ALAGAPPA UNIVERSITY

(A State University Established in 1985)

Karaikudi - 630003. Tamil Nadu, India

FACULTY OF SCIENCE
DEPARTMENT OF COMPUTATIONAL LOGISTICS

M.Sc., INFORMATION TECHNOLOGY

REGULATIONS AND SYLLABUS

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

DEPARTMENT OF COMPUTATIONAL LOGISTICS
M.Sc., Information Technology

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 andGraded as Category-I University by MHRD-UGC)
Karaikudi -630003, Tamil Nadu.

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ALAGAPPA UNIVERSITY
DEPARTMENT OF COMPUTATIONAL LOGISTICS
Karaikudi -630003, Tamil Nadu.

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

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Name of the Department	: Computational Logistics
Name of the Programme	: M.Sc., Information Technology
Duration of the Programme	: 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 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 work/seminar/project work/practical training/report writing/Viva-voce, etc or a combination of these, to meet effectively the teaching and learning needs.

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 courses credits will be assigned on the basis of the number of lectures/tutorials/laboratory and other forms of learning required completing 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 the remaining 5 weeks are to be utilized for 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 determines 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, practicals, 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. A teacher offering a course will also be responsible for maintaining attendance and performance sheets (CIA -I, CIA-II, assignments and seminar) of all the students registered for the course. The Non-major elective programme and MOOCs coordinator 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. Then forward the same to be Controller of Examinations.

ProgrammeEducational Objective (PEOs)	
PEO-1	To provide opportunities for acquiring in-depth knowledge of fundamental concepts and programming skills for integrated development.
PEO-2	To develop critical thinking and decision-making skills.
PEO-3	Analyzecommonbusinessfunctionsandidentify,design,anddevelopappropriateinformationtechnologysolutions(inweb,desktop,network, and/ordatabaseapplications).
PEO-4	Practicecommunication,problemsolvingandemotional intelligencethroughtheuseofappropriatetechnologyandwiththeunderstandingofthebusiness environment.
PEO-5	Learnfuturetechnologiesthrough acquiredfoundational skillsandknowledge andemploythem innewbusiness environments.
PEO-6	To prepare students to work effectively in a variety of contexts using various languages, systems and networks.
PEO-7	Todemonstrateanunderstandingoftheconceptsofonlinesecurity and privacy.
PEO-8	To apply their knowledgein the field of IT and engineering
PEO-9	Continue to independently learn and master new tools of the profession.
PEO-10	To develop research and innovative thinking.

Programme Specific Objective (PSOs)	
PSO1	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying

	complexity.
PSO2	**Problem-Solving Skills**: The ability to apply standard practices and strategies insoftware project developmentusing open-endedprogramming environments to deliver a quality product for business success.
PSO3	**Security Awareness:** To demonstrate that they can use digital technology in research, analysis, and critical inquiry. Apply cybersecurity concepts to technology pursuits in order to help secure people's privacy, liberty and better their way of life.
PSO4	**Practical Skills:** The ability to complete given tasks. An Analytical skill the collection, interpretation and use of information. An Organizational skill the planning of work and meeting deadlines. And Social skills the communication of ideas.
PSO5	**Decision Making Skills:** Take on leadership positions and/or embark on a research career in the field. And contribute to the success of organizations and communities through adopting a lifelong process of research, adaptation, and implementation of technology.

Program Outcome (POs)	
PO1	**Disciplinary Knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of a Post graduate programme of study.
PO2	**Problem Solving Skill:** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.
PO3	**Decision Making Skill:** Foster analytical and critical thinking abilities for data-based decision-making.
PO4	**Ethical Value:** Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.
PO5	**Communication Skill:** Ability to develop communication, managerial and interpersonal skills.
PO6	**Individual and Team Leadership Skill:** Capability to lead themselves and the team to achieve organizational goals.
PO7	**Employability Skill:** Inculcate contemporary business practices to enhance employability skills in the competitive environment.
PO8	**Entrepreneurial Skill:** Equip with skills and competencies to become an entrepreneur.
PO9	**Research related skills:** Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned research perspective; Sense of inquiry and capability for asking relevant questions / problem arising / synthesizing / articulating / ability to recognize cause and effect relationships / define problems. Formulate hypothesis, Test / analyse / Interpret the results and derive conclusion, formulation and designing mathematical models
PO10	**Self-directed & Lifelong Learning:** Ability to work independently, identify and manage a project. Ability to acquire knowledge and skills, including "learning how to learn", through self-placed and self-directed learning aimed at personal development, meeting economic, social and cultural objectives.

Programme Specific Outcome (PSOs)	
PSO1	Capability to apply the acquired techniques and tools to find solutions for complex problems.
PSO2	An ability to use the core concepts of computing and optimization techniques to develop more efficient and effective computing mechanisms.
PSO3	An ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals.
PSO4	Ability to apply domain knowledge and expertise in research to design cost effective systems towards sustainable future.
PSO5	To promote professional, social, and ethical practices and to embrace shared growth.

Eligibility for Admission

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

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 suggestedfor 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, and 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 Non-Major Elective courses with 2 credits offeredby other departments (one in II Semester and another in III Semester).

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

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

Registration process: Students have to 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 voluntary for the students.

Students have to undergo a total of 2 Self Learning Courses (MOOCs) one in II semester and another in III semesters.

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 toemployability skills.

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

The student shall undertake the Project/Dissertation/internship during the fourthsemester.

Plan of work

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 acknowledgethe same in their dissertation/project work.

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 submitted in partial fulfillment of the requirement for the degree of Master ofScience 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)

Format of Certificates

Certificate –Guide

This is to certify that the thesis entitled " --- "
submitted to Alagappa University, Karaikudi-630 003 in partial fulfilment for the degree of Master of Science in ----------- by Mr/Miss --------------------- (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   Research Supervisor

Date: _____

<div align="center">**Certificate - (HOD)**</div>

This is to certify that the thesis entitled "___" submitted by Mr/**Miss** ----------------(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___,**   Assistant   Professor, 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: Karaikudi   Head of The Deaprtment

Date: _____

<div align="center">**Declaration (student)**</div>

I hereby declare that the dissertation entitled "------------" submitted to Alagappa University for the award of the degree of Master of -------- in ------------- has been carried out by me under the guidance of **Dr**------------Assistant Professor, 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

The students shall undergo Internship / industrial training in the reputed organizations for minimum of two weeks to acquire industrial knowledge during the summer vacation of second semester. The students have to 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 / industrial training.

Format to be followed for Internship Report

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

Title of internship report

Internship report submitted in partial fulfillment of the requirement for the Master ofScience in Information Technologye 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 ASIARank- 216, QS BRICS Rank-104, QS India Rank-20)

Karaikudi – 630003

(Year)

Format of certificate
(Faculty in-charge)

This is to certify that the internship report entitled "--" submitted to Alagappa University, Karaikudi-630 003 in partial fulfilment for theMaster of Science in by Mr/Miss ------------------------------- (Reg. No.:------------) under my supervision. This is based on the work carried out by him/her in the organization M/--. 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:_____

(HOD)

This is to certify that the Internship report entitled"__"submitted by Mr./Miss. ------- (Reg No:_____) 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-------------------, Assistant Professor, 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 anyUniversity or Institution.

Place: Karaikudi   Head of the Department

Date: -----------   -

(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 theMaster of Science in_____by Mr./Miss ---------------------- (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_____. This Internship report or any part of this work has not been submitted elsewhere for any other degree, diploma, fellowship, or anyother similar record of any University or Institution.

Place: Supervisor or In-charge

Date:_____

Declaration (student)

I hereby declare that the Internship Report entitled"-------------" submitted to the Alagappa University for the award of the Master of Science in ____has been carried out by me under the supervision of---------------, Assistant Professor, Department of__, Alagappa University, Karaikudi – 630 003. This ismy original and independent work carried out by me in the organization M/S ---------- for the period of 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:_____

Acknowledgment

Content as follows:

Chapter No.	Title	Page No.
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	

Field Visit

The students shall undergo Field Visits to various aquaculture farms, fish landing centers, sea food processing industries, Research Institutes, ship building industries etc. to acquire industrial and practical knowledge during the first semester.

Format to be followed for Field Visit report

The format for Field Visit report to be followed by the student are given below

Format of the title page

Field Visit report

submitted in partial fulfilment of the requirement for the Master of Science in to theAlagappa 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 certificate

<u>**(HOD)**</u>

       This is to certify that the Field Visit report submitted by Mr./Miss --------------------------- (Reg No:------------) to the Alagappa University, in partial fulfilment for the award of the Master of Science in__is a bonafide record of Field Visit reports carried out by him/her during ------------------- ---------. This is to further certify that the report 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: Karaikudi   Head of the Department

Date:_____

Declaration (student)

       I hereby declare that the Field Visit Report submitted to the Alagappa Universityfor the award of the Master of Science in_____has been carried out by me. This ismy originaland independent work carried out by me during____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:_____

Acknowledgment Content as follows:

S. No.	Date	Field Visit	Page No.	Signature
1				
2				
3				
4				
5				

No. of copies of the dissertation/internship report

       The candidate should prepare three copies of the dissertation 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. The candidate should prepare one copy of the fieldvisit/internship report and submit the same for the evaluation of examiners.

Teaching methods

The teacher delivers a lecture using smart boards, black board and other real equipment and then allows students to discuss the lecture. Whenever a student has an opinion, a comment, a problem, or a difficulty understanding any part of the lecture, the teacher will reply, and clarify the doubts the student may have. Student interest is stimulated and their understanding of the concept is assessed through this strategy. In the laboratory, the teacher gives the instruction which is associated with the course and also gives the demonstration regarding the experiment for the subject who is handling. Afterwards, the students do the experiments individually. Course oriented and subject oriented workshops and demo classes are arranged with the industrial experts by the department. Then the periodic tests would be conducted and for the students of slow learners would be given special attention.

Attendance

Students must have earned 75% of attendance in each course for appearing for 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).

F.   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

1	Average marks of two CIA test	15 marks
2	Observation note book	10 marks
	Total	25 Marks

Internship- 25 Marks (assess by Guide/incharge/HOD/Supervisor)

1	Presentations	15 Marks
2	Progress report	10 Marks
	Total	25 Marks

Project/Dissertation -50 Marks (assess by Guide /incharge /HOD/ Supervisor)

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

G. **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 RegularPractical examination in the respective semester.

A candidate should get registered for the first-semester examination. If registration is not possible owing to a 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 the maximum marks will be 100 marks forproject report evaluation and for the Viva-Voce it is 50 marks

For the Internship the maximum marks will be 50 marks for project report evaluationand for the Viva –Voce it is 25 marks.

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

H.   **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	5 x 5 = 25	5 questions – 1each from every unit
Section C	5 questions Either / or type like 1.a (or) b. All questions carry equal marks	5 x8 = 40	5 questions – 1 each from every unit

Dissertation /Project report Maximum 150 Marks

Dissertation /Project report	100 Marks
Vivo voce	50 Marks

Internship report Maximum 75 Marks

Internship report	50 Marks
Vivo voce	25 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 lessthan 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 andin 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 / Internshipif he /she gets not less than 40% in each of the Project / Dissertation / Internship and Viva-

Voce and not less than 50% in the aggregate of both the marks for Project / Dissertation /Internship Report and Viva-Voce.

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

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 to have 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) = $\sum_i C_i \ G_i / \sum_i C_i$

GPA = <u>Sum of the multiplication of Grade Points by the credits of the courses</u>

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++ D+**	First Class with Distinction*
8.0 and above but below 8.5	**D**	
7.5 and above but below 8.0		
7.0 and above but below 7.5	**A++**	First Class
6.5 and above but below 7.0	**A+ A**	
6.0 and above but below 6.5		
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 7.9 shall 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 6.4 shall 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 5.4 shall 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.

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

f) 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 „C_i" is the Credit earned for Course i in any semester; „G_i" is the Grade Point obtained by the student for Course i and „n" refers to the semester in which 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 within the 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 Information Technology shall not exceed eight semesters continuing from the first semester.

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 a majority of 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 have to 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 day based on the theme.1. Environmental awareness 2. Hygiene and Health. A minimum of two faculty members can accompany the students and guide them.

Job and Career Option for M.Sc (IT)

Software Developer Programmer

Tester Web Developer

Scientist

Data Analyst

Research Assistant

Research Associate and etc.

