



# ALAGAPPA UNIVERSITY



(A State University Established in 1985)

Karaikudi - 630003, Tamil Nadu, India



## FACULTY OF SCIENCE DEPARTMENT OF COMPUTER APPLICATIONS



### M.C.A.,

## REGULATIONS AND SYLLABUS

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

**DEPARTMENT OF COMPUTER APPLICATIONS  
M.C.A.**

**REGULATIONS AND SYLLABUS**

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





**ALAGAPPA UNIVERSITY**

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

## The panel of Members-Broad Based Board of Studies

<p><b>Chairperson:</b> Name : Dr.V.Palanisamy, Designation : Professor &amp; Head Department: Computer Applications, Alagappa University, Teaching Experience:32 years , Research Experience:27 years, Area of Research Network Security, Biometrics, Data mining, Ad-Hoc Networking and Image processing</p>	
<p><b>Foreign Expert:</b> Name: Dr. Md. Shohel Sayeed , Designation: Associate Professor, Department Faculty of Information Science and Technology (172), Multimedia University, Melaka Campus, Malaysia, Teaching Experience: 22 Years, Research Experience:12Years, Area of Research: Digital and Spatial Information Systems/ Data Communication and Networking / Bio Cybernetic Systems using EEG, ECG&amp;PPG/Image and Signal Processing/Statistical Data Analysis/ Data Mining/Machine Learning/ Deep Learning/ Cloud Computing /Biometric and Bio informatics.</p>	
<p><b>Indian Expert:</b> Name: <b>Dr.A.Suruliandi</b> -, Designation: Professor &amp; Head Department: Computer Science &amp; Engineering, Manonmaniam Sundaranar University, Teaching experience:33 years, Research Experience:21 Years, Area of Research: Digital Image Processing, Remote Sensing, Data Analytics.</p>	
<p><b>Indian Expert:</b> Name: Dr.S.Sujatha, Designation: Professor&amp; Head Department: Computer Applications, University College of Engineering, BIT Campus, Anna University, Teaching Experience: 20 Years, Research Experience:20Years, Area of Research: Big Data Technologies, Block Chain Technologies, IoT and Cloud Computing.</p>	
<p><b>Industry Expert:</b> Name: Dr. Laveen Vikram Sundararaj, Designation: Engineering Manager Company name and address C 12/3 NIT Quarters, NIT Warangal, Experience: 17 Years, Area: Aerospace embedded systems.</p>	
<p><b>Members:</b> Name: Dr. K. Mahesh, Designation: Professor, Department Computer Applications, Alagappa University, Teaching Experience:32 Years, Research Experience:14 Years, Area of Research: Video processing and Image processing</p>	
<p>Name: Dr.P. Eswaran, Designation: Assistant Professor, Department Computer Applications, Alagappa University, Teaching Experience: 13 Years, Research Experience: 15 Years, Area of Research: Digital Image Processing, Data Mining.</p>	
<p>Name: Dr.M.Vanitha, Designation: Assistant Professor, Department Computer Applications, Alagappa University, Teaching Experience: 12 Years, Research Experience: 14 Years, Area of Research: Digital Image processing, Data mining and Network Security.</p>	
<p>Name: Dr.A.Nagarajan, Designation: Assistant Professor, Department Computer Applications, Alagappa University, Teaching Experience:16 Years, Research Experience: 10 Years, Area of Research: Digital image processing, Data mining, Big data</p>	
<p>Name: Dr.P.Prabhu, Designation: Assistant Professor in IT, Department : DDE (IT), Alagappa University, Teaching Experience: 29 Years, Research Experience: 6 Years, Area of Research:- Data mining, Machine Learning and Image processing</p>	

<p>Name: Mr.S.BalaSubramanian, Designation: Assistant Professor in Comp. Sci., Department : DDE (Comp. Sci.), Alagappa University, Teaching Experience:17 Years, Area of Research: Cloud Computing, Internet of Things, Software Testing, Data mining.</p>	
<p>Alumnus/Alumna: Name: Dr.M.Janaki Current position, Associate Professor Type of Profession Teaching, Professional address- Department of Computer Science,Dr.Umayal Ramanathan College for Women, Teaching Experience – 17 years, Areas of Research: Network Security and Cloud computing.</p>	



**ALAGAPPA UNIVERSITY**  
**DEPARTMENT OF COMPUTER APPLICATIONS**  
Science Campus, Karaikudi -630003, Tamil Nadu.

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

**Name of the Department** : Computer Applications

**Name of the Programme** : Master of Computer Applications (M.C.A)

**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 (subject paper) of a programme. Each course offered by the Department is identified by a unique course code. A course contains lectures/tutorials/laboratory/seminar/project / practical training/report writing /Viva-voce, etc or a combination of these, to meet 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/tutorial/laboratory and other forms of learning required to complete the course contents in a 15-week schedule. One credit is equal to one hour of lecture per week. For laboratory/field work one credit is equal to two hours.

**Semesters**

An Academic year is divided into two Semesters. In each semester, courses are offered in 15 teaching weeks and 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 determine the deliberation of courses and specifies the allocation of credits semester-wise and course-wise. For each course, it will also identify the number of credits for lectures, tutorials, practical, seminars etc. The courses (Core/Discipline Specific Elective/Non-Major Elective) are designed by teachers and approved by the Departmental Committees. Courses approved by the Departmental Committees shall be approved by the Board of Studies/Broad Based

Board of Studies. A teacher offering a course will also be responsible for maintaining attendance and performance sheets (CIA -I, CIA-II, assignments and seminar) of all the students registered for the course. The Non-major elective programme, MOOCs coordinator and Internship Mentor are responsible for submitting the performance sheet to the Head of the department. The Head of the Department consolidates all such performance sheets of courses pertaining to the programmes offered by the department. Then forward the same to be Controller of Examinations.

#### **Programme Educational Objectives (PEOs)**

<b>PEO-1</b>	To prepare high quality graduates for software industry, corporate sector, government organizations and academics by providing skill-based education in the core and emerging areas of computer applications.
<b>PEO-2</b>	To offer high-grade, value-based Post-graduate programme in Computer Applications.
<b>PEO-3</b>	To investigate the requirements of a problem and find the solution to them using computing principles.
<b>PEO-4</b>	To gain knowledge for creating and evaluating computer based system, components and process to meet the specific needs of applications
<b>PEO-5</b>	To utilize current techniques and tools necessary for complex computing practices
<b>PEO-6</b>	To develop system based components and integrate effectively for user requirements.
<b>PEO-7</b>	To train competent professionals with knowledge of computer applications to pursue variety of careers and /or higher education.
<b>PEO-8</b>	To practice effectively as individuals and as team members in multidisciplinary projects involving technical, managerial, economical and social constraints.
<b>PEO-9</b>	To understand societal, environmental, health, legal, ethical issues within local and global contexts and the consequential responsibilities relevant to professional practice.
<b>PEO-10</b>	To make the students as capable of adopting new technologies and constantly upgrade their skills with an attitude towards lifelong learning.

