**

Suggested Readings:

Laura Acklenet. Al. (1998). Microsoft office 97 office professional Essentials, EEE GUE E& T Prentice Hall India

Shelley O'Hara, Denise B.Vega& Julia Kelley, Discover office97,Comdex Computer Publishing

Online resources

https://www.scribd.com/document/460465075/Shelley-O-Hara-Ron-Mansfield-Absolute-Beginner-BookFi-pdf#

https://www.msuniv.ac.in/images/e-content/6.Computer%20%20Fundamentals%20and%20Office%20Automation.pdf

K1-Remember	*K2-Understand*	*K3-Apply*	*K4-Analyze*	*K5-Evaluate*	*K6-Create*

Course Designed by: Dr. S. Santhoshkumar

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)
CO2	L(1)	L(1)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)
CO3	M(2)	M(2)	L(1)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)
CO5	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)	S(3)
W.A V	2	2	1.6	1.2	1.8	1.8	1.8	2	2	2

S–Strong(3), M-Medium(2), L-Low(1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	M(2)	M(2)
CO2	M(2)	M(2)	M(2)	M(2)	M(2)
CO3	M(2)	M(2)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	M(2)	M(2)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2.4	2.4	2.2	2.2	2.2

S–Strong(3), M-Medium(2), L-Low(1)

Semester- III					
NME2	**Course Code**	**Web Designing**	**T**	**Credits: 2**	**Hours: 3**
Unit-I					
Objective 1	To Learn networking, internet and HTML fundamentals				
Introduction To the Internet: Electronic mail – Resource Sharing – Remote Login – World Wide Web – Search Engine – Browsers – Introduction to static, dynamic and active web pages. Introduction to HTML: Designing a Homepage – History of HTML-HTML Generations-HTML Documents-Anchor Tag-Hyperlinks					
Outcome 1	Learners gain basic knowledge on internetworking, Email and WWW				**K2**
Unit - II					
Objective 2	To understand different sections in general structure of an HTML document				
Head And Body Sections: Header Section – Title – Links - Colorful Web page – Comment Lines - Designing the Body Section: Heading – Printing - Aligning the Headings – Horizontal Rule-Paragraph-Tab Settings -Images and Pictures-Embedding Images					
Outcome 2	Learners able to Design a website with basic features of HTML and embedding images				**K3**
Unit - III					
Objective 3	To Learn list and table formatting features of HTML				
Ordered And Unordered Lists: Lists– Unordered Lists- Headings in a List-Ordered Lists- Nested Lists – Table Handling: Table creation in HTML – width of the Table and Cells-Cells Spanning Multiple Rows / Columns - Coloring Cells-Column Specification					
Outcome 3	Learners able to create different types of lists, tables and format data in cells				**K3**
Unit - IV					
Objective 4	To Learn the facilities in HTML that makes it Dynamic HTML and Framesets				
DHTML And Style Sheets: Defining Styles - Elements of Styles - Linking a Style Sheet to an HTML Document – In – line Styles – Internal and External Style Sheets – Multiple Styles - Frames: Frameset Definition – Frame Definition – Nested Framesets					
Outcome 4	Learners able to Dynamically control the appearance of a website using different types of style sheets				**K4**
Unit - V					
Objective 5	To Learn to get input data through HTML form and pass data to the server				
Forms: Action Attribute-Method Attribute-Enctype Attribute-Drop down list - Check Boxes-Radio Buttons-Text Field-Text area-Password and Hidden Fields-Submit and Reset Buttons-Designing Sample Forms					
Outcome 5	Learners able to Design forms with GUI elements in Document object model to input and handle data				**K4**

Suggested Readings:

C. Xavier. (2000). World Wide Web design with HTML, - Tata McGraw Hill Publishing Company Limited. ISBN9780074639719

Ivan Bay ross. (2012). HTML 5 and CSS3 Made Simple, BPB Publications ISBN 9788183334419

Online resources

http://www.pagetutor.com/html_tutor/index.html

http://www.tutorialspoint.com/html/html_tutorial.pdf

http://www.htmlcodetutorial.com/

http://www.w3schools.com

K1-Remember	K2-Understand	K3-Apply	K4-Analyze	K5-Evaluate	K6-Create

Course Designed by: Dr. A. Padmapriya

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)	L(1)
CO2	L(1)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)
CO3	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
CO5	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
W.AV	2	2	1.8	1.8	1.8	1.8	1.8	1.8	2.2	2.2

S–Strong(3), M-Medium(2), L-Low(1)

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	M(2)	M(2)
CO2	M(2)	M(2)	M(2)	M(2)	M(2)
CO3	M(2)	M(2)	M(2)	M(2)	M(2)
CO4	M(2)	M(2)	M(2)	S(3)	S(3)
CO5	M(2)	M(2)	M(2)	S(3)	S(3)
W. AV	2.2	2.2	2	2.4	2.4

S–Strong(3), M-Medium(2), L-Low(1)

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