Employment Areas for M.Sc (IT)

IT Industry

Data Science

Research Centres

All Numerical and Scientific Areas

M.Sc. INFORMATION TECHNOLOGY-PROGRAMME STRUCTURE

S. No	Course Code		Title of the paper	T/P	Credits	Hours/ Week	Marks		
							I	E	Total
I Semester									
1	546101	Core 1	Mathematics for Computing	T	5	5	25	75	100
2	546102	Core 2	Distributed Operating System	T	5	5	25	75	100
3	546103	Core 3	Web Technology	T	5	5	25	75	100
4	546104	Core 4	Python Programming	T	5	5	25	75	100
5	546105	Core 5	Lab-I : Web Technology and Python Lab	P	3	6	25	75	100
6			**Elective-I**	T	4	4	25	75	100
					27	**30**	**150**	**450**	**600**
II Semester									
7	546201	Core 6	Database Systems	T	5	5	25	75	100
8	546202	Core 7	Data Mining	T	5	5	25	75	100
9	546203	Core 8	Digital Image Processing	T	4	4	25	75	100
10	546204	Core 9	Lab II: Data Mining Lab	P	2	4	25	75	100
11	546205	Core 10	Lab III: Digital Image Processing Lab	P	2	4	25	75	100
12			**Elective-II**	T	4	4	25	75	100
13			Non-Major Elective-I	T	2	3	25	75	100
14			Library, Yoga & Career Guidance			1			
15	MOOC"S		Self-learning course (SLC)				Extra credit		
					24	**30**	**175**	**525**	**700**
III Semester									
16	546301	Core 11	Internet of Things	T	5	5	25	75	100
17	546302	Core 12	Big Data Analytics and R Programming	T	5	5	25	75	100
18	546303	Core 13	Machine Learning	T	4	4	25	75	100
19	546304	Core 14	Lab III – Data Analytics Lab	P	2	4	25	75	100
20	546305	Core 15	Lab IV – Machine Learning Lab	P	2	4	25	75	100
21			Elective-III	T	4	4	25	75	100
22			Non-Major Elective-II	T	2	3	25	75	100
23			Library, Yoga & Career Guidance			1			
24			Self-learning course (SLC) –MOOCs**				Extra credit		
					24	**30**	**175**	**525**	**700**
IV Semester									
23	546999	Core 16	***Dissertation Work or Internship programme		15	30	50	150	200
					15	**30**	**50**	**150**	**200**
			Total		**90 +Extra Credits**		**550**	**1650**	**2200**

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

SLC- Voluntary basis   * Dissertation / internship report –Marks -Vivo-voce (50) +thesis (100) + internal (50) =200

T-Theory   P-Practical

ELECTIVE COURSES

	Elective Group I
546501	Object Oriented Software Engineering
546502	Software Project Management
546503	Object Oriented Analysis and Design

	Elective Group II
546504	Virtualization & Cloud Computing
546505	Cyber Security
546506	Soft Computing

	Elective Group III
546507	Mobile Computing
546508	Mobile Application Development
546509	Advanced Network Security

I-Semester					
Core 1	**Course Code: 546101**	**Mathematics For Computing**	**T**	**Credits:5**	**Hours:5**
Unit -I					
Objective 1	**To develop problem-solving techniques.**				
Mathematical Logic: Statements and Notations, Connectives, Well-formed formulas – Truth Tables – Tautology - Equivalence Implication -Normal Forms. **Predicate Calculus:** Predicates, Statement Function - Variables – Quantifiers - Free and Bound Variables – The Universe of Discourse, Inference Theory of Predicate Calculus.					
Outcome1	**Ability to illustrate by examples the basic terminology of functions, relations, and sets and demonstrate knowledge of their associated operations.**				**K2-K4**
Unit -II					
Objective 2	**To provide the basic principles of set theory.**				
Set Theory: Basic Concepts and Notations – Ordered Pairs and Cartesian Product – **Set Operations Relations:** Properties of Binary Relations, Equivalence, Transitive Closure, Compatibility and Partial Ordering Relations, Lattices, Hasse Diagram. **Functions:** Composition of Functions, Inverse Function, Hashing Functions, NaturalNumbers, Recursive Functions.					
Outcome 2	**Ability to get a problem-solving knowledge for mathematical sequences.**				**K2-K4**
Unit -III					
Objective 3	**Ability to demonstrate in practical applications the use of basic counting principles of permutations, combinations, inclusion/exclusion principle and the pigeonhole methodology.**				
Elementary Combinatorics: Basics of Counting, Combinations & Permutations, with Repetitions, Constrained Repetitions, Binomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion – Exclusion, Pigeon Hole Principles and Its Application - Mathematical Induction – Recurrence Relations – Particular Solutions –Solution of Recurrence Relations by Using Generating Functions.					
Outcome 3	**Ability to demonstrate in practical applications the use of basic counting principles of permutations, combinations, inclusion/exclusion principle and the pigeonhole methodology.**				**K2-K4**
Unit -IV					
Objective 4	**To find solutions for decision making problems using fundamental statistics and probability.**				
Probability and Statistics: Introduction to Statistics – Frequency Distribution – Measures of Central Tendancy – Covariance – Correlation and Linear Regression - Introduction to Probability – Terminologies – Event – Sample Space – Rules of Probability – Conditional Probability – Bayes Theorem – Distributions : Binomial – Poisson – Other Type of Distribution – Multinomial and Hypergeometric Probabilities –Testing of Hypothesis - Sampling Distributions - Estimation of Parameters – StatisticalHypothesis - Large Sample Tests Based on Normal Distribution For Single Mean and Difference of Means -Tests Based on t, Chi-square and F distributions for Mean, Variance And Proportion - Contingency Table (Test For Independent) – Goodness ofFit..					
Outcome 4	**Apply statistical techniques in solving decision making problems.**				**K3**

Unit -V	
Objective 5	**To gain knowledge about graph algorithms.**
Graphs: Basic Concepts – Representation of Graphs - Isomorphism and Sub graphs,Trees and Their Properties, Spanning – Trees - Directed Trees - Binary Trees - Planar Graphs -Multi Graphs and Euler Circuits -Hamiltonian Graphs, Chromatic Numbers.	

Outcome 5	**Ability to represent and apply the concept of directed graphs to solve network flow problems.**	**K2, K3**

Suggested Readings:

Trembley, J. P., Manohar, R. (2008). Discrete Mathematics with Applications to Computer Science. TMH.

Mott, J.L., Kandel A., Baker T.P. (2008) Discrete Mathematics for Computer Scientists and Mathematicians (2nd ed.) PHI.

Gupta. S.C, Kapoor. V.K. (2009). Fundamentals of Mathematical Statistics. Sultan Chand and Sons.

Mallik, Sen. Discrete Mathematical Structures. Cengage Learning.

Bernand Kolman., Robert C.Busby, Sharon. Discrete Mathematical Structures. Cutler Ross. PHI.

Rosen, K.H. Discrete Mathematics and its Applications (6th ed.). TMH.

Chakraborthy, S. K., Sarkar, B. K. (2011). Discrete Mathematics Oxford.

Milton, J. S., Arnold, J.C. (2007). Introduction to Probability and Statistics (4th ed.). Tata McGraw Hill.

Devore. J.L., (2014). Probability and Statistics for Engineering and the Sciences‖. Cengage Learning. (8th ed.) New Delhi.

Online Resources:

https://ocw.mit.edu/courses/18-310-principles-of-discrete-applied-mathematics-fall-2013/

https://www.classcentral.com/course/swayam-discrete-mathematics-5217

https://onlinecourses.swayam2.ac.in/ugc19_ma03/preview

https://ocw.mit.edu/courses/18-212-algebraic-combinatorics-spring-2019/

https://onlinecourses.nptel.ac.in/noc23_ma19/preview

K1-Remember	**K2 - Understand**	**K3 - Apply**	**K4- Analyze**	**K5 - Evaluate**	**K6 – Create**
				Course Handled by:Dr. M.S. Anitha	

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)
CO2	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	3	3	3	3	3	2.8

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

I-Semester					
Core 2	**Course Code: 546102**	**Distributed Operating System**	**T**	**Credits:5**	**Hours:5**
Unit -I					
Objective 1	Gain insights on Distributed Operating Systems and its hardware and software features.				
Distributed Systems: Introduction- Goals Hardware and Software Concepts- Design Issues- **Communication in Distributed Systems: Layered Protocol**: ATM Networks Client Server Model- Remote Procedure Call – Group Communication – Implementation Issues. Case Study: SUNRPC, DEC RPC.					
Outcome 1	Understand the design principles in distributed systems.				K2
Unit -II					
Objective 2	To learn the mechanisms of OS to handle processes and threads and their communication.				
Synchronization: Clock Synchronization– Mutual Exclusion– Electio Algorithm-Atomic Transactions– Dead Lock in Distributed Systems. **Process and Processors:** Threads – System Models - Processor Allocation – **Scheduling in Distributed Systems:** Load Balancing and Sharing Approach, Fault Tolerance, Real Time Distributed Systems, Process Migration and Related Issues.					
Outcome 2	Apply various distributed algorithms related to clock synchronization, concurrency control, deadlock detection, load balancing, fault Tolerance.				K3
Unit -III					
Objective 3	To get knowledge in distributed file systems.				
Distributed File Systems: Introduction, Features – Goal – **System Design:** File Service Interface – Directory Service Interface – Naming Transparency – Two Level Naming- FileModels- File Accessing Models-File Sharing Semantics,File Caching Scheme,FileReplication,FaultTolerance, TrendsIn Distributed FileSystem. Case Study:DistributedFileSystem.					
Outcome 3	Analyse the design and functioning of file systems.				K4
Unit -IV					
Objective 4	To learn distributed shared memory systems.				
DistributedSharedMemory(DSM): Introduction- Architecture- Design and Implementation Issues – Granularity - Structure of Shared Memory Space – Replacement Strategy – Thrashing. Bus Based Multi Processors, Ring Based Multiprocessors, Switched Multiprocessors – Consistency Models – Page Based Distributed Shared Memory – Shared Variable Distributed Shared Memory– Object Based Distributed Shared Memory. Case Study: MACH and CHORUS					
Outcome 4	To know about Shared Memory Techniques.				K2, K3
Unit -V					
Objective 5	To make students aware about the principles, desired properties, security issues and protection mechanism for distributed web system.				
DistributedWeb-BasedSystems: Architecture, Processes, Communication, Naming, Synchronization, **Consistency and Replication:** Web Proxy Caching, Replication for WebHosting Systems, Replication of Web Applications **Security:** Introduction of Security in Distributed OS- Overview of Security Techniques, Features, Need, Access Control,Security Management. Case Study:Java RMI,Sun Network File System, Google.					
Outcome 5	To develop knowledge and to recognize the inherent difficulties that arise due to distributed-ness of web system.				K2-K4

Suggested Readings:
Andrew S Tannebaum. (2002). Distributed Operating Systems. Pearson Education.
Pradeep K. Sinha. (1997). Distributed Operating Systems Concepts and Design. PHI.
George Coulouris., Jean Dollimore., Tim Kindberg. (2011). Distributed Systems: Concepts and Design (5th ed.). Addison Wesley.
Sunita Mahajan, Seema., Shah. (2013). Distributed Computing. OXFORD Press.
Randy Chow, Theodore Johnson, Distributed Operating systems and Algorithms, 1997

Online Resources:
https://www.javatpoint.com/distributed-operating-system
https://www.cs.uic.edu/~ajayk/Chapter12.pdf
https://csis.pace.edu/~marchese/CS865/Lectures/Chap12/Chapter12.htm
https://lass.cs.umass.edu/~shenoy/courses/spring22/lectures/Lec20.pdf

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

Course Handled by: Dr. S. Narayanan

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	-	-	-	M(2)	-	M(2)
CO2	S(3)	2	2	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2.4	2.2	2.2	2.8	2.4	2.8

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

I-Semester					
Core 3	Course Code: 546103	Web Technology	T	Credits:5	Hours:5
Unit -I					
Objective 1	**Enrich knowledge about HTML5 control and scripting language concepts for developing client-side applications.**				
Introduction to HTML5: Overview - New Elements - Canvas - Video and Audio - WebStorage – Geolocation - Offline Web Pages - Microdata - HTML5 APIs - Migrating fromHTML4 to HTML5 - **Advanced CSS:** Introduction to CSS3 - Selectors - Designing and Implementing CSS3. **Advanced Client-Side Programming:**Document Object Model (DOM)- Overview of DOM–Jquery.					
Outcome1	**Design a web page with Web form fundamentals and web control classes.**				K2-K5
Unit -II					
Objective 2	**To introduce the basics of PHP.**				
Basics of PHP: Introduction to PHP–Working of PHP with Web Server-Hardware and Software requirements-Basic PHP Development-PHP scripts–syntax–variables-datatypes- Operators-Variable and String manipulation.					
Outcome 2	**Understand client and server-side scripting and their applicability.**				K2
Unit -III					
Objective 3	**To perform operations using control flow statements of PHP.**				
Control Structures: The if statement-if else statement,multiple if, nested if-The switch statement. Loops-The while, dowhile and for statements-Break & continue statements- Nesting loops.					
Outcome 3	**To implement PHP script using control flow statements.**				K2-K5
Unit -IV					
Objective 4	**To develop web applications using PHP.**				
PHPArrays: Single, Multidimensional,Casting and Associative Arrays-Associative arrays - Accessing arrays - Looping through an array - Sorting arrays- Sorting associative arrays. **PHP Functions and File Handling:** Functions- Introduction - Library Function-Array functions-String functions-Date and time functions- User Defined Function-Defining with and without parameters -Returning value from function-Function calls with the static statement-Passing arguments to afunction by value and by reference.					
Outcome 4	**To develop PHP applications using arrays and functions.**				K2-K5
Unit -V					
Objective 5	**To learn to use form controls to acquire user input.**				
WorkingWiththeFileSystem: File Operations-Working with directories-Working With Forms- Forms-Super global variables-The server array-A script to acquire user input- Importing user input-Accessing user input-Combine HTML and PHP code-Using hidden fields-Redirecting the user-File upload and scripts.					
Outcome 5	**Design webpages using multiple forms.**				K2-K5

Suggested Readings:

Kogent Learning Solutions Inc. (2011). HTML 5 in Simple Steps. Dreamtech Press.