#### **Programme Specific Objectives**

<b>PSO-1</b>	To develop the ability to plan, analyze, design, code, test, implement and maintain a software product for real-time system
<b>PSO-2</b>	To prepare the students to pursue higher studies in computing and related fields and to work in the fields of teaching and research.
<b>PSO-3</b>	To make efficient team leaders, effective communicators and capable of working in multidisciplinary environment following ethical values.
<b>PSO-4</b>	To promote students capability to set up their enterprise in various sectors of Computer applications
<b>PSO-5</b>	To identify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.

## Programme Outcomes (PO)

<b>Program Outcomes (POs)</b>	
On successful completion of the M.C.A. programme, students will be able to	
<b>PO1</b>	<b>Computational Knowledge:</b> Apply knowledge of mathematics, science and computing appropriately to model the software applications
<b>PO2</b>	<b>Problem Analysis:</b> Identify and analyze complex problems and formulate appropriate solutions.
<b>PO3</b>	<b>Design and Development of Solutions:</b> Design and develop customized frameworks for small to large enterprises.
<b>PO4</b>	<b>Conduct Investigations of Complex Computing problems:</b> Utilize the research-based knowledge and research methods for the analysis and interpretation of data to provide valid conclusions in real-time applications.
<b>PO5</b>	<b>Modern Tool Usage:</b> Identify and apply the appropriate techniques necessary for innovative software solutions, resources and modern computing tools to perform complex computing activities
<b>PO6</b>	<b>Project Management and Finance:</b> Manage multidisciplinary projects and assess societal, environmental, health, safety, legal and cultural issues.
<b>PO7</b>	<b>Professional Ethics:</b> Function efficiently both as a member and team leader exhibiting professional skills with human values and ethics.
<b>PO8</b>	<b>Communication Efficacy:</b> Communicate effectively with the computing community Covered and the society to enhance documentations, presentations and to use appropriate opportunity Covered according to their intelligence
<b>PO9</b>	<b>Life-long Learning:</b> Engage in independent and continuous learning as a computing professional and able to upgrade the skill sets for the lifelong betterment of the individual and society at large.
<b>PO10</b>	<b>Innovative Practices:</b> Contribute value and wealth for the society benefit.

## Programme Specific Outcomes (PSO)

<b>Program Specific Outcomes (PSOs)</b>	
After the successful completion of M.C.A. programme, the students are expected to	
<b>PSO1</b>	Ability to design and develop computing systems using concepts of Mathematics, Computer applications and other related disciplines to meet customers' business objectives.
<b>PSO2</b>	Ability to analyze and formulate solutions with the use of state -of-the-art technologies, skills and models to existing and emerging issues
<b>PSO3</b>	Abilities to face the changing trends and career opportunities in computer application.
<b>PSO4</b>	Ability to demonstrate team work, leadership skills, professional ethics and strong human values
<b>PSO5</b>	Ability to do ideas, innovation and sharing can develop class environment congenial and competitive for generation.

## Eligibility for admission

Candidates for admission to the first year of the Master of Computer Applications (M.C.A) programme shall be required to have passed with a minimum of 60% marks in Part-III (minimum 55% marks for SC/ST candidates) in any one of the following examinations of any recognized University:

B.Sc. Degree in Mathematics/Statistics/Applied Sciences/Computer Science/ Information Technology (OR) B.Sc. Degree in Physics/Chemistry/ Electronics as major subject and Mathematics as ancillary subject (OR) B.C.A./B.Com./B.B.A.(OR) qualification equivalent thereto. The candidate should have studied 10+2+3 pattern with Mathematics/Statistics/Business Mathematics in +2 level.

## Bridge Course

The University recommended two to three weeks bridge courses for the non-computer science background students covering essential basics required to pursue two year MCA programme from the academic year 2022-23.

### Suggested Bridge Courses:

- i. Introduction to Information Technology
- ii. Programming in C
- iii. Introduction to Database Systems
- iv. Basics of Computer Networks
- v. Problem Solving Techniques

## 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

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

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

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

C. Non-Major Electives (NME)- Exposure beyond the discipline

- Students have to undergo a total of two Non Major Elective courses with 2 credits offered by other departments (one in II Semester another in III Semester).



- A uniform time frame of 3 hours on a common day (Tuesday) shall be allocated for the Non-Major Electives.
- Non Major Elective courses offered by the departments pertaining to a semester should be announced before the end of previous semester.

D. 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).

E. Self-Learning Courses from MOOCs platforms.

- MOOCs shall be on voluntary for the students.
- Students have to undergo a total of 2 Self Learning Courses (MOOCs) one in II semester and another in III semester.
- The actual credits earned through MOOCs shall be transferred to the credit plan of programmes as extra credits. Otherwise 2 credits/course be given if the Self Learning Course (MOOCs) is without credit.
- While selecting the MOOCs, preference shall be given to the course related to employability skills.

F. Projects: The duration of the Project shall be six months in the fourth semester. The candidate shall undergo Project Work during the final semester. The candidate should prepare report of work for the project and should get approval from the guide. The candidate, after completing the project work, shall be allowed to submit it to the University departments at the end of the final semester. The candidate should prepare three copies of the project report and submit the same for the evaluation of examiners. After evaluation, one copy will be retained in the department library, one copy will be retained by the guide and the student shall hold one copy.

### Teaching Methods

- **Presentation with visual aids like Smart Board and Power Point/Pdf slide:**

A presentation delivers content through oral, audio and visual channels allowing teacher-learner interaction and making the learning process more attractive. Through presentations, teachers can clearly introduce difficult concepts by illustrating the key principles and by engaging the students in active discussions. When presentations are designed by learners, their knowledge sharing competences, their communication skills and their confidence are developed.

- **Demonstration especially for Practical Courses:**

Demonstration is a specific type of presentation and a technique of teaching by example rather than simple explanation. Demonstration is a visual practical presentation of a concept and process. The learners perform a demonstration to ascertain learning. The teacher performs the tasks step-by-step to enable the learners to repeat the same task independently or in groups.

- **Group Discussion:**

Group Discussion is mainly used to generate ideas, increase learner's confidence in their answers, encourage broad participation, promote higher level of reasoning and learn concepts in-depth, develop skills such as teamwork, critical thinking, inter personal communication and peer teaching.

- **Seminar:**

Students take the initiative to preview the course content, find evidence and answers to questions assigned before course, share knowledge points with peers during the course. Students develop the quality of listening, questioning scientifically, debating with evidence, and collaborating during the discussion and communications.

- **Quiz:**

It is sometimes used to assess learners. It often has fewer questions of lesser difficulty and requires less time for completion than a test. This gives the teacher an instant idea of what learners already know about the topic. Quizzes can be used to revise learner's retention of previous lessons or at the end of a lesson. This allows the teacher to get feedback on learner's progression.

### **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, analyzing, 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).

#### **a. 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**

<b>S. No</b>	<b>Content</b>	<b>Marks</b>
1	Average marks of two CIA tests	15
2	Seminar/Group Discussion/Quiz	5
3	Assignment	5
	Total	25

#### **Practical – 25 marks**

<b>S. No</b>	<b>Content</b>	<b>Marks</b>
1	Average marks of two CIA tests	15
2	Lab observation note	10
	Total	25

## Project – 50 marks

S. No	Content	Marks
1	Review First	20
2	Review Second	20
3	Presentation	10
	Total	50

### b. External Examination

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

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

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

For the Project Report the maximum marks will be 100 marks for project report evaluation and for the Viva-Voce it is 50 marks. Each candidate shall be required to appear for Viva-Voce Examination (in defense of the Project).

### A. Scheme of External Examination (Question Paper Pattern)

Theory - Maximum 75 Marks

<b>Section A</b>	10 questions. All questions carry equal marks. (Objective type questions)	$10 \times 1 = 10$ Marks	10 questions – 2 each from every unit
<b>Section B</b>	5 questions Either / or type like 1.a (or) b. All questions carry equal marks.	$5 \times 5 = 25$	5 questions – 1 each from every unit
<b>Section C</b>	5 questions Either / or type like 1.a (or) b. All questions carry equal marks	$5 \times 8 = 40$	5 question –Should cover all units

### Practical – Maximum 75 Marks

Section A	Software Programmes (2Nos)	50 Marks
Section B	Record note	10 Marks
Section C	Vivo voce	15 Marks

## Project report – Maximum 150 Marks

Project report	100 Marks
Vivo voce	50 Marks

### Results

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

### Passing Minimum

- A candidate shall be declared to have passed in each course if he/she secures not less than 40% marks in the End Semester Examinations and 40% marks in the Internal Assessment and not less than 50% in the aggregate, taking Continuous assessment and End Semester Examinations marks together.
- The candidates not obtained 50% in the Internal Assessment are permitted to improve their Internal Assessment marks in the subsequent semesters (2 chances will be given) by writing the CIA tests and by submitting assignments.
- Candidates, who have secured the pass marks in the End-Semester Examination and in the CIA but failed to secure the aggregate minimum pass mark (E.S.E + C I.A), are permitted to improve their Internal Assessment mark in the following semester and/or in University examinations.
- A candidate shall be declared to have passed in the Project if he /she get not less than 40% in each of the Project Report and Viva-Voce and not less than 50% in the aggregate of both the marks for Project Report and Viva-Voce.
- A candidate who gets less than 50% in the Project must resubmit the report. Such candidates need to take again the Viva-Voce on the resubmitted Project report.

### Grading of the Courses

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

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

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

- 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).

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

a. 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

$$\text{GRADE POINT AVERAGE (GPA)} = \frac{\sum_i C_i G_i}{\sum_i C_i}$$

GPA = Sum of the multiplication of Grade Points by the credits of the courses  
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	<b>O+</b>	First Class – Exemplary*
9.0 and above but below 9.5	<b>O</b>	
8.5 and above but below 9.0	<b>D++</b>	First Class with Distinction*
8.0 and above but below 8.5	<b>D+</b>	
7.5 and above but below 8.0	<b>D</b>	
7.0 and above but below 7.5	<b>A++</b>	First Class
6.5 and above but below 7.0	<b>A+</b>	
6.0 and above but below 6.5	<b>A</b>	
5.5 and above but below 6.0	<b>B+</b>	Second Class
5.0 and above but below 5.5	<b>B</b>	
0.0 and above but below 5.0	<b>U</b>	Re-appear

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

- 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\*.
- 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\*.

- 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+), and those who earned CGPA between 7.0 and 7.4 shall be given Letter Grade (A++) and declared to have First Class
- 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.
- Candidates those who earned CGPA between 0.0 and 4.9 shall be given Letter Grade (U) and declared to have Re-appear.
- Absence from an examination shall not be taken as an attempt.

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

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

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

### **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 therefore (i.e. 90 credits).

a. All the candidates who have passed the examinations in all the prescribed courses shall be eligible for the award of the Degree of Master of Computer Applications (M.C.A.)

b. A Candidate who has passed all the examinations in the first attempt within two years of admission shall be declared to have passed in First Class with Distinction provided he/she secures more than 75% marks in the aggregate.

c. A Candidate who has passed all the examinations within FOUR years of admission shall be declared to have passed in First Class provided he/she secures not less than 60% marks in the aggregate.

### **Maximum duration of the completion of the programme**

A student shall be permitted to continue the programme from I to IV semester irrespective of failure(s) in the courses of the earlier semesters. The candidate will qualify for the MCA degree only if he/she passes all the arrears courses with in a period of FOUR years.

### **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.



**BRIDGE COURSE - I**  
**INTRODUCTION TO INFORMATION TECHNOLOGY**

**Objectives:**

- To educate the beginners the fundamentals of computer hardware and software.
- To teach them the basic concepts of internet and programming concepts.

**Internet and World Wide Web:** Internet and World Wide Web-Web Multimedia-Recent Trends in IT- Anatomy of Computer-Central Processing Unit-Memory **Input and Output Devices:** Input and Output Devices-Secondary Storage Media-Introduction to Software-User Interfaces-Types of Operating Systems **Word Processing:** Word Processing: Formatting Documents-Word Processing Features-Desktop Publishing-Spreadsheet Applications & Database Applications-Internet Connectivity

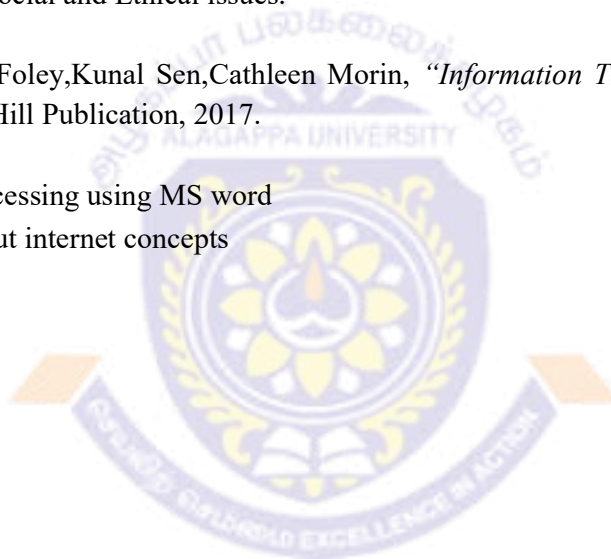
**Communications:** Communications: Network Applications-The Electronic Web-Local Area Networks-Multimedia-IT in Business. **Programming and System Development:** Programming and System Development: Programming Languages-Programming Techniques-Personal, Social and Ethical issues.