Fritz Schneider, Thomas Powell. (2013). JavaScript: The Complete Reference(3rd ed.). Tata McGraw - Hill Education.

David Sklar, Nathan Torkington. Learning PHP 5 (2004). O'Reilly.

Steven Holzner. (2009). PHP: The Complete Reference (2nd ed.). Tata McGraw-Hill Publishing Company Limited.

Ivan Bayross. (2010). Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML(4th ed.). BPB Publication.

Jason Gilmore, W. (2006). Beginning PHP and MySQL 5(2nd ed.). Apress.

Kevin Yank. (2011). Build Your Own Database Driven Web Site Using PHP & MySQL (4th ed.). Sitepoint.

Ahsanul Bari. (2008). Cake Php Application Development (1st ed.). Packet Publishing Ltd.

K1-Remember	*K2 - Understand*	*K3 - Apply*	*K4- Analyze*	*K5 - Evaluate*	*K6 – Create*
				Course Handled by: Dr. R. Rameshbabu	

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)	S(3)	S(3)	M(2)	S(3)	M(2)	S(3)
CO2	S(3)	L(1)	L(1)	M(2)	M(2)	-	-	-	L(1)	M(2)
CO3	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**3**	**2.4**	**2.4**	**2.6**	**2.6**	**2.2**	**2**	**2.2**	**2.2**	**2.8**

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

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S(3)	M(2)	M(2)	S(3)	M(2)	M(2)
CO2	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)
CO3	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**2.8**	**2.6**	**2.2**	**2.8**	**2.6**	**2.2**

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

I-Semester					
Core 4	**Course Code: 546104**	**Python Programming**	**T**	**Credits:5**	**Hours:5**
Unit -I					
Objective 1	**To understand the fundamentals of python programming and object-oriented skills in python.**				
Introduction: History of Python– Basics of Python Programming- Characteristics- Features - Applications of Python-**Variables:** Variable Names, Assigning Multiple Values,Global and Local Variables-Identifiers- Reserved Words-Lines and Indentation-Quotation in Python-Comments-**Built-in Data Types:** Numeric, Sequence, Mapping, Set, Boolean- Binary- Python Keywords-Python Literals-Operators**. Python OOPs:** OOPs Concept- Class and Objects- Constructor-Destructor-**Inheritance:** Types- Abstraction.					
Outcome 1	**Explain the basic concepts in python language and design classes for given problem.**				**K2, K3**
Unit -II					
Objective 2	**Discover the need for working with the strings and functions.**				
Strings: Creating a String, Accessing Characters in String, reversing a String, String Slicing, Deleting/ Updating from a String, Escape Sequencing, Formatting Strings, Inbuilt Python Functions for String, String operators and operations-**Functions:** Basics of a Function, calling a Function, Pass by Reference Vs Value, Function Arguments, Anonymous Function, The Return Statement, Scope of Variable, Local and Global Variables.					
Outcome 2	**Apply the various data types and identify the usage of control statements, loops, strings, functions and modules in python for processing the data.**				**K3**
Unit -III					
Objective 3	**Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.**				
Lists: Characteristics of List, creating a List, List Indexing and Splitting, Updating List Values, List Operations, Adding Elements to the List, Removing Element from The List, Access Elements from List, List Built-in Functions. **Tuples:** Creating a Tuple, Nested Tuples, Accessing of Tuples, Different Tuple Operations: Adding Elements to the Tuple, Deleting Elements from a Tuple, check for the Element Existingin the Tuple, Length of the Tuple, Concatenation, Selection of Tuple Methods, Slicing of Tuples, Built-in Methods,and Built-in Functions. **Sets:** Creating a Set, Adding Elements to the Set, accessing a Set, Removing Elements from the Set, and Set Methods. **Dictionaries:** Creating the Dictionary, Accessingthe Dictionary Values, AddingDictionary Values, Deleting Elements Using del Keyword, iterating Dictionary, Propertiesof Dictionary Keys, Built-in Dictionary Functions and Methods.					
Outcome 3	**Perform operations on data structures in python.**				**K3, K4**
Unit -IV					
Objective 4	**Describe the various operators and control flow statements.**				
Conditional Statements: If Statement, If- Else Statement, Nested If Statement, If- Elif- Else Statement. **Python Loops:** Introduction-**While Loop:** Definition- Break Statement in While Loop, Continue Statement in While Loop, and While Loop with Else – **For Loops**:Definition- Break Statement in For Loop, Continue Statement in For Loop, and The Range of Function, Else in For Loop-NestedLoops. **Control Statements:** Break, Continue and Pass Statements.					
Outcome 4	**Develop python program to demonstrate use of conditional branches and loop.**				**K3**

Unit -V	
Objective 5	**Object oriented concepts, exception handling, illustrate advanced concepts like multithreading, graphics and generate various test cases.**

Files and Input / Output: File Objects, File Built-in Function, File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules. **Errors and Exceptions:** Definition- Exceptions in Python- Exceptions Vs Syntax Errors – Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions.

Outcome 5	**Handle exceptions.**	**K3-K5**

Suggested Readings:

Chun, J Wesley. (2012). Core Python Programming(3rd ed.). Pearson.

Reema Thareja. (2016). PYTHON Programming Using Problem Solving Approach. Oxford University Press.

Ashok Namdev Kamthane, Amit Ashok Kamthane. (2018). Programming and Problem Solving with PYTHON. McGraw Hill Education.

Barry, Paul. (2010). Head First Python (2nd ed.). O Rielly.

Lutz, Mark. Learning Python (4th ed.). O Rielly.Ahsanul Bari. (2008). Cake Php Application Development (1st ed.). Packet Publishing Ltd.

Online Resources:

https://www.python.org/about/gettingstarted/

https://www.programiz.com/python-programming/object-oriented-programming

https://www.geeksforgeeks.org/python-programming-language/

https://developers.google.com/edu/python

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

Course Handled by: Dr. M. Sangeetha

Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	S(3)
CO2	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	M(2)	S(3)	M(2)	S(3)	M(2)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	-	M(2)	M(2)	S(3)	M(2)	S(3)	S(3)
W.AV	**3**	**3**	**2.6**	**1.6**	**2.2**	**2.0**	**2.8**	**2.0**	**2.8**	**3**

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

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	L(1)	L(1)	M(2)	L(1)
CO2	S(3)	S(3)	S(3)	S(3)	M(2)
CO3	S(3)	S(3)	M(2)	S(3)	S(3)
CO4	S(3)	S(3)	L(1)	S(3)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)
W.AV	**3**	**2.6**	**1.8**	**2.8**	**2.4**

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

		I-Semester			
Core 5	Course Code: 546105	Lab-I: Web Technology and Python Programming Lab	P	Credits:3	Hours:6
Objective 1	**Be familiar with Web page design using HTML5 and style sheets.**				
Develop a HTML Program for Login Form using External CSS.					
Outcome 1	**Classify the syntax and semantics of HTML and CSS to build web pages.**				**K2-K4**
Objective 2	**To develop an ability to design and implement webpages.**				
Develop HTML programs using forms. Create a Valediction Form using Javascript.					
Outcome 2	**Construct and visually format tables and forms using HTML and CSS.**				**K3-K4**
Objective 3	**Understand, analyse and build web applications using PHP.**				
Develop a php program to demonstrate swapping numbers, palindrome and Fibonacci series.					
Outcome 3	**Develop dynamic webpage by using server-side scripting language PHP.**				**K3, K4**
Objective 4	**To acquire basic programming skills.**				
Develop python program using conditional and control statements.					
Outcome 4	**Develop basic python programming to do variety of tasks.**				**K3**
Objective 5	**To acquire skills in python conditional statements and basic data structure.**				
Develop python program for basic String Operations & String Methods, List, Tuples, Dictionaries, Arrays and file handling operations.					
Outcome 5	**To define Python functions and to use Python data structure- lists, tuples, dictionaries.**				**K3**
Suggested Readings:					
Learning Python, Fourth Edition by Mark Lutz					
Online Resources:					
https://www.halvorsen.blog/documents/programming/web/web.php https://www.netsolutions.com/insights/what-is-php/ https://phptherightway.com/ https://www.programiz.com/python-programming/examples https://www.sanfoundry.com/python-problems-solutions/					
K1-Remember	*K2 - Understand*	*K3 - Apply*	*K4- Analyze*	*K5 - Evaluate*	*K6 – Create*
		Course Handled by: Dr. R. Rameshbabu and Dr. M. Sangeetha			

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

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

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

I-Semester					
DSE I	Course Code: 546501	Object Oriented Software Engineering	T	Credits:4	Hours:4
Unit -I					
Objective 1	Understand the principles of software engineering, UML modelling and project organization and communication concepts.				
Introduction to Software Engineering: Software Engineering Concepts, Software Engineering Development Activities, Managing Software Development, Object Oriented Paradigm. **Modeling with Unified Modeling Languages**: Introduction, An overview of UML, Modeling Concepts and Deeper ViewintoUML. **Project Organization and Communication**: Introduction, A Rocket Example, An Overview of Projects, Project Organization Concepts, Project Communication Concepts, Organizational Activities.					
Outcome 1	Illustrate SE development activities and UML modelling concept in detail.				K2, K3
Unit -II					
Objective 2	To provide deeper knowledge on the requirement activities and analysis concept.				
RequirementsElicitation-Introduction: Usability Examples, An Overview of Requirements Elicitation, Requirements Elicitation Concepts, Requirements Elicitation Activities, Managing Requirements Elicitation. **Analysis**-Introduction: An Optical Illusion, An Overview of Analysis, Analysis Concepts, Analysis Activities: From Use Casesto Objects,Managing Analysis.					
Outcome 2	Explain the requirement activities and compare the analysis concepts.				K2, K4
Unit -III					
Objective 3	To develop skills in system design activities, addressing design goals and to manage system design.				
SystemDesign: Decomposing the System-**Introduction:** A Floor Plan Example, an Overview of System Design, System Design Concepts, System Design Activities. **System Design**: Addressing Design Goals, Introduction, A Redundancy Example, an Overview of System Design Activities, **Concepts:** UML Deployment Diagrams, System Design Activities: Addressing Design Goals, Managing System Design.					
Outcome 3	Identify the design goals and construct UML diagrams.				K2, K3
Unit -IV					
Objective 4	To develop skills on the concept of reusing object design and various design patterns.				
Object Design Reusing Pattern Solutions: Introduction- Bloopers, An Overview of Object Design, **Reuse Concepts:** Solution Objects, Inheritance and Design Patterns. **ReuseActivities**:Selecting Design Patterns and Components, Managing Reuse. **Object Design Specifying Interfaces**: Introduction, A Relational Example, An Overview of Interface Specification, Interface Specification Concepts, Interface Specification Activities, Managing Object Design.					
Outcome 4	Outline object design reuse and select design patterns.				K4
Unit -V					
Objective 5	To learn to address performance requirements.				
Mapping Models to Code: An Overview of Mapping, Mapping Concepts, Mapping Activities and Managing Implementation, Mapping Object Model to Database Schema. **Testing**:**Introduction:**Testing the Space Shuttle, Overview of Testing–Testing Concepts,Testing Activities,Managing Testing.					
Outcome 5	Demonstrate optimizing class model and illustrate testing activities and test management.				K2, K3

Suggested Readings:

Bernd Bruegge, Allen H.Dutoit. (2010). Object Oriented Software Engineering Using, Patterns and Java. Third Edition. Pearson Education. UML

Stephen R Schach. (2005), Object Oriented & Classical Software Engineering. 6th Edition TMH.

Timothy C.Lethbridge, Robert Laganiere. (2004). Object Oriented Software Engineering Practical Software Development using UML & Java. TMH Edition.

Grady Booch, James Rambaugh, Ivar Jacobson. (2006). The Unified Modeling Language user guide. Pearson education.

Online Resources:

http://www.mhhe.com/lethbridge

https://onlinecourses.nptel.ac.in/noc19_cs69/preview

https://www.coursera.org/learn/software-engineering-modeling-software-systems-using-uml

https://www.udemy.com/course/oo-se-java

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

Course Handled by: Dr. AV. Karthick

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	M(2)	M(2)
CO2	S(3)	S(3)	M(2)	S(3)	S(3)
CO3	S(3)	S(3)	M(2)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2.8	2.8	2.4	2.8	2.8

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

		I-Semester			
DSE I	Course Code: 546502	**Software Project Management**	T	Credits:4	Hours:4

Unit -I	
Objective 1	**Understand the pipeline of software project management**

Introduction: Project - Definition - Software projects vs other types of project- Project Management Activities - plans, methods and methodologies- categorizing software projects - Management definition-problems with software projects-setting objectives-stake holders- Requirement specification-Management control- Project Planning : Overview - Step wise project planning- project selection -identifying project scope, objectives and project infrastructure-Identify project products and activities-estimate effort- Identify activity risks-Allocate resources-review/ publicize plan- Execute plan and lower levels of planning.