**Suggested Readings:**

Dennis P.Curtin, Kim Foley,Kunal Sen,Cathleen Morin, “*Information Technology The Breaking Wave*“, Tata McGraw Hill Publication, 2017.

**Outcomes:**

- Learn word processing using MS word
- Understand about internet concepts





## BRIDGE COURSE - II PROGRAMMING IN C

### Objectives:

- To understand structure of C program
- To understand Arrays, Strings, Functions and Pointers

**Basic Structure of C Programs** – Programming Style – Character Set – C Tokens – Keywords and Identifiers – Constants, Variables and Data Types – Declaration of Variables – Defining Symbolic Constants – Declaring a variable as a constant. Operators and Expressions. **Managing I/O Operations:** Reading and Writing a Character – Formatted Input, Output. Decision making and branching – Flow of control **Arrays:** One-Dimensional Arrays – Declaration, Initialization – Two-Dimensional Arrays – Multi-dimensional Arrays – Dynamic Arrays – Initialization. **Strings:** Declaration, Initialization of String variables – Reading and Writing strings– String handling functions. **User-defined functions:** Need – Multi-function programs – Elements of user defined functions – Definition – Return values and their types – Function calls, declaration, category – All types of arguments and return values – Nesting of functions – Recursion – Passing arrays, Strings to functions – Scope visibility and life time of variables. **Structures and Unions:** Structure Definition – Giving Values to Members – Structure Initialization – Arrays of Structures – Arrays Within Structures – Structures Within Structures – Structures And Functions – Unions. **Pointers:** Introduction – Understanding Pointers – Accessing the Address of a Variable – Declaring and Initializing Pointers – Accessing a Variable through its Pointer.

### Suggested Readings:

E.Balagurusamy , 2012, 6th Edition *Programming in ANSI C*, Tata McGraw Hill Publishing Company.

Ashok N.Kamthane, 2006 , *Programming with ANSI and Turbo C*, Pearson Education  
Schaum's Outline Series, Gottfried, 2006, *Programming with C*, Tata McGraw Hill.

### Outcomes:

- Able to understand and design the solution to a problem using C
- Understand and implement Structures, Arrays and function

**BRIDGE COURSE - III**  
**INTRODUCTION TO DATABASE SYSTEMS**

**Objectives:**

- To introduce the Database Architecture
- To understand Data Normalization, Relational Algebra and its operations.

**Introduction to Database Management Systems:** Why a Database – Characteristics of Data in a Database – Database Management System: Transaction Management System – Concurrency Control – Security Management – Language Interface – Storage Management – Why DBMS – Types of Database Management Systems: Hierarchical Model – Network Model – Relational Model - **Database Development Life Cycle** : Database Development Life Cycle Phases - **Database Architecture** : Conceptual, Physical and Logical Database Models –**Data Normalization** Data Normalization : Keys and Relationships – First Normal Form – Second Normal Form – 3NF – BCNF – 4NF – 5NF – DKNF – **Relational Algebra** : Relational Algebraic Operations – UNION, INTERSECTION, DIFFERENCE – CARTESIAN PRODUCT – SELECT – PROJECT – RENAME – JOIN – DIVISION.

**Suggested Readings:**

Alexis Leon, Mathews Leon, *Database Management Systems*, Tata McGraw Hill Education, 2008  
Elmasri Ramez, Navathe Shamkant, *Fundamentals of Database System*, Pearson Education, 7<sup>th</sup> Edition, 2017.

Raghu Ramakrishnan, Johannes Gehrke, *Database Management Systems*, Tata McGraw Hill Education, 2014

**Outcomes:**

- Describe Normalization for Database design.
- Understand the Relational Algebraic Operations

**BRIDGE COURSE - IV**  
**BASICS OF COMPUTER NETWORKS**

**Objectives:**

- To understand networking concepts and basic communication model
- To understand network architectures and components required for data communication.

**Introduction to Computer Networks:** Definition of a Computer Network, Classification of networks: Based on transmission technology, Based on the their scale, Local area networks, Metropolitan area networks, Wide area networks - Merits and De-merits of Layered Architecture, Service Primitives: **Reference models:** The OSI Reference Model, The TCP/IP Reference Model, Comparison of the OSI & the TCP/IP Reference Models-**Network topologies;** Linear Bus Topology, Ring Topology, Star Topology, Hierarchical or Tree Topology, Topology Comparison, Considerations when choosing a Topology -**Switching;** Circuit switching, Message switching, Packet switching, Implementation of packet switching, Relationship between Packet Size and Transmission time, Comparison of switching techniques- Multiplexing-Transmission medium-Data Link Layer-Network Layer- Transport Layer.

**Suggested Readings:**

Andrew S. Tanenbaum and David J. Wetherall, 2011 “*Computer Networks*”, 5<sup>th</sup> Edition, University of Washington, Pearson.

Bhushan Trivedi, 2016, “*Data Communication and Networks*” Oxford University Press

K S Easwarakumar, R S Rajesh, R.Balasubramanian, 2010 “*Computer Networks: Fundamental and Application*”, 1/e, Vikas Publishing

Rajneesh Agarwal, 2011, “*Data Communication and Computer Networks*”, 1/e, Vikas Publishing

**Outcomes:**

- Able to understand the working principles of various application protocols
- Acquire knowledge about security issues and services available

## **BRIDGE COURSE - V**

### **PROBLEM SOLVING TECHNIQUES**

#### **Objectives:**

- To acquire knowledge on problem solving techniques
- To understand the basics of programming

**Introduction:** Overview of computer-history-what is hardware-software-components of computer-input devices-output devices-memory-types of software- introduction to programming languages-assembler-interpreter-compiler

**Problem solving:** Identification of problem – steps of problem solving-overview of problem solving techniques-Algorithm-method of writing-Rules-Examples- Flowchart-Symbols used in flowchart-conditional statement-looping statements-connectors-Examples-Pseudo code-Definition-method of writing-data types-high level languages- logical operators-conditional statement-for loop-while loop-Data Structures-Examples

**Programming:** Architecture of a computer program- Programming languages- first Program - Writing, compiling, and executing a program – finding errors and debugging

#### **Suggested Readings:**

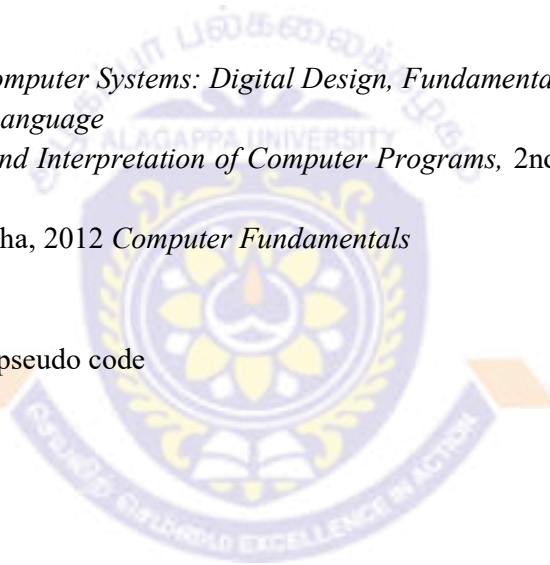
Ata Elahi Springer, 2018, *Computer Systems: Digital Design, Fundamentals of Computer Architecture and Assembly Language*

Harold Abelson, *Structure and Interpretation of Computer Programs*, 2nd Edition, MIT Electrical Engineering

Pradeep K. Sinha & Priti Sinha, 2012 *Computer Fundamentals*

#### **Outcomes:**

- Able to write algorithm, pseudo code
- Able to draw flowchart



## MASTER OF COMPUTER APPLICATIONS (M.C.A)-PROGRAMME STRUCTURE

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

S. No	Paper Code	Title of the paper	T/P	Credits	Hours/Week	Marks			
<b>I Semester</b>						<b>I</b>	<b>E</b>	<b>Total</b>	
1	541101	Core 1	Computer Architecture and Organization	T	5	5	25	75	100
2	541102	Core 2	Object Oriented Programming & C++	T	5	5	25	75	100
3	541103	Core 3	Relational Database Management System	T	4	4	25	75	100
	541104	Core 4	Discrete Mathematics	T	4	4	25	75	100
4	541105	Core 5	Object Oriented Programming & C++ Lab	P	2	4	25	75	100
	541106	Core 6	RDBMS Lab	P	2	4	25	75	100
5		DSE*1	1. Computer Networks 2. Mobile Communications 3. Professional Ethics	T	3	3	25	75	100
			Library / Seminar/Yoga/ counselling/Field trip	-		1			
<b>Total</b>				--	<b>25</b>	<b>30</b>	<b>175</b>	<b>525</b>	<b>700</b>
<b>II Semester</b>									
6	541201	Core 7	Design and Analysis of algorithm	T	4	4	25	75	100
7	541202	Core 8	Advanced Java Programming	T	4	4	25	75	100
	541203	Core 9	Accounting & Financial Management	T	4	4	25	75	100
8	541204	Core 10	Operating system	T	4	4	25	75	100
9	541205	Core 11	Java Programming Lab	P	2	4	25	75	100
	541206	Core 12	Algorithms Lab	P	2	4	25	75	100
10		DSE*2	1. Artificial Intelligence & Machine Learning 2. Blockchain Technology 3. Internet of Things	T	3	3	25	75	100
11		NME	Non-Major Elective	T	2	3	25	75	100
			Self-learning course (SLC) –MOOCs	-			Extra credit		
<b>Total</b>				--	<b>25</b>	<b>30</b>	<b>200</b>	<b>600</b>	<b>800</b>
<b>III Semester</b>									
12	541301	Core 13	Data Science & Big data analytics	T	4	4	25	75	100
13	541302	Core 14	Python Programming	T	4	4	25	75	100
14	541303	Core 15	Software Engineering	T	4	4	25	75	100
	541304	Core 16	Information and Cyber Security	T	4	4	25	75	100
15	541305	Core 17	Python Programming Lab	P	2	4	25	75	100
	541306	Core 18	Data Science and Big Data Analytics Lab	P	2	4	25	75	100
16		DSE*3	1. Mobile Application Development 2. Virtual Reality and Augmented Reality 3. Digital Image Processing	T	3	3	25	75	100
17		NME	Non-Major Elective	T	2	3	25	75	100
		SLC	Self-learning course–MOOCs	-			Extra credit		
<b>Total</b>				--	<b>25</b>	<b>30</b>	<b>200</b>	<b>600</b>	<b>800</b>
<b>IV Semester</b>									
18	541999	Core 19	Project work programme	-	15	30	50	150	200
<b>Total</b>				-	<b>15</b>	<b>30</b>	<b>50</b>	<b>150</b>	<b>200</b>
<b>Total</b>				--	<b>90+</b>	<b>120</b>	<b>625</b>	<b>1875</b>	<b>2500</b>

<b>Discipline Specific Elective</b>		
<b>S.No</b>	<b>Paper Code</b>	<b>Title of the Paper</b>
<b>DSE – I</b>		
1.	541551	Computer Networks
2.	541552	Mobile Communications
3.	541553	Professional Ethics
<b>DSE – II</b>		
4.	541554	Artificial Intelligence & Machine Learning
5.	541555	Blockchain Technology
6.	541556	Internet of Things
<b>DSE – III</b>		
7.	541557	Mobile Application Development
8.	541558	Virtual Reality and Augmented Reality
9.	541559	Digital Image Processing

### **Non Major Electives**

<b>Semester</b>	<b>Course/Title</b>	<b>Course Code</b>	<b>Credit</b>	<b>Hours/Week</b>	<b>Marks</b>		<b>Total</b>
					<b>Int.</b>	<b>Ext.</b>	
<b>II</b>	NME – I: Introduction to Information Technology		2	3	25	75	100
<b>III</b>	NME – II: Office Automation		2	3	25	75	100

SEMESTER – I					
Core	Course Code : 541101	COMPUTER ARCHITECTURE AND ORGANIZATION	T	Credits:5	Hours: 5
<b>Unit I</b>					
<b>Objective 1</b>	<b>To Manipulate representations of numbers stored in digital computers</b>				
<p><b>Number Systems:</b> Binary, Octal, Decimal and Hexadecimal number systems – Conversion from one base to another base – Use of complements – binary arithmetic – Data Representation: Fixed Point Representations – Floating Point Representations – Numeric and Character codes, Other Binary Codes – Error detection codes. Boolean algebra and Combinational Circuits: Fundamental concepts of Boolean Algebra – De Morgan’s theorems – Simplification of expressions – Sum of products and products of sums – Karnaugh map simplification — two level implementation of Combinational Circuits.</p>					
<b>Outcome 1</b>	<b>Design and realize the functionality of computer hardware with basic gates and other components using combinational and sequential logic.</b>				<b>K2</b>
<b>UNIT II</b>					
<b>Objective 2</b>	<b>To impart knowledge about the various components of a computer and its internals</b>				
<p><b>Combinational Circuits:</b> Half Adder – Full Adder– Decoders – Encoders – Multiplexers – De multiplexer. <b>Sequential Circuits:</b> Flip-flop’s – Registers – Shift Registers – Binary Counters – BCD Counters – Memory Unit.</p>					
<b>Outcome 2</b>	<b>Understand the importance of the hardware-software interface</b>				<b>K2</b>
<b>Unit III</b>					
<b>Objective 3</b>	<b>To Understand the basics of instructions sets and their impact on processor design</b>				
<p><b>Basic Computer organization and design:</b> Instruction Codes – Computer Registers – Computer Instructions – Timing and Control – Instruction cycle – Memory reference instructions – Input output and Interrupt – Complete Computer Description – Design on Basic Computer – Design of Accumulator logic.</p>					
<b>Outcome 3</b>	<b>Identify various components of computer and their interconnection</b>				<b>K3</b>
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To demonstrate an understanding of the design of the functional units of a digital computer system.</b>				
<p><b>Central Processing Unit:</b> Introduction – General Register organization – Stack organization – Instruction formats – Addressing modes – Data transfer and manipulation – Program control.</p>					
<b>Outcome 4</b>	<b>Identify basic components and design of the CPU, ALU and control unit.</b>				<b>K5</b>