Outcome 1	**Explain the various activities involved in software project management.**	**K2**

Unit -II	
Objective 2	**Develop skills in project planning and evaluation.**

Project Evaluation: Strategic assessment- technical assessment – Cost- benefit analysis- cash flow forecasting - cast- benefit evaluation techniques-Risk evaluation - Selection of an appropriate project approach: Technologies-Technical plan contents list- Process models- Water fall model- V-process model-spiral model-software prototyping-categorizing prototypes-controlling changes during prototyping-incremental delivery-Dynamic system Development method-Extreme programming-Managing iterative processes-selecting the most appropriate process model.

Outcome 2	**Analyse and determine the effective process model.**	**K2, K4**

Unit -III	
Objective 3	**Develop skills to conduct project planning activities that accurately forecast project costs, timelines, and quality.**

Software Effort Estimation: Stages of estimation-problems with over-and under- estimates-software effort estimation techniques-function point analysis-function points mark II-Objects points- code-oriented approach-COCOMO - Activity planning : objectives-project schedules-projects and activities-sequencing and scheduling activities- network planning models-formulating a network model- forward pass-backward pass-Identifying the critical path-Activity float-shortening the project duration-Identifying critical activities.

Outcome 3	**Become familiar in identifying software effort estimation techniques.**	**K2, K3**

Unit -IV	
Objective 4	**To develop skills in identifying and managing risks.**

Risks management : Risks – Nature – Types – Managing Risks - Hazard identification- Hazard analysis-Risk planning and control-Evaluating risks to the schedule - Resource allocation: Nature of resources-Identifying resource requirements-Scheduling resources- creating critical paths-counting the cost-Publishing the resource schedule-cost schedules- Scheduling sequence - Monitoring and control : creating the framework-collecting the data-visualizing progress-cost monitoring-Earned value-prioritizing monitoring- change control.

Outcome 4	**Apply estimating and risk management techniques to projects.**	**K3**

Unit -V	
Objective 5	**To understand contract management and software quality measures.**

Managing contracts : Types of contract- stages in contract placement-contract management-acceptance-managing people and organizing teams: Understanding behavior- organizational behavior : Selecting persons and methods -Motivation- job characteristics model-working in groups- Decision making-Leadership-Organizational structures – stress- Health and safety- Software quality in project planning - importance -ISO 9126-practical software quality measures-product versus process quality management-External standards-techniques to help enhance software quality-Quality plans.

Outcome 5	**Implement processes for successful resource, communication, and risk and change management.**	**K2-K5**

Suggested Readings:
Bob Hughes, Mike Cotterll. (2011). *Software Project Management*(*5th ed.*). TMH.
Walker Royce. (2012). *Software Project Management.* Pearson Edition.
Joel Henry. (2004). *Software Project Management*. Pearson Edition .
PankjJalote. (2005). *Software Project Management in Practice*. Pearson Edition.

Online Resources:
https://www.geeksforgeeks.org/software-engineering-software-project-management-spm/
https://mobileappdev.academic.csusb.edu/wp-content/uploads/2019/04/Software-Project-Management-Plan.pdf

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

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

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

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

I-Semester					
DSE I	Course Code: 546503	Object Oriented Analysis and Design	T	Credits:4	Hours:4
Unit -I					
Objective 1	To understand the basics of object oriented analysis and design concepts.				
Object Oriented System Development: Introduction – Object Basics - The Object Model: Evolution – Elements - Classes and Objects: Object Nature – Relationship Among Objects – Class Nature – Relationships Among Classes – Building Quality Classes and Objects – System Development Life Cycle.					
Outcome 1	Describe about object and system development life cycle.				K2, K3
Unit -II					
Objective 2	To learn the UML design diagram and map to code. Be expose to various testing techniques.				
Object Oriented Methodologies: Rumbaugh Object Modeling Technique – Booch – Jacobson – Shaler / Mellor – Coad / Yardon – Patterns – Frame Works – The Unified Approach – UML – Static and Dynamic Model – UML diagrams.					
Outcome 2	Use the UML analysis and design diagrams and apply appropriate design pattern.				K3, K4
Unit -III					
Objective 3	To develop robust object-based models for Systems.				
Object Oriented Analysis: Identifying Use Cases – Use Case Model – Documentation – Classification: Identifying Classes – Noun Phrases Approach – Common Class Pattern Approach – Use Case Driven Approach – Identifying Object Relationship Attributes and Methods.					
Outcome 3	Analyse use case model.				K3, K4
Unit -IV					
Objective 4	Develop skills in object oriented design.				
Object Oriented Design: Introduction – Design Process – Design Axioms – Designing Classes – Visibility – Refining Attributes – Designing Methods - Access Layer Design – View Layer Design.					
Outcome 4	Design and implement projects using OO concepts.				K4, K5
Unit -V					
Objective 5	To inculcate necessary skills to handle complexity in software design.				
Managing Analysis and Design: Evaluation Testing – Impact of Object Oriented Testing - Coding – Maintenance – Metrics – Case Study Foundation Class Library – Client/Server Computing.					
Outcome 5	Create code from design and be familiar with various testing techniques.				K2-K6
Suggested Readings: Ali Bahrami. (2008). *Object Oriented System Development.* Tata McGraw Hill Edition. Grady Booch, Robert A.Maksimchuk. (2009). *Object Oriented Analysis And Design With Applications*(*3rd ed.*). Pearson Education. James Rumbaugh. (2002). *Object Oriented Modeling and Design*. PHI. Larman. (2003). Applying Uml & Patterns, An Introduction To Object Oriented Analysis And Design(*2nd ed.)*. Pearson Education.					

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

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

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

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

II-Semester					
Core 6	Course Code: 546201	Database Systems	T	Credits:5	Hours:5

Unit -I	
Objective 1	To study the physical and logical database designs, database modelling, relational, hierarchical, and network models.

Database System: Introduction-Data Independence-Database System Architecture- The External Level – The Conceptual Level – The Internal Level – Mappings – The DatabaseAdministrator – Data Dictionary – Data Models – Record-based Data Models – Object based Data Models – Physical Data Models - Hierarchical Data Models – Network DataModels-Relational Data Model-Entity-Relationship Models–Object Oriented DataModel-Comparison Between Data Models.

Outcome 1	Underst and the basic concepts of relational data model, entity-relationship model, relational algebra and SQL.	K2

Unit -II	
Objective 2	To understand and use data manipulation language to query, update, and manage a database.

Distributed Databases: Introduction-Preliminaries-The Twelve Objectives - Problems – Client/Server Systems – DBMS Independence-SQL Facilities – Decision Support-DataPreparation-Data Warehouses and Data Marts – Online Analytical Processing – **ObjectOrientedDatabases:**Introduction-ObjectOriented DataModels-Object OrientedDBMS–ObjectOrientedLanguages.

Outcome 2	Understand the basics of Distributed and Object-Oriented Databases.	K2

Unit -III	
Objective 3	Understand the role of database management system in an organisation.

Temporal Databases: Introduction-Intervals-Packing and Unpacking relations-Generalizing the relational operators–Database Design– Integrity Constraints–**Multimedia Databases:** MultimediaSources–Multimedia Database Queries–Multimedia Database Applications.

Outcome 3	Identify appropriate techniques and tools for Temporal Databases.	K3

Unit -IV	
Objective 4	Familiarize the students with a good formal foundation on the relational model.

SpatialDatabases: SpatialData-SpatialDatabaseCharacteristics–SpatialDataModel-SpatialDatabaseQueries–TechniquesofSpecial DatabaseQuery.

Outcome 4	Gain conceptual understanding of Spatial Databases.	K3

Unit -V	
Objective 5	To develop skills of using recent data mining software for solving practical problems.

Emerging Database Technologies: Introduction–**InternetDatabases:**Internet Technology – The World Wide Web-Web Technology – Web Databases – Advantages-**Mobile Databases:** Architecture of Mobile Databases–Characteristics of Mobile Computing– Mobile DBMS.

Outcome 5	Familiarity with the current database technologies.	K2

Suggested Readings:

Date, C. J., Kannan, Swamynathan, S. (2006). An Introduction to Database Systems (8th ed.). Pearson Education.

Singh, S. K., (2008). Databse Systems: Concepts, Design and Applications (2nd ed.). Person Education.

Abraham Silberschatz., HentryF.Korth, Sudarshan, S. (2010). Database Management System Concepts (6th ed.). McGraw Hill International.

Online Resources:

https://onlinecourses.swayam2.ac.in/cec19_cs05/preview

https://www.oreilly.com/library/view/concepts-of-database/9789332537422/xhtml/bibliography.xhtml

https://www.geeksforgeeks.org/complete-reference-to-databases-in-designing-systems/

https://alison.com/tag/databases

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

Course Handled by:Dr. AV. Karthick

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)	L(1)	M(2)	S(3)	M(2)	M(2)
CO2	S(3)	L(1)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	M(2)	L(1)
CO3	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)	S(3)	S(3)	M(2)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)
CO5	S(3)	L(1)	L(1)	M(2)	L(1)	L(1)	M(2)	S(3)	S(3)	S(3)
W.AV	3	2	2.4	2	1.6	1.8	2	2.6	2.6	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)	M(2)	S(3)	S(3)	S(3)
CO2	S(3)	M(2)	S(3)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	S(3)
CO4	M(2)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	M(2)	M(2)	S(3)	L(1)
W.AV	2.6	2.4	2.8	2.8	2.6

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

II-Semester					
Core 7	**Course Code: 546202**	**Data Mining**	**T**	**Credits:5**	**Hours:5**

Unit -I	
Objective 1	**To introduce students to the basic concepts and techniques of data mining.**

Data Mining and Data Preprocessing: Introduction to Data Mining Systems – KnowledgeDiscovery Process – Data Mining Techniques – Issues – applications- Data Objects andattribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction,Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

Outcome 1	**Demonstrate advanced knowledge of data mining concepts and techniques.**	**K2**

Unit -II	
Objective 2	**To develop the abilities of critical analysis to data mining systems and applications.**

Data Warehousing, Business Analysis And On-Line Analytical Processing (OLAP): Basic Concepts - Data Warehousing Components – Building a Data Warehouse – DatabaseArchitectures - Multidimensional Data Model - Characteristics of OLAP Systems – TypicalOLAPOperations, OLAP and OLTP.

Outcome 2	**Identify suitable technique for the given problem.**	**K3**

Unit -III	
Objective 3	**Develop a general framework for decision support within organisation.**

FrequentPatterns,AssociationsandClassification: Mining Frequent Patterns,Associations and Correlations- The Apriori Algorithm–Classification and Prediction–Classification by Decision Tree Induction - Bayesian Classification–Rule Based Classification-LazyLearners.

Outcome 3	**Analyze and formulating data for the problem under consideration.**	**K4**

Unit -IV	
Objective 4	**Analyse and design a real database application.**

Cluster Analysis: Clustering Techniques - Partitioning Methods - Hierarchical Methods -Density Based Methods - Grid Based Methods - Model based clustering - Outlier analysis-OutlierDetection Methods.

Outcome 4	**Deploy classification and clustering algorithms. And determine whether a real-world problem has a data mining solution**	**K5**

Unit -V	
Objective 5	**To develop skills of using recent data mining software for solving practical problems.**

Spatial,Multimedia, Text and WebData: Spatial Data Mining–Multimedia Data Mining –Text Mining –Mining the World Wide Web–Data Mining Applications–Trendsin DataMining.

Outcome 5	**Develop the model using data mining and computing techniques.**	**K5**

Suggested Readings:

Jiawei Han, Micheline Kamber. (2011). Data Mining: Concepts and Techniques (3rd ed.). (The Morgan Kaufmann Series in Data Management Systems.

Ian H. Witten., Eibe Frank, Mark A. Hall.(2014). Data Mining: Practical Machine Learning Tools and Techniques(3rd ed.). Elsevier.

Margret H. Dunham. (2003). Data Mining: Introductory and Advanced Topics. Pearson Education.

Awad, M., Latifur Khan., Bhavani Thuraisingham, Lei Wang. (2015).Design and Implementation of Data Mining Tools. CRC Press-Taylor & Francis Group.

Pang-Ning Tan., Michael Steinbach, Vipin Kumar. (2016). Introduction to Data Mining-Instructor's Solution Manual. Pearson Education.

Mohammed J.Zaki., Wagner Meira JR. (2016). Data Mining and Analysis: Fundamental Concepts and Algorithms. Cambridge India.
Ebook: https://repo.palkeo.com/algo/information-retrieval/Data mining and analysis.pdf

Online Resources:
https://www.investopedia.com/terms/d/datamining.asp
https://www.comp.nus.edu.sg/~lingtw/cs4221/dw.pdf
https://cedar.buffalo.edu/~srihari/CSE626/Lecture-Slides/Ch5-Part1-ystematicOverview.pdf

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

Course Handled by:Research Scholar

Course Outcome VS Programme Outcomes

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

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

II-Semester					
Core 8	Course Code: 546203	**Digital Image Processing**	T	Credits:4	Hours:4

Unit -I	
Objective 1	Learn digital image processing fundamentals.