<b>Unit V</b>					
<b>Objective 5</b>	<b>To understand the functionality of Input output organization and Memory organization of computer systems.</b>				
<b>Input – output organization:</b> Peripheral devices – Input output interface – Asynchronous data transfer – Modes of transfer – Priority interrupt – DMA – IOP – Serial Communication. <b>Memory organization :</b> Memory Hierarchy – Main memory – Auxiliary memory – Associative memory – Cache memory – Virtual memory – Memory management hardware.					
<b>Outcome 5</b>	<b>Compare and select various Memory devices as per requirement.</b>				<b>K6</b>
<b>Suggested Readings:</b> David Money and Harris Sarah L. 2012 Digital Design and Computer Architecture, 2 <sup>nd</sup> Edition, Elsevier Inc Donald Leach, Albert Malvino and Goutam Saha, 2010, Digital Principles and Applications, 4th Edition, McGraw Hill. Morris Mano, 2017, Computer System Architecture, Third Edition, Pearson Patterson D. A. and J. L. Hennessy, 2017, Computer Organization and Design, 4 <sup>th</sup> Edition, Morgan Kaufmann Pub William Stallings, 2016, Computer Organization & Architecture Designing for performance 10 <sup>th</sup> Edition, Pearson.					
<b>Online Resources:</b> <a href="http://www.csitsun.pub.ro/courses/cn2/Digital_design_book/Digital%20Design%20and%20Computer%20Architecture.pdf">http://www.csitsun.pub.ro/courses/cn2/Digital_design_book/Digital%20Design%20and%20Computer%20Architecture.pdf</a> www.geeksfor geeks. <a href="https://www.geektonight.com/">https://www.geektonight.com/</a> <a href="https://www.studocu.com/">https://www.studocu.com/</a>					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course Designed by: Dr.M.Vanitha</b>					

### Course Outcome VS Programme Outcomes

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

**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)	M(2)	M(2)
CO2	M(2)	M(2)	L(1)	L(1)	S (3)
CO3	S (3)	L(1)	S (3)	S (3)	L(1)
CO4	S (3)	M(2)	M(2)	M(2)	M(2)
CO5	S (3)	S (3)	S (3)	L(1)	M(2)
W. AV	2.8	2.2	2.4	1.8	2

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



SEMESTER - I					
Core	Course Code: 541102	OBJECT ORIENTED PROGRAMMING AND C++	T	Credits: 5	Hours: 5
<b>Unit - I</b>					
<b>Objective 1</b>	<b>To understand tokens, expressions, and control structures</b>				
<p><b>Introduction:</b> Differences Between C and C++, The Object Oriented Technology, Disadvantage of Conventional Programming, Concepts of Object Oriented Programming, Advantages of OOP Structure of A C++ Program, Header Files and Libraries</p> <p><b>Input and Output C++ :</b> Introduction, Streams In C++ And Stream Classes, Pre-Defined Streams, Stream Classes, Formatted and Unformatted Data, Unformatted Console I/O Operations, Member Functions of Istream Class, Formatted Console I/O Operations, Bit Fields, Flags Without Bit Field, Manipulators, User Defined Manipulators.</p> <p><b>Basic concept in C++ programming:</b> Operators, control structures, functions, overloading, and recursion Tokens in C++, Variable Declaration and Initialization, Data Types, Operators in C and C++, Scope Access Operator, Namespace, Memory Management Operators, Comma Operator, Revision of Decision Statements, Control Loop Statements.</p>					
<b>Outcome 1</b>	<b>Students can Identify the key differences between C and C++ and demonstrate the application of object-oriented programming concepts to solve programming problems efficiently.</b>				<b>K4</b>
<b>Unit II</b>					
<b>Objective 2</b>	<b>To understand the concept of data abstraction and encapsulation, inheritance and virtual functions implement dynamic binding with polymorphism.</b>				
<p><b>Functions in C++ :</b> Introduction, Structure Of Function, Passing Arguments, Lvalues and Rvalues, Return By Reference, Returning More Values By Reference, Default Arguments, Const Arguments, Inputting Default Arguments, Inline Functions, Function Overloading, Principles Of Function Overloading, Recursion.</p> <p><b>Classes and Objects:</b> Introduction, class specification, class objects, accessing class members, defining member functions, accessing member functions within a class, outside member functions as inline, private member function, memory allocation for objects, array of objects, function prototype, call by reference, return by reference, objects as function arguments, inline function, friend function, constant parameter and member function.</p> <p><b>Object Initialization:</b> Introduction - constructors, default constructor, parameterized constructors and multiple constructors in a class, dynamic initialization through Constructors, copy constructor, dynamic constructor and destructor. Dynamic Objects: Introduction, pointers to objects, array of pointers to objects, this pointer.</p>					
<b>Outcome 2</b>	<b>Design and create functions and classes in C++ with appropriate features like function overloading, inline functions, default arguments, constructors, destructors, and friend functions to develop modular and reusable code.</b>				<b>K6</b>