DIGITALIMAGEFUNDAMENTALS: Element of Digital Image Processing Elements of Visual Perception - Psychovisual Model Brightness-Contrast-Hue Saturation, Machb and Effect,Color Image Fundamentals–RBG-HisModels,Image Sampling,Quantization, Dither, Matrix Theory Result, Block Matrices and Kronecker Products.

Outcome 1	Understand the fundamental ideas of digital image processing.	K2

Unit -II	
Objective 2	Be exposed to basic spatial image transformation techniques.

IMAGETRANSFORMS: Basic Intensity Transformation Functions,Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filter, Sharpening Spatial Filters,Combining Spatial Enhancement methods.2-DOrthogonal andUnitaryTransforms, 1-Dand2-DDiscreteFourierTransformationtechniques.

Outcome 2	Comprehend spatial and frequency domain.	K2

Unit -III	
Objective 3	To develop skills in spatial filtering algorithms.

IMAGEENHANCEMENT: PointOperation-Contrast Stretching, Clipping and Thresholding Density Slicing, Histogram Equalization, Modification and Specification, Spatial Operation-Spatial Averaging, Low Pass,HighpassBandPassFiltering,Direction Smoothing,MediumFilteringandHomomorphicFiltering.

Outcome 3	Gain abstract knowledge of image enhancement techniques.	K3

Unit -IV	
Objective 4	To identify image restoration methods and its implications.

IMAGERESTORATION: Image Observation Model, Sources of Degradation, Inverse and Wiener Filtering, Geometric Mean Filter,Non-Linear Filter, Smoothing Splines and Interpolation, Constrained Least Squares Restoration.

Outcome 4	Apply image restoration problem in spatial and frequency domains.	K3

Unit -V	
Objective 5	Be familiar with image compression techniques.

IMAGE DATA COMPRESSION: Image Data Rates,Pixel Coding,Need For Data Compression. Error Free Compression: Variable Length Coding, Bit Plane Coding, LZW Coding, **Lossy Compression:**Transform Coding, Wavelet Coding, **Compression Standards:**Binary Image Compression Standard, StillImage Compression Standards, Video Compression Standards. **DynamicContent:**Latest Techniquesin Compression.

Outcome 5	Explain image data compression problems and various compression standards.	K4

Suggested Readings:

Chandra, B., Dutta Majumder, D. (2006). Digital Image Processing and Analysis. Prentice-Hall of India private limited.

Rafael C. Gonzalez., Richard E. Woods. (2008). Digital Image Processing(3rd ed.). PearsonEducation.

Jain, A. (2001). Fundamentals of Digital Image Processing. Prentice Hall of India.

Jayaraman, S., Veerakumar, T., Esakkirajan, S. (2009). Digital Image Processing(1st ed.). McGraw Hill Education.

Khalid Sayood. (2018). Introduction to Data Compression(5th ed.). Morgan Kaufmann.

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

Course Handled by:Prof. A. Sethilrajan and Dr. M. Sangeetha

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

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

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

II-Semester					
Core 9	Course Code: 546204	Lab II: Data Mining Lab	P	Credits:2	Hours:4
Objective 1	To learn the libraries and to develop skills in data preprocessing.				
Create multi-dimensional arrays and find its shape and dimension, Create a matrix full of zeros and ones. Compute correlation matrix on the given dataset.					
Outcome 1	Ability to process missing data and to visualize the correlation among data items.				K3, K4
Objective 2	To discover and measure interesting patterns from different kinds of databases.				
Develop a program to compute Association Rule Mining on a sales dataset.					
Outcome 2	Generate association rules to a practical problem.				K4-K6
Objective 3	To develop skills in data classification.				
Develop a program to compute classification and logistic regression on the given dataset.					
Outcome 3	Understand and deploy appropriate classification technique.				K3-K5
Objective 4	Emphasize hands-on experience working with Data Mining techniques.				
Develop a program to Load data from CSV file, Compute the basic statistics of given data - shape, no. of columns, mean, Splitting a data frame on values of categorical variables, Visualize data using Scatter plot.					
Outcome 4	Ability to conceptualize a Data Mining solution to a practical problem.				K3-K5
Objective 5	To learn clustering problems and solve as it is.				
Develop a program to compute K means clustering.					
Outcome 5	Deploy appropriate classification and clustering techniques for applications.				K4-K6
Suggested readings:					
Online Resources: https://medium.com/almabetter/data-preprocessing-techniques-6ea145684812 https://www.geeksforgeeks.org/clustering-in-data-mining/ https://www.geeksforgeeks.org/apriori-algorithm/ https://datatrained.com/post/best-clustering-algorithms-in-data-mining/#:~:text=Clustering%20algorithms%20in%20data%20mining%20are%20an%20unsupervised%20Machine%20Learning,has%20data%20like%20one%20another.					
K1-Remember	K2 - Understand	K3 - Apply	K4- Analyze	K5 - Evaluate	K6 – Create
					Lab Handled by: Dr. AV. Karthick

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	L(1)	S(3)	M(2)
CO2	S(3)	S(3)	M(2)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	M(2)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2.8	2.8	2.4	3	2.8

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

		II-Semester			
Core 10	Course Code: 546205	Lab III: Digital Image Processing Lab	P	Credits:2	Hours:4
Objective 1		To learn the fundamental concepts of Digital Image Processing.			
Computation of Mean, Standard Deviation, Correlation coefficient of the given Image.					
Outcome 1		Review the fundamental concepts of a digital image processing system.			K1
Objective 2	To develop and enhance the image using latest tools.				
Contrast stretching of a low contrast image, Histogram, and Histogram Equalization.					
Outcome 2	Identify the Ideal filters in the spatialand frequency domain for edge detection.				K3-K5
Objective 3	To introduce transformation methods to be used in image processing.				
Implementation of Image Smoothening Filters (Mean and Median filtering of an Image)					
Outcome 3	Applying various Geometric transformations on image and Illustrate Two- dimensional Fourier transform.				K2-K5
Objective 4	To learn image compression.				
Image Compression by DCT, DPCM, HUFFMAN coding.					
Outcome 4	Interpret image compression techniques.				K2-K4
Objective 5	Students should be able to provide solution for image processing applications.				
Canny edge detection Algorithm.					
Outcome 5	Design algorithms to solve image processing problems and meet design specifications.				K4-K6

Online Resources:
https://www.mathworks.com/matlabcentral/fileexchange/37796-spatial-filtering-of-image
https://www.mathworks.com/help/signal/ug/frequency-domain-filter-implementation.html#:~:text=To%20implement%20general%20IIR%20filtering,%2Ffft(a%2Cn))%3B
https://www.geeksforgeeks.org/edge-detection-using-in-built-function-in-matlab/
https://github.com/topics/geometric-transformation

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

LabHandled by: Dr. M. Sangeetha

Course Outcome VS Programme Outcomes

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

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)	L(1)	M(2)	L(1)
CO2	S(3)	S(3)	M(2)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2.8	2.6	2.4	2.8	2.6

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

II-Semester					
DSE II	Course Code: 546504	Virtualization And Cloud Computing	T	Credits:4	Hours:4

Unit -I

Objective 1	Learn the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability and benefits.

INTRODUCTION:IntroductiontoCloudComputing–DefinitionofCloud–Evolutionof CloudComputing– Underlying Principlesof ParallelandDistributed Computing–CloudCharacteristics–CloudServices– Cloudmodels–ElasticityinCloud–On-demand Provisioning.

Outcome 1	To develop the understanding of fundamentals and technological aspects of cloud computing, cloud services and cloud models.	K1

Unit -II

Objective 2	Comprehensive understanding of virtualization, implementation levels of Virtualization, structure, tools and mechanisms.

VIRTUALIZATION: Basics of Virtualization – Types of Virtualization – ImplementationLevelsofVirtualization–VirtualizationStructures–Tools and Mechanisms–Virtualization of CPU–Memory–I/O Devices–DesktopVirtualization–Server Virtualization.

Outcome 2	To differentiate between cloud computing and virtualization, cite their types, delivery models and levels among with hardware and network requirements. list and tabulate their features and applications in industries.	K3

Unit -III

Objective 3	Cloud service delivery model is discussed in detail.

CLOUD ENABLING TECHNOLOGIES AND INFRASTRUCTURE:Service Oriented Architecture–RESTful Web Services–NIST Cloud Computing Reference Architecture–IaaS– PaaS–SaaS– Public, PrivateandHybridClouds–CloudStorage–DesignChallengesin Cloud– Peer-to-Peer Architecture.

Outcome 3	To understand and explain the various Architectures of Cloud Computing and illustrate SAAS, PAAS, IAAS.	K2

Unit -IV

Objective 4	Students will learn about the cloud deployment and its dependency and the concept of host security and its implementation in cloud delivery models.

RESOURCEMANAGEMENTANDSECURITYINCLOUD: Inter Cloud Resource Management–Resource Provisioning and Platform Deployment–Global Exchange of Cloud Resources– Security Overview– Cloud Security Challenges–Software-as-a-ServiceSecurity– SecurityGovernance –Virtual MachineSecurity.

Outcome 4	Estimate Security Risks in cloud Computing and Examine techniques to counteract security issues at Virtualization, network and Service level.	K3

Unit -V

Objective 5	To study the application development aspect of cloud computing.

PROGRAMMINGMODELS: Parallel and Distributed Programming Paradigms–MapReduce– Hadoop–Mapping Applications–Google App Engine–Amazon AWS–Cloud Software Environments– Eucalyptus–Open Nebula – OpenStack.

Outcome 5	Deploy Openstack and eucalyptus in a lab environment to test the functionality.	K4

Suggested readings:

Kai Hwang, Geoffrey C Fox, Jack G Dongarra. (2012). Distributed and Cloud Computing, From Parallel Processing to the Internet of Things. Morgan Kaufmann Publishers.

James E. Smith, Ravi Nair. (2005). Virtual Machines: Versatile Platforms for Systems and Processes. Elsevier/Morgan Kaufmann.

GautamShroff. (2011). Enterprise Cloud Computing. Cambridge University Press.

Kumar Saurabh. (2011). Cloud Computing – Insights Into New-Era Infrastructure. Wiley India.

John W.Rittinghouse, James F.Ransome, (2010). Cloud Computing: Implementation Management, and Security. CRC Press.

Anthony T.Velte, Toby J.Velte, Robert Elsenpeter. (2010). Cloud Computing – A Practical Approach. McGraw Hill Education.

George Reese. (2009). Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice). O'Reilly.

Michael Miller, Rajkumar Buyya, Christian Vecchiola, ThamaraiSelvi, S. (2008). Mastering

Cloud Computing. Que Publishing. TMGH.
Online Resources:
https://www.dialogic.com/~/media/products/docs/whitepapers/12023-cloud-computing-wp.pdf https://www.geeksforgeeks.org/virtualization-cloud-computing-types/ https://www.javatpoint.com/cloud-computing-technologies https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000007CS/P001073/M023283/ET/1505968949CC-mod31-Q1-eText.pdf

K1-Remember	*K2 - Understand*	*K3 - Apply*	*K4- Analyze*	*K5 - Evaluate*	*K6 – Create*
				Course Handled by: Dr. Pramila	

Course Outcome VS Programme Outcomes

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

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)	L(1)	L(1)	L(1)
CO2	S(3)	S(3)	M(2)	S(3)	M(2)
CO3	M(2)	S(3)	M(2)	M(2)	M(2)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**2.6**	**2.6**	**2.4**	**2.4**	**2.2**

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

II-Semester					
DSE II	**Course code: 546505**	**Cyber Security**	**T**	**Credits:4**	**Hours:4**

Unit -I	
Objective 1	**To learn the principles of cyber security and to identify threats and risks.**

PLANNING FOR CYBER SECURITY: Best Practices - Standards and a Plan of Action- Security Governance Principles, Components And Approach - Information Risk Management - Asset Identification - Threat Identification Vulnerability Identification - Risk Assessment Approaches - Likelihood and Impact Assessment - Risk Determination, Evaluation and Treatment - Security Management Function Security Policy – Acceptable Use Policy -Security Management Best Practices.

Outcome 1	**To spot gaps in the system and devise improvements.**	**K2, K4**

Unit -II	
Objective 2	**To learn how to secure physical assets and develop system security controls.**

SECURITY CONTROLS: People Management - Human Resource Security-Security Awareness and Education Information Management - Information Classification and Handling -Privacy - Documents and Record Management - Physical Asset Management - Office Equipment-Industrial Control Systems-Mobile Device Security - System Development-Incorporating Security into SDLC Case Study on Information Security Policies.