<b>Unit III</b>					
<b>Objective 3</b>	<b>Students learn about the inheritance concept , function</b>				
<b>Inheritance:</b> Derived Class– Virtual Functions– Polymorphism- Abstract Base Class– Types of Inheritance.					
<b>Outcome 3</b>	<b>Utilize inheritance, virtual functions, and polymorphism in C++ to create a hierarchy of classes, enabling code reusability, extensibility, and flexibility in program design.</b>				<b>K6</b>
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To learn how to design and implement generic classes with C++ templates.</b>				
<b>Introduction:</b> File Stream Classes, File Opening Modes, File Pointers and Manipulators, Manipulators With Arguments, Sequential Access Files, Binary And ASCII Files random Access Operation. <b>Programming with Templates:</b> Introduction, Need Of Template, Definition Of Class Template, Normal Function Template, Working Of Function Templates, Class Template With More Parameters, Functions Templates With More Arguments, Overloading Of Template Functions, Member Function Templates, Recursion With Template Function, Class Template With Overloaded Operators, Class, Template Revisited, Class Templates And Inheritance, Container Classes, Types Of Containers, Container Adaptors, Iterators.					
<b>Outcome 4</b>	<b>Apply file stream classes for input and output operations and implement templates effectively to create generic functions and classes that can work with different data types in C++.</b>				<b>K3, K4</b>
<b>Unit V</b>					
<b>Objective 5</b>	<b>To learn how to use exception handling in C++programs</b>				
<b>Introduction:</b> Basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism. Exceptions in constructors and destructors, handling uncaught exceptions, exceptions in operator overloaded functions, exception in Inheritance tree, exceptions in class templates, memory allocation failure exception.					
<b>Outcome 5</b>	<b>Demonstrate the implementation of exception handling mechanisms in C++ to effectively manage and handle runtime errors and exceptional situations, ensuring program robustness and stability.</b>				<b>K4, K5</b>
<b>Suggested Readings:</b> AshokKamthane.N,2013,ProgrammingInC++,2ndEdition,Pearsoneducation, Bjarne Stroustrup, 2013,“The C++ Programming Language”, Fourth Edition, Addison Wesley.Balagurusamy.E,2017,ObjectOrientedProgrammingwithC++,7thEdition,TataMcGrawHill Publishing Co. Rajaram.R, 2013. Object Oriented Programming in C++, Fifth Edition, New Age International Publishers, New Delhi. RobeLafore,2012,ObjectOrientedProgramminginC++,FourthEdition,GalgotiaPublicationsPvt.Ltd.,New Delhi SouravSahay,2012,ObjectOrientedProgrammingwithC++,2ndedition,OXFORD					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course Designed by: Dr.A.Nagarajan</b>					

### Course Outcome VS Programme Outcomes

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

**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 (3)	M (2)
CO3	S (3)	S(3)	M (2)	S (3)	M (2)
CO4	M (2)	M(2)	L(1)	S (3)	M (2)
CO5	M (2)	M(2)	M (2)	M (2)	S (3)
<b>W.AV</b>	<b>2.6</b>	<b>2.4</b>	<b>2</b>	<b>2</b>	<b>2.4</b>

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

SEMESTER I					
<b>Core</b>	<b>Course Code:</b> <b>541103</b>	<b>RELATIONAL DATABASE MANAGEMENT SYSTEM</b>	<b>T</b>	<b>Credits: 4</b>	<b>Hours: 4</b>
<b>Unit – I</b>					
<b>Objective 1</b>	<b>To understand the fundamentals of data models</b>				
Data base System Applications, data base System VS file System – View of Data – Data Abstraction – Instances and Schemas – data Models – the ER Model – Relational Model – Other Models – Database Languages – DDL – DML – database Access for applications Programs – data base Users and Administrator – Transaction Management – data base System Structure – Storage Manager – the Query Processor. History of Data base Systems - Data base design and ER diagrams – Beyond ER Design Entities, Attributes and Entity sets					
<b>Outcome 1</b>	<b>Compile an understanding of data models, data abstraction, and the ER model in database systems.</b>				<b>K2</b>
<b>Unit II</b>					
<b>Objective 2</b>	<b>To make a study of SQL and relational database design</b>				
Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical data base Design – Introduction to Views – Destroying / altering Tables and Views. Relational Algebra – Selection and projection set operations – renaming – Joins – Division – Examples of Algebra overviews – Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus					
<b>Outcome 2</b>	<b>Design logical structures using relational algebra and SQL queries, while maintaining data integrity.</b>				<b>K3</b>
<b>Unit III</b>					
<b>Objective 3</b>	<b>To know about data storage techniques and query processing.</b>				
Form of Basic SQL Query – Examples of Basic SQL Queries – Introduction to Nested Queries – Correlated Nested Queries Set – Comparison Operators – Aggregative Operators – NULL values – Comparison using Null values – Logical connectivity's – AND, OR and NOT – Impact on SQL Constructs – Outer Joins – Disallowing NULL values – Complex Integrity Constraints in SQL Triggers and Active Data bases. Schema refinement – Problems Caused by redundancy – Decompositions – Problem related to decomposition – reasoning about FDS – FIRST, SECOND, THIRD Normal forms – BCNF – Lossless join Decomposition – Dependency preserving Decomposition – Schema refinement in Data base Design – Multi valued Dependencies – FORTH Normal Form.					
<b>Outcome 3</b>	<b>Evaluate SQL queries, integrity constraints, and normalization techniques for efficient database design.</b>				<b>K5</b>

<b>Unit IV</b>					
<b>Objective 4</b>	<b>To impart knowledge in transaction processing, concurrency control techniques and External storage</b>				
Transaction Concept- Transaction State- Implementation of Atomicity and Durability – Concurrent – Executions – Serializability- Recoverability – Implementation of Isolation – Testing for Serializability- Lock –Based Protocols – Timestamp Based Protocols- Validation- Based Protocols – Multiple Granularity. Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions – Buffer Management – Failure with loss of non-volatile storage-Advance Recovery systems- Remote Backup systems.					
<b>Outcome 4</b>	<b>Implement transaction management strategies and recovery mechanisms to ensure data consistency.</b>				<b>K3</b>
<b>Unit V</b>					
<b>Objective 5</b>	<b>To know basic database storage structures and access techniques.</b>				
Data on External Storage – File Organization and Indexing – Cluster Indexes, Primary and Secondary Indexes – Index data Structures – Hash Based Indexing – Tree base Indexing – Comparison of File Organizations – Indexes and Performance Tuning- Intuitions for tree Indexes – Indexed Sequential Access Methods (ISAM) – B+ Trees: A Dynamic Index Structure. Dynamic Content: Big Data - Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, and Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.					
<b>Outcome 5</b>	<b>Know advanced database concepts, including indexing, big data challenges.</b>				<b>K6</b>
<b>Suggested Readings:</b>					
Abraham Silberschatz, Henry F.Korth, S.Sudarshan, 2019, Data base System Concepts, 7 <sup>th</sup> Edition, Tata McGraw Hill.					
Garcia-molina, 2013,"Database Systems - The Complete Book", 2e, Dorling Kindersley India.					
Raghurama Krishnan, Johannes Gehrke, 2014, Data base Management Systems,3e TATA McGrawHill.					
Ramez Elmasri, Shamkant B.Navathe, 2013 “Database Systems, Models, Language, Design and Application Programming, 6 <sup>th</sup> Edition, Pearson Education.					
Seema Acharya, Subhashini Chellappan. (2019). Big Data and Analytics”, Wiley Publications					
Sharad Maheshwari Ruchinjain, 2016,"Database Management Systems: Complete Practical Approach", 2e, Laxmi Publications.					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course Designed by: Dr.K.Mahesh</b>					