Outcome 2	**Achieve management, operational and technical means for effective cyber security.**	**K3-K4**

Unit -III	
Objective 3	**To understand how to apply security for Business applications and Network Communications.**

CYBER SECURITY FOR BUSINESS APPLICATIONS AND NETWORKS: Business Application Management - Corporate Business Application Security - End User Developed Applications-System Access - Authentication Mechanisms - Access Control System Management-Virtual Servers - Network Storage Systems-Network Management Concepts - Firewall-IP Security - Electronic Communications – Case Study on OWASP Vulnerabilities using OWASP ZAP tool.

Outcome 3	**Develop a set of risk and security requirements to ensure that there are no gaps in an organization's security practices.**	**K2-K5**

Unit -IV	
Objective 4	**To learn the technical means to achieve security.**

TECHNICAL SECURITY: Supply Chain Management - Cloud Security-Security Architecture-Malware Protection Intrusion Detection - Digital Rights Management- Cryptographic Techniques - Threat and Incident Management - Vulnerability Management- Security Event Management - Forensic Investigations - Local Environment Management-Business Continuity – Case Study on Cloud and Cryptographic Vulnerabilities.

Outcome 4	**Identify and report vulnerabilities in the system.**	**K2-K4**

Unit -V	
Objective 5	**To learn to monitor and audit security measures.**

SECURITY ASSESSMENT: Security Monitoring and Improvement-Security Audit-SecurityPerformance-Information Risk Reporting-Information SecurityCompliance Monitoring-Security Monitoring and Improvement Best Practices.

Outcome 5	**Audit and monitor the performance of cyber security controls.**	**K2-K5**

Suggested Readings:

Ali Bahrami. (2008). *Object Oriented System Development.* Tata McGraw Hill Edition.

Grady Booch, Robert A.Maksimchuk. (2009). *Object Oriented Analysis And Design WithApplications*(3*rd* *ed.*). Pearson Education.

James Rumbaugh. (2002). *Object Oriented Modeling and Design*. PHI.

Larman. (2003). Applying Uml & Patterns, An Introduction To Object Oriented Analysis AndDesign(2*nd* *ed.)*. Pearson Education.

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

Course Outcome VS Programme Outcomes

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

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	S(3)	S(3)	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	3	3	3	3	3

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

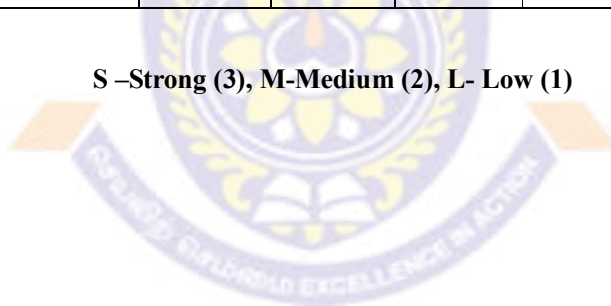| II-Semester					
DSE II	Course Code: 546506	Soft Computing	T	Credits:4	Hours:4
Unit -I					
Objective 1	To know the fundamental concept of ANN and its basic models.				
Introduction: Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics - Applications - Artificial Neural Network: Fundamental Concept – Application Scope - Basic Terminologies – Neural Network Architecture – Learning Process – Basic Models of ANN: McCulloch-Pitts Model – Hebb Network – Linear Separability.					
Outcome 1	Understand soft computing techniques and their role in problem solving.				K1, K2
Unit -II					
Objective 2	To provide deeper knowledge about perceptron's and counter propagation networks.				
Supervised Learning Networks: Perceptron Networks – Adaline and Madaline Networks – Back Propagation Network – Radial Basis Function Network. Associative Memory Networks – BAM - Hopfield Network - Boltzmann Machine. Unsupervised Learning Networks: Kohonen Self Organizing Network – Counter Propagation Network – ART Network.					
Outcome 2	Analyze various neural network architectures.				K3, K4
Unit -III					
Objective 3	To introduce students to the basic concepts and techniques of Fuzzy sets.				
Fuzzy Sets: Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets – Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation - Membership Functions: Features – Fuzzification –Methods of Membership value assignments – Defuzzification – Methods.					
Outcome 3	Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.				K2-K5
Unit -IV					
Objective 4	To develop the abilities of forming fuzzy rules.				
Fuzzy Arithmetic: Extension Principle – Fuzzy Measures – Fuzzy Rules and Fuzzy Reasoning: Fuzzy Propositions – Formation of Rules – Decomposition of Rules – Aggregation of Rules – Approximate Reasoning – Fuzzy Inference and Expert Systems –Fuzzy Decision Making – Fuzzy Logic Control Systems.					
Outcome 4	Analyze and formulate fuzzy rules and fuzzy reasoning.				K4, K5
Unit -V					
Objective 5	Be familiar with fundamental concept of genetic algorithm.				
Genetic Algorithm: Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm - Elements of GA - Encoding - Fitness Function – Genetic Operators: Selection – Cross Over - Inversion and Deletion - Mutation – Simple and General GA - The Schema Theorem - Classification of Genetic Algorithm – Genetic Programming –Applications of GA.					
Outcome 5	Analyze and apply genetic algorithm in real time.				K2-K5
Suggested Readings: Sivanandam, S. N., Deepa, S.N., (2011). Principles of Soft Computing(2nd ed.). Wiley India. Rajasekaran, S., Pai, G.A.V., Neural Networks, Fuzzy Logic, Genetic Algorithms. Prentice Hall India.					
Online Resources: https://www.cet.edu.in/noticefiles/274_soft%20computing%20LECTURE%20NOTES.pdf https://nitsri.ac.in/Department/Computer%20Science%20&%20Engineering/FuzzyLogic.pdf http://ise.ait.ac.th/wp-content/uploads/sites/57/2020/11/Fuzzy-2.pdf https://www.turing.com/kb/genetic-algorithm-applications-in-ml https://www.analyticsvidhya.com/blog/2021/06/genetic-algorithms-and-its-use-cases-in-machine-learning/ https://www.datacamp.com/blog/supervised-machine-learning					
K1-Remember	K2 - Understand	K3 - Apply	K4- Analyze	K5 - Evaluate	K6 – Create

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)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO2	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

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	S(3)	S(3)	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**3**	**3**	**3**	**3**	**3**

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

III-Semester					
Core 11	Course Code: 546301	**Internet of Things**	T	Credits:5	Hours:5

Unit -I	
Objective 1	Understand about the basic concept of Internet of Things along and its logical design along with their system management.

Introduction to Internet of Things: Definition – Characteristics - Design Concepts – Physical – Things in IoT - IoT Protocols – **Logical Design:** IoT Functional Blocks – Communication Models - IoT Enabling Technologies - IoT Levels - Deployment Templates - Domain Specific IoTs - IoT and M2M – Difference between IoT and M2M – Software Defined Network (SDN) and Network Function Virtualization (NFV) for IoT - IoT System Management – Need – SNMP – Network Operator Requirements – System Managementwith NETCONF-YANG.

Outcome 1	Able to understand the basic concept of Internet of Things.	K2

Unit -II	
Objective 2	Different IoT architectures are discussed in detail.

Developing IoT and IoT Architecture: IoT Platforms Design Methodology - M2M High- Level ETSI Architecture - IETF Architecture for IoT - OGC Architecture - IoT Reference Model - Domain Model - Information Model - Functional Model - Communication Model -IoT Reference Architecture.

Outcome 2	Explain different IoT models.	K2

Unit -III	
Objective 3	To outline the functionalities and protocols of internet communication.

IoT Protocols: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP –Security.

Outcome 3	Understand the networking concepts for communication and underlying IoT protocols.	K2

Unit -IV	
Objective 4	To provide hands on training in constructing systems using Raspberry Pi and Arduino.

Building IoT with Raspberry Pi & Arduino: Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device - Building Blocks -Raspberry Pi - Board - Linux on Raspberry Pi – Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms - Arduino.

Outcome 4	Connecting smart objects in Internet using Raspberry Pi and Arduino with Python.	K3

Unit -V	
Objective 5	Examine the real-world applications of IoT using case studies.

Case Studies: Real World Design Constraints - Applications - Asset Management, Industrial Automation, Smart Grid, Commercial Building Automation, Smart Cities - Participatory Sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud StorageModels & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.

Outcome 5	Analyse various IoT use cases.	K4

Suggested readings:

Arshdeep Bahga, Vijay Madisetti. (2015). Internet of Things – A hands-on approach. Universities Press.
By Jan Holler., Vlasios Tsiatsis., Catherine Mulligan., Stefan Avesand, Stamatis Karnouskos, David Boyle. (2014). From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence(1st ed.). Academic Press.
Francis daCosta. (2013). Rethinking the Internet of Things: A Scalable Approach to Connecting Everything(1st ed.). Apress Publications.
Cuno Pfister. (2011). Getting started with Internet of Things. O"Reilly Media.
Dieter Uckelmann., Mark Harrison., Michahelles, Florian (Eds). (2011). Architecting the Internet of Things. Springer.
Jan Ho¨ ller., Vlasios Tsiatsis., Catherine Mulligan., Stamatis., Karnouskos., Stefan Avesand, David Boyle. (2014). From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence. Elsevier.
Honbo Zhou. (2012). The Internet of Things in the Cloud: A Middleware Perspective. CRC Press.
Olivier Hersent., David Boswarthick, Omar Elloumi. (2012). The Internet of Things – Key applications and

Protocols. Wiley.

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

Course Handled by: Dr. AV. Karthick

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

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

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

III-Semester					
Core 12	**Course Code: 546302**	**Big Data Analytics and R Programming**	**T**	**Credits:5**	**Hours:5**
Unit -I					
Objective 1	**Learn data analytics &its life cycle.**				
Introduction to Big Data Analytics: Big Data Overview – Data Structures – Analyst Perspective on Data Repositories - State of the Practice in Analytics – BI Versus Data Science - Current Analytical Architecture – Drivers of Big Data – Big Data Ecosystem - Data Analytics Lifecycle – Data Discovery – Data Preparation – Model Planning – ModelBuilding – Communicate Results – Operationalize.					
Outcome 1	**Demonstrate data analytics life cycle and processing of big data.**				**K2, K3**
Unit -II					
Objective 2	**To explore the programming language R, with respect to the data analysis.**				
Basic Data Analytic Methods Using R: Introduction to R programming – R Graphical User Interfaces – Data Import and Export – Attribute and Data Types – **Descriptive Statistics Exploratory Data Analysis:** Visualization Before Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables Data Exploration Versus Presentation- **Statistical Methods of Evaluation:** Hypothesis Testing – Difference of Means – WilcoxonRank - Sum Test – Type I and Type II Errors – Power and Sample Size – ANOVA.					
Outcome 2	**Ability to perform data analysis in R.**				**K3, K4**
Unit -III					
Objective 3	**To introduce supervised and unsupervisedtechniques.**				
Advanced Analytical Theory and Methods: Clustering – K Means – Use Cases – Overview – Determining Number of Clusters – Diagnostics – Reasons to Choose and Cautions – Additional Algorithms - **Association Rules:** Apriori Algorithm – Evaluation of Candidate Rules – Applications of Association Rules – Validation and Testing – Diagnostics. **Regression:** Linear Regression and Logistic Regression – Use Cases – Model Description – Diagnostics - Additional Regression Models.					
Outcome 3	**Identify appropriate clustering techniques and generate association rules for real-world datasets.**				**K3- K5**
Unit -IV					
Objective 4	**Able to gain advanced knowledge in classification techniques.**				
Classification: Decision Trees – Overview – Genetic Algorithm – Decision Tree Algorithms – Evaluating Decision Tree – Decision Trees in R – Naïve Bayes – Bayes Theorem – Naïve Bayes Classifier – Smoothing – Diagnostics – Naïve Bayes in R. **Text Analysis:** Text Analysis Steps – Example – Collecting – Representing Term Frequency – Categorizing – Determining Sentiments – Gaining Insights.					
Outcome 4	**Students should be able to Implement classification algorithms for real applications.**				**K4, K5**
Unit -V					
Objective 5	**To study advanced methods to big data technology and tools, Case studies on the current research and applications including MapReduce and Hadoop, pig, hive and big data in industry.**				
Advanced Analytics Technology and Tools: MapReduce and Hadoop - Analytics for Unstructured Data - UseCases - MapReduce - Apache Hadoop – The Hadoop Ecosystem – Pig – Hive – Hbase – Manout – NoSQL - **Tools in Database Analytics:** SQL Essentials –Joins – Set operations – Grouping Extensions.					
Outcome 5	**Inspect the big data using programming tools like Hadoop MapReduce, Pig and Hive.**				**K4,K5**
Suggested readings: John Wiley & Sons. (2015). Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data. EMC Education Services Published. Noreen Burlingame. (2012). The little book on Big Data. New Street publishers. Anil Maheshwari. (2017). Data Analytics. McGraw Hill Education. Norman Matloff. (2011). The Art of R Programming: A Tour of Statistical Software Design (1st ed.)Starch Press. Sandip Rakshit. (2017). R for Beginners. McGraw Hill Education.					

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

Course Handled by:Prof. A. Senthilrajan and Dr. M. Sangeetha

Course Outcome VS Programme Outcomes

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

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)	M(2)	S(3)	M(2)
CO2	S(3)	S(3)	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**3**	**2.8**	**2.8**	**3**	**2.8**

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

III-Semester					
Core 13	Course Code: 546303	**Machine Learning**	T	Credits:4	Hours:4

Unit -I	
Objective 1	To understand the basic underlying concepts of machine learning.

Introduction: Machine Learning–**Types of Machine Learning:** Supervised, Unsupervised, Semi-Supervised, Reinforcement Learning –Perspectives and Issues in Machine Learning- Pattern Recognition- Classification – Regression – Feature Selection-Machine Learning Algorithms, Turning Data Into Probabilities, and Statistics for Machine Learning, Probability Theory – Probability Distributions – Decision Theory.

Outcome 1	Express deeper knowledge in different types of machine learning algorithms in greater detail and their use cases.	**K2**

Unit -II	
Objective 2	To be able to formulate machine learning problems corresponding to different applications.

Linear Discrimination: Introduction-Generalizing the Linear Model- Geometry of the Linear Discriminant: Two Classes and Multiple Classes- Pairwise Separation- Parametric Discrimination Revisited- Gradient Descent- Logistic Discrimination. **Instance-based Learning:** K-Nearest Neighbor – Self-Organizing Map (SOM)-Learning VectorQuantization (LVQ) - Locally Weighted Learning (LWL).

Outcome 2	Apply structured thinking to unstructured problems.	**K3**

Unit -III	
Objective 3	To understand a range of machine learning algorithmsalong with their strengths and weaknesses.

From Theory to Algorithms: Linear Predictors: Linear Regression, Logistic Regression- Polynomial Regression. **Learning Decision Trees:** Inference model - General Domains – Symbolic Decision Trees - ID3 Algorithm-Random Forest. **Advanced Learning:** Neural Networks – Active Learning -Ensemble Learning: Bagging: - Bootstrap, Aggregation -Boosting: - Weak Learnability- Adaboost- Stacking

Outcome 3	Identify Machine Learning model to choose for each type of problem.	**K3- K5**

Unit -IV	
Objective 4	To introduce advanced techniques in machine learning.

Deep Learning: Introduction- History of Deep Learning-A Probabilistic Theory of Deep Learning-Basic Concept of Neurons- **Feed Forward Networks:** Multilayer Perceptron- Backpropagation - Empirical Risk Minimization-Regularization- Batch Normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks-Generative Adversarial Networks(GAN), Semi-supervised Learning-Auto Encoders-Convolutional Neural Network-Recurrent Neural Network.

Outcome 4	Show deeper mathematical knowledge to introduce the requiredtheory.	**K5,K6**

Unit -V	
Objective 5	To appreciate the concepts and algorithms of deep learning.

Applications of Deep Learning: Images Segmentation – Object Detection – Automatic Image Captioning – Image Generation with Generative Adversarial Networks – Video toText with LSTM Models – Attention Models for Computer Vision.

Outcome 5	To review and implement the deep learning techniques for real-time applications.	**K4, K5**

Suggested Readings:
Alpaydin, E. (2014). Introduction to Machine Learning. Prentice Hall of India.
Mitchell, T. M. (2017). Machine Learning (1st ed.). McGraw-Hill.
Bishop, C. M. (2011). Pattern Recognition and Machine Learning. Springer.
Duda, R. O., Hart, P. E., Stork, D.G. (2001). Pattern Classification. John Wiley and Sons.
Vladimir N. Vapnik. (1998). Statistical Learning Theory. John Wiley and Sons.
Shawe-Taylor, J., Cristianini, N. (2000). Introduction to Support Vector Machines. University Press. Cambridge.

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

Course Handled by: Dr. Sameswari

Course Outcome VS Programme Outcomes

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

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)	-	L(1)	L(1)
CO2	S(3)	M(2)	M(2)	M(2)	M(2)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	2.8	2.4	2.2	2.4	2.4

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

III-Semester						
Core 14	Course Code: 546304	**LabIV-Data Analytics Lab**	P	Credits:2		Hours:4
Objective 1	**Understand the basics of R programming including objects, classes, vectors etc.**					
Develop programs using class and objects in R. Implement R data structure.						
Outcome 1	**Become proficient in writing a fundamental program and perform analytics with R.**					K3
Objective 2	**To introduce Data visualization and Data Management in R.**					
Visualize Data Using Any Plotting Framework. Implement Linear And Logistic Regression.						
Outcome 2	**To examine the various data visualization types and identify the type to be applied using R.**					K3-K5
Objective 3	**To develop skills in analysing clustering methods.**					
Implement K-means clustering algorithm in R programming. Analyse the result.						
Outcome 3	**Implement K-means clustering, Linear Regression, and Logistic Regression.**					K3-K5
Objective 4	**To apply classification techniques in real time applications.**					
Implement classification algorithm in R programming. Analyse the result.						
Outcome 4	**Implement Naïve Bayesian classifier and Decision Trees.**					K3-K5
Objective 5	**Imparting the architectural concepts of Hadoop and introducing map reduce paradigm.**					
i.Implement the following file management tasks in Hadoop: ii.Adding files and directories, Retrieving files, Deleting files. iii.Benchmark and stress test an Apache Hadoop cluster.						
Outcome 5	**Perform big data processing using Hadoop framework**					K5
Online Resources: https://www.coursera.org/learn/data-analysis-r https://www.geeksforgeeks.org/k-means-clustering-in-r-programming/ https://techvidvan.com/tutorials/classification-in-r/ https://www.javatpoint.com/hadoop-tutorial https://www.analyticsvidhya.com/blog/2021/10/everything-you-need-to-know-about-linear-regression/						
K1-Remember	*K2 - Understand*	*K3 - Apply*	*K4- Analyze*	*K5 - Evaluate*		*K6 – Create*
LabHandled by: Prof. A. Senthilrajan and Dr. M. Sangeetha						

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)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO2	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	3	2.8	2.8	2.8	2.8	2.8	2.6	2.6	3	3

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)	M(2)	M(2)	M(2)
CO2	S(3)	S(3)	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	3	2.8	2.8	2.8	2.8

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

III-Semester					
Core 15	**Course Code: 546305**	**LabV: Machine Learning Lab**	**P**	**Credits:2**	**Hours:4**
Objective 1	**To understand the basic concepts and techniques of Machine Learning through python programming.**				
Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.					
Outcome 1	**Understand the mathematical and statistical prospectives of machine learning algorithms through python programming.**			**K2**	
Objective 2	**To develop skills of using recent machine learning packages for solving practical problems.**				
Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.					
Outcome 2	**Design and evaluate various ML models through python in built functions.**			**K3-K5**	
Objective 3	**Tolearn to generate, analyse and interpret data using Python.**				
Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.					
Outcome 3	**Design Python programs for various machine learning algorithms.**			**K3-K5**	
Objective 4	**Make use of Data sets in implementing the machine learning algorithms**				
Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.					
Outcome 4	**Apply appropriate datasets to the Machine Learning algorithms.**			**K3-K5**	
Objective 5	**To demonstrate knowledge in deep learning.**				
For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.					
Outcome 5	**Understand the basic concepts of deep neural network model and design the same.**			**K3**	
Online Resources: https://www.coursera.org/articles/types-of-machine-learning https://www.geeksforgeeks.org/ml-linear-discriminant-analysis/ https://www.w3schools.com/python/python_ml_getting_started.asp https://www.edx.org/learn/machine-learning/ibm-machine-learning-with-python-a-practical-introduction https://www.geeksforgeeks.org/classifying-data-using-support-vector-machinessvms-in-python/ https://machinelearningmastery.com/tutorial-first-neural-network-python-keras/					
K1-Remember	*K2 - Understand*	*K3 - Apply*	*K4- Analyze*	*K5 - Evaluate*	*K6 – Create*
			LabHandled by: Dr. AV.Karthick		

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

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

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

III-Semester					
DSE III	**Course Code: 546507**	**Mobile Computing**	**T**	**Credits:4**	**Hours:4**

Unit -I	
Objective 1	**Grasp the concepts and features of mobile computing technologies and applications.**

Introduction: Wireless Concept - Dialogue Control, Networks, Middleware and Gateways, Applications and Services, Developing Mobile Computing Applications, Security in Mobile Computing, Standards - **Mobile Computing Architecture:** History of Computers, History of Internet, Internet - Ubiquitous Network, Architecture of Mobile Computing, Three Tier Architecture, Design Considerations For Mobile Computing, Mobile Computing Through Internet, Making Existing Applications Mobile – Enabled. **Mobile Computing Through Telephony:** Evolution of Telephony, Multiple Access Procedure, Mobile Computing through Telephone, Developing An IVR Application, Voice XML, Telephony Application Programming Interface (TAPI).

Outcome 1	**Evaluate the architecture and principles of operation of computer systems and networks.**	**K2-K5**

Unit -II	
Objective 2	**Learn the emerging trends in mobile communication.**

Emerging Technologies: Introduction, Bluetooth, Radio Frequency Identification (RFid), Wireless Broadband (WiMAX), Mobile IP, Internet Protocol Version 6 (Pv6), Java Card. Global System For Mobile Communications (GSM): Global System For Mobile Communications, GSM Architecture, GSM Entities, Call Routing in GSM, PLMN Interfaces, GSM Addresses and Identifiers, Network Aspects in GSM, GSM Frequency Allocation, Authentication and Security Short message service (SMS): Mobile Computing Over SMS, Short Message Services (SMS), Value Added Services Through SMS, Accessing SMS Bearer.

Outcome 2	**Analyze next generation Mobile Communication System.**	**K2**

Unit -III	
Objective 3	**To explore the working of GPRS and its applications.**

General Packet Radio Service (GPRS): Introduction, GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Limitations of GPRS, Billing And Charging in GPRS.

Outcome 3	**Illustrate GPRS architecture and its operations.**	**K2-K4**

Unit -IV	
Objective 4	**To provide deeper knowledge in WAP and wireless LAN technologies.**

Wireless Application Protocol (WAP): Introduction, WAP, MMS, GPRS Applications - CDMA and 3G: Introduction, Spread - Spectrum Technology, Is - 95, CDMA Vs GSM, Wireless Data, Third Generation Networks, Applications on 3G. Wireless LAN: Introduction, Wireless LAN Advantages, IEEE 802.11 Standards, Wireless LAN Architecture, Mobility in Wireless LAN, Deploying Wireless LAN, Mobile Ad Hoc Networks and Sensor Networks, Wireless LAN Security, Wi- Fi vs 3G.

Outcome 4	**Describe network and transport layers of Mobile Communication and analyze various protocols of all layers for mobile and ad hoc wireless communication networks.**	**K2, K3**

Unit -V	
Objective 5	**To develop skills on the concept of VoIP**

Voice Over Internet Protocol And Convergence: Voice Over IP, H.323 Frame Work for Voice Over IP, Session Initiation Protocol (SIP), Comparison Between H.323 and SIP, Real Time Protocols, Convergence Technologies, Call Routing, Voice Over IP Applications, IP Multimedia Subsystem (IMS), Mobile VoIP Security Issues In Mobile Computing: Introduction, Information Security, Security Techniques And Algorithms, Security Protocols, Public Key Infrastructure, Trust, Security Models, Security Frameworks For Mobile Environment.

Outcome 5	**Evaluate VoIP.**	**K2, K3**

Suggested Readings:
Asoke K Talukder, Roopa R Yavagal. (2008). Mobile Computing. TMH publications.
Rajkamal. (2008). Mobile Computing. Oxford press.

Online Resources:
https://www.javatpoint.com/mobile-computing
https://www.techopedia.com/2/31446/trends/the-top-10-trends-in-mobile-computing
https://blog.oureducation.in/gprs-architecture/
https://minigranth.in/mobile-computing-tutorial/wireless-application-protocol
https://journals.ala.org/ltr/article/view/4771/5703

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

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)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO2	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	3	3	3	3	3	3	3	3	3	3

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	S(3)	S(3)	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	3	3	3	3	3

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

III-Semester					
DSE III	Course Code: 546508	Mobile Application Development	T	Credits:4	Hours:4

Unit -I	
Objective 1	To learn the fundamental design paradigms and technologies to mobile computing applications.

INTRODUCTION: Mobile Applications – Characteristics and Benefits – Application Model – Infrastructure and Managing Resources – Mobile Software Engineering – Frameworks and Tools – Mobile devices Profiles.

Outcome 1	Be competent with the characterization and architecture of mobile applications.	K2

Unit -II	
Objective 2	To develop skills in designing user interface.

USER INTERFACE: Generic UI Development – VUIs and Mobile Applications – Text to Speech Techniques – Designing the Right UI – Multimodal and Multichannel UI –Gesture Based UIs – Screen Elements and Layouts – Voice XML – Java API.

Outcome 2	Design user interface for a mobile application.	K2-K4

Unit -III	
Objective 3	To explore mobile application design.

APPLICATION DESIGN: Memory Management – Design Patterns For Limited Memory – Work Flow For Application Development – Techniques for Composing Applications – Dynamic Linking – Plug-ins and Rules of Thumb for Using DLLs –Concurrency and Resource Management – Look and Feel.

Outcome 3	Becomes competent with designing mobile applications using one application development framework.	K2-K5

Unit -IV	
Objective 4	To provide skills in application development.

APPLICATION DEVELOPMENT: Intents and Services – Storing and Retrieving Data – Communication via the Web – Notification and Alarms – Graphics and Multimedia –Telephony – Location Based Services – Packaging and Deployment – Security and Hacking.

Outcome 4	Design and develop mobile applications using one application development framework.	K3- K5

Unit -V	
Objective 5	To explore the tools in the android platform.

TOOLS GOOGLE ANDROID PLATFORM: Eclipse Simulator – Android Application Architecture – Android Application Life Cycle - Event Based Programming – Apple iPhone Platform – UI Toolkit Interfaces – Event Handling and Graphics Services – Layer Animation.

Outcome 5	Develop mobile applications for the Android operating system and deploy to the Android marketplace for distribution.	K2-K6

Suggested Readings:

Share Conder, Lauren Darcey. (2014). Android Wireless Application Development(4th ed.). Pearson.

Zigurd Mednieks, Laird Dornin, G., Blake Meike, Masumi Nakamura. (2012). Programming Android. Reilly.

Jeff Mcherter, Scott Gowell. (2012). Professional mobile Application Development. Wiley India Private Limited.

Barry A. Burd. (2015). Android Application Development For Dummies All in One. Wiley.

Reto Meier, Wrox Wiley, "Professional Android 2 Application Development", 2010.

Ed Burnette, Hello. (2012). Android: Introducing Google Mobile Development Platform (3rd ed.). Pragmatic Programmers.

Jerome(J.F) DiMarzio. (2010). Android A Programmers Guide. Tata McGraw-Hill.

Maritn Sauter. (2011). From GSM to LTE: An Introduction to Mobile Networks and Mobile Broadband. John Wiley and Sons.

Alasdair Allan. (2010). IPhone Programming. Reilly.

Paula Beer, Carl Simmons. (2015). Android App Development for Young Adults. The Rest of US Paperback.

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

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)	M(2)	M(2)	M(2)	M(2)
CO2	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	S(3)	S(3)
CO3	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)
W.AV	**3**	**2.8**	**2.8**	**2.8**	**2.8**	**2.8**	**2.8**	**2.8**	**2.8**	**2.8**

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

Course Outcome VS Programme Specific Outcomes

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

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

III-Semester					
DSE III	Course Code: 546509	**Advanced Network Security**	T	Credits:4	Hours:4

Unit -I	
Objective 1	To familiarize with network security.

INTRODUCTION: Security Trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of Network Security – Security Attacks, Services and Mechanisms – OSI Security Architecture – Classical Encryption Techniques: Substitution Techniques, Transposition Techniques, Steganography- **Foundations of Modern Cryptography:** Perfect Security – Information Theory – ProductCryptosystem – Cryptanalysis.

Outcome 1	Explain the fundamentals of networks security, security architecture, threats and vulnerabilities.	K2

Unit -II	
Objective 2	To understand Cryptography Theories, Algorithms and Systems.

SYMMETRIC CRYPTOGRAPHY: Mathematics of Symmetric Key Cryptography: Algebraic Structures - Modular Arithmetic-Euclid,,S Algorithm- Congruence and Matrices - Groups, Rings, Fields- Finite fields - **SYMMETRIC KEY CIPHERS:** SDES – Block Cipher Principles of DES – Strength of DES – Differential and Linear Cryptanalysis - Block Cipher Design Principles – Block Cipher Mode of Operation – Evaluation Criteria for AES– Advanced Encryption Standard - RC4 – Key Distribution.

Outcome 2	Apply the different cryptographic operations of symmetric cryptographic algorithms.	K3

Unit -III	
Objective 3	To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

PUBLIC KEY CRYPTOGRAPHY: Mathematics of Asymmetric Key Cryptography: Primes – Primality Testing – Factorization – Euler,,s Totient Function, Fermat,,s and Euler,,s Theorem - Chinese Remainder Theorem – Exponentiation and Logarithm - **ASYMMETRIC KEY CIPHERS:** RSA Cryptosystem – Key Distribution – Key Management – Diffie Hellman Key Exchange - ElGamal Cryptosystem – Elliptic CurveArithmetic-Elliptic Curve Cryptography.

Outcome 3	Analyse and relate the different cryptographic operations of public key cryptography.	K3- K5

Unit -IV	
Objective 4	To enrich knowledge in various Authentication schemes to simulate different applications.

MESSAGE AUTHENTICATION AND INTEGRITY: Authentication Requirement – Authentication Function – MAC – Hash Function – Security of Hash Function and MAC – SHA –Digital Signature and Authentication Protocols – DSS - **Entity Authentication:** Biometrics, Passwords, Challenge Response Protocols - Authentication Applications -Kerberos, X.509

Outcome 4	Comprehend the importance of authentication and implement various Authentication schemes to simulate different applications.	K3- K5

Unit -V	
Objective 5	To learn about various Security practices and System security standards.

SECURITY PRACTICE AND SYSTEM SECURITY: Electronic Mail Security – PGP, S/MIME – IP Security – Web Security - **SYSTEM SECURITY:** Intruders – Malicious Software – Viruses – Firewalls.

Outcome 5	Summarize various Security practices and System security standards.	K5

Suggested readings:
William Stallings. (2006). Cryptography and Network Security: Principles and Practice(3rd ed.). PHI.
Shyamala, C K., Harini, N., Padmanabhan, T. R. Cryptography and Network Security. Wiley India Pvt.Ltd.
BehrouzA.Foruzan. (2007). Cryptography and Network Security. Tata McGraw Hill.

Course Handled by:Dr. S. Narayanan

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

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

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

IV-Semester					
Core 16	Course Code: 546999	Dissertation Work or Internship programme	T	Credits:15	Hours:30
Objective 1	To get real time experience, to be able to work in teams, gain communication skills.				
Outcome 1	Gain work experience and helps explore the career path.				K4-k6

II-Semester					
NME I	**Course Code:**	**Object Oriented Programming with C++**	**T**	**Credits:2**	**Hours:3**

Unit -I	
Objective 1	**To learn the object-oriented concept of C++.**

Principles Of Object-Oriented Programming. Procedure Oriented Programming – Object Oriented Programming – Basic Concepts and Benefits of OOP – Object OrientedLanguage – Applications Of OOP – Structure Of C++ – Applications of C++.

Outcome 1	**Student should be able to demonstrate theobject-oriented programming principles and techniques in C++.**	**K2**

Unit -II	
Objective 2	**Be exposed to Tokens, expressions, control structures and Functions in C++.**

Tokens, Expression and Control Structure – Operators – Manipulators – Functions in C++: Function Prototyping – Call By Reference – Return By Reference – Inline Functions– Default Const Arguments – Function Overloading– Friend And Virtual Functions.

Outcome 2	**Comprehend tokens, expressions, control structures and apply the principles of Virtual functions.**	**K2, K3**

Unit -III	
Objective 3	**Introduces the principles of Objects and classes.**

Objects And Classes – Member Functions – Nesting of Member Functions –Private Member Functions – Memory Allocation of Objects – Static Data Member Functions –Arrays of Objects – Objects As Functions – Arguments –Pointers To Be Members.

Outcome 3	**Design and implement classes and objects for code reuse in C++.**	**K3**

Unit -IV	
Objective 4	**To understand the concept of constructors and destructors.**

Constructors: Parameterized Constructors – Multiple Constructors – Constructor with Default Parameters – Copy and Dynamic Constructors – Destructors –Operator Overloading –Overloading Unary and Binary Operators – Overloading-Binary OperatorsUsing Friend Functions.

Outcome 4	**Demonstrate the use of constructors and destructors.**	**K2, K3**

Unit -V	
Objective 5	**To learn how inheritance promote code reuse.**

Inheritance: Defining Derived Classes – Single Inheritance – Making Private Member Inheritable – Multiple Inheritance – Hybrid Inheritance – Virtual Base Classes – AbstractClasses – Constructors In Derived Class – Member Classes –Nesting Of Classes.

Outcome 5	**Implementinheritance in C++.**	**K3**

Suggested Readings:

Balagurusamy , E. (2013). Object Oriented Programming with C++: 6e. Tata McGraw Hill Education Private Limited.

Barakati, N. Object Oriented Programming in C++. SAMS PHI Pvt. Ltd.

Lafore, R. (2001). Object Oriented Programming in C++, (4 th ed.). Sams Publishing.

Lippman, S. B., Lajoie, J., & Moo, B. E. (2011). C++ Primer, (5th ed.).

Shukla, R. K. (2008). Object-Oriented Programming in C++. Wiley India Pvt Ltd.

Online Resources:

https://www.simplilearn.com/tutorials/cpp-tutorial/oops-concepts-in-cpp

https://www.learningcore.in/2022/01/tokens-expressions-and-control.html

https://www.javatpoint.com/cpp-constructor

https://www.codingninjas.com/studio/guided-paths/oops-in-c

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

Course Handled by:Dr. AV.Karthick and Dr. M. Sangeetha

Course Outcome VS Programme Outcomes

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

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

Course Outcome VS Programme Specific Outcomes

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

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

III-Semester					
NME II	Course Code:	Internet and Web Design	T	Credits:2	Hours:3

Unit -I

Objective 1	To get familiar with network types, topologies and structural arrangements.

Introduction to Internet - Anatomy – Terminology – History – Connecting and Accessing Internet - Internet Services: Protocols, Email, Newsgroup, Net Meeting, chatting – Applications – Impact – Internet Technology and Protocols: TCP/IP, SLIP, PPP, SMTP, POP3 – FTP – HTTP – Addressing on Internet –Domain Name System. Hazards on theInternet (viruses, spam, worms, hoaxes, and scams).

Outcome 1	Describe the basic working scheme of the Internet and the World Wide Web.	K2

Unit -II

Objective 2	Gain an in-depth understanding of the web and Internet technologies.

Introduction to World Wide Web and Web Design: WWW – History – Basic Features – Browsers – Servers – Search Engines and their categories – Functions – Search Criterion – Hypertext. Basic Web Design principles -Planning process - Rules of web designing - Designing navigation bar – Page design - Home Page Layout - Web Design concept – Web site"s purpose, specification, creating user profiles and website prototypes - Web Standards – Web Development Models- Website classifications. Different websitestructures and web design approaches.

Outcome 2	Students acquire knowledgein the fundamental tools and technologies for web design and design a web page.	K2, K3

Unit -III

Objective 3	To acquire skills in creating a HTML page.

HTML : Definition - HTML Documents - Basic structure of an HTML document - Creating an HTML document - Mark up Tags - Heading- Paragraphs - Line Breaks - HTML Tags. Elements of HTML : Introduction - Working with Text- Working with Lists,Tables and Frames - Working with Hyperlinks, Images and Multimedia – Working withForms and controls.

Outcome 3	Comprehend the technologies for Hypertext Mark-up Language (HTML).	K2, K3

Unit -IV

Objective 4	To provide knowledge increating CSS.

Introduction to Cascading Style Sheets - Concept of CSS - Creating Style Sheet - CSS Properties - CSS Styling(Background, Text Format, Controlling Fonts) - Working withblock elements and objects - Working with Lists and Tables - CSS Id and Class – BoxModel(Introduction, Border properties, Padding - Properties, Margin properties) - CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector) - CSS Color - Creating page Layout and Site Designs.

Outcome 4	Students will write CSS effectively to create well organized, styled web pages.	K3- K5

Unit -V

Objective 5	Focuses on publishing a working website.

Web Publishing or Hosting: Creating the Web Site - Saving the site – Working on the web site - Creating web site structure - Creating Titles for web pages - Themes-Publishing web sites. Interactive Tools (Fundamental only) : ASP, Javascript, Microsoft Front Page,Dreamweaver.

Outcome 5	Specify design rules in constructing web pages and sites.	K3-K5

Suggested readings:
Deitel, & Nieto. (2000). Internet & World Wide Web – How to program. Pearson Education Publishers.
Kogent learning solutions.pdf. (2005). HTML 5 in Simple Steps Dreamtech Press. Kogent Learning Solutions Inc.
Bangia, R. (2005). Internet & Web Design, (2nd ed.). Firewall Media Publications.
Duckett, J. (2004). Beginning HTML, XHTML, CSS, & JavaScript. India: Wiley.
Krishnamoorthy, R., & Prabhu, S. (2004). Internet & Java Programming. New Age International Publishers.
Powell, T. A. (2003). The Complete Reference HTML & XHTML, (4th ed.). Tata McGraw Hill.
Steven, M. Web Designing & Architecture-Educational Technology Centre University of
Buffalo Schafer HTML, XHTML, & CSS Bible, (5th ed.). India:Wiley.

Online Resources:
https://www.w3schools.com/html/html_responsive.asp
https://designmodo.com/css-website-designs/
https://www.programiz.com/html/web-design-basics

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

Course Handled by: Dr. AV. Karthick and Dr. Karolin

CourseOutcomeVSProgrammeOutcomes

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

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

CourseOutcomeVSProgrammeSpecificOutcomes

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

S–Strong(3),M-Medium(2),L-Low (1)

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