### 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)	S(3)	M(2)	S(3)	L(1)	S(3)	S(3)
CO2	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)	M(2)	S(3)	S(3)
CO3	M(2)	S(3)	S(3)	M(2)	L(1)	M(2)	S(3)	M(2)	S(3)	M(2)
CO4	S(3)	M(2)	S(3)	S(3)	S(3)	L(1)	M(2)	S(3)	S(3)	S(3)
CO5	S(3)	M(2)	M(2)	M(2)	S(3)	M(2)	S(3)	S(3)	M(2)	M(2)
<b>W. AV</b>	<b>2.8</b>	<b>2.6</b>	<b>2.6</b>	<b>2.4</b>	<b>2.6</b>	<b>2</b>	<b>2.6</b>	<b>2.2</b>	<b>2.8</b>	<b>2.4</b>

**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)	M (2)	S(3)
CO3	S(3)	S(3)	M (2)	M (2)	M (2)
CO4	S(3)	M (2)	M (2)	M (2)	S(3)
CO5	M (2)	S(3)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>2.8</b>	<b>2.6</b>	<b>2.4</b>	<b>2.2</b>	<b>2.6</b>

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

SEMESTER - I					
Core	Course Code : 541104	Discrete Mathematics	T	Credits:4	Hours:4
<b>Unit -I</b>					
<b>Objective 1</b>	<b>To have an understanding of the theory of inference for the statement of calculus.</b>				
<b>Mathematical Logic:</b> Statements and notation – Connectives - Normal forms – The theory of inference for the statement calculus – The predicate calculus – Inference theory and predicate calculus.					
<b>Outcome 1</b>	<b>Develop Problem-solving skills.</b>				<b>K1</b>
<b>Unit II</b>					
<b>Objective 2</b>	<b>To discuss the basic concepts of sets, Notation, Inclusion, Equality of sets and functions</b>				
<b>Set theory :</b> Sets – Basic concepts – Notation – Inclusion and equality of sets – The power set – Relations and ordering – Properties – relation matrix and graph of a relation – Partition – Equivalence and compatibility relations – Composition – Partial ordering – Partially ordered set - Functions – Definition – Composition – Inverse – Binary and n-ary operations – Characteristic function – Hashing function.					
<b>Outcome2</b>	<b>Enhance Analytical skills.</b>				<b>K3</b>
<b>Unit III</b>					
<b>Objective 3</b>	<b>To know and understand the concept of Groups, Co-sets and Lagrange's theorem and Normal subgroups.</b>				
<b>Algebraic structures</b> - Algebraic systems: Examples and general properties – semigroups and monoids: Definitions and examples – Homomorphism of semigroups and monoids – Sub semigroups and sub monoids – Groups: Definitions and examples – Cosets and Lagrange's theorem – Normal subgroups – Algebraic systems with two binary operations.					
<b>Outcome3</b>	<b>Learn Algebraic structures.</b>				<b>K4</b>
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To understand the concept of basic graph theory notions and to apply with computer applications.</b>				
<b>Graph theory:</b> Basic concepts – Definitions – Paths – Reachability and connectedness – Matrix representation of graphs – Trees.					
<b>Outcome4</b>	<b>Define and recognize the basic concepts of graph theory.</b>				<b>K2</b>
<b>Unit V</b>					
<b>Objective 5</b>	<b>Develop the probability distributions and mathematical expectations.</b>				
<b>Finite probability</b> – Probability distributions – Conditional probability – independence – Bayes' theorem – Mathematical expectation.					
<b>Outcome 5</b>	<b>Identify the concepts of finite probability.</b>				<b>K5</b>



**Textbook(s):** Tremblay, J.P., Manohar, R. (2017). *Discrete Mathematical Structures with Applications to Computer Science*. New York: Mc-Graw Hill Book Company. (Unit I to IV).

**Suggested Readings:**

Judith Gersting, L. (2003). *Mathematical Structures for Computer Science*. (5<sup>th</sup> ed.). W.H.Freeman and Company.(Unit V)

Kolman, B., Roberty Busby, C., Sharn Cutter Ross, (2013). *Discrete Mathematical Structures*. (6<sup>th</sup> ed.). Pearson Education.

Ramasamy, V., (2006). *Discrete Mathematical Structures with application to Combinatorics*. Universities Press

**Online resources**

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

<https://www.classcentral.com/course/swavam-discrete-mathematics-5217>

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

**Course Designed by:**

**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)	L(1)	S(3)	S(3)
CO2	S(3)	M(2)	S(3)	L(1)	M(2)	S(3)	S(3)	S(3)	S(3)	S(3)
CO3	S(3)	S(3)	M(2)	S(3)	S(3)	S(3)	S(3)	S(3)	S(3)	M(2)
CO4	S(3)	S(3)	L(1)	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)	M(2)	S(3)	M(2)	S(3)
<b>W.AV</b>	<b>3</b>	<b>2.8</b>	<b>2.4</b>	<b>2.4</b>	<b>2.8</b>	<b>2.8</b>	<b>2.8</b>	<b>2.6</b>	<b>2.8</b>	<b>2.8</b>

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

**Course Outcome VS Programme Specific Outcomes**

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	S(3)	S(3)
CO2	S(3)	L(1)	S(3)	S(3)	M(2)
CO3	S(3)	M(2)	S(3)	S(3)	S(3)
CO4	S(3)	M(2)	S(3)	S(3)	L(1)
CO5	S(3)	S(3)	S(3)	S(3)	S(3)
<b>W.AV</b>	<b>3</b>	<b>2.2</b>	<b>2.8</b>	<b>3</b>	<b>2.4</b>

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

SEMESTER – I					
Core	CourseCode: 541105	OBJECT ORIENTED PROGRAMMING and C++ LAB	P	Credits: 2	Hours: 4
<b>Objectives</b>	<ul style="list-style-type: none"> <li>The main objectives of this course are to:               <ol style="list-style-type: none"> <li>To study the features of commercial C++ Language such as</li> <li>This course gives training to understand the Object-based view of Systems.</li> <li>To develop robust object-based models for Systems.</li> <li>To inculcate necessary skills to handle complexity in software design</li> </ol> </li> </ul>				
<b>LIST OF PROGRAMS</b>	<b>Name of the Program:</b> <ol style="list-style-type: none"> <li>QUADRATIC EQUATION</li> <li>EMPLOYEE DETAILS</li> <li>TABULAR FORMAT</li> <li>INLINE FUNCTION USING METHOD OVERLOADING</li> <li>USING MEMBER FUNCTION</li> <li>OPERATOR OVERLOADING</li> <li>USING FRIEND FUNCTION AND FRIEND CLASS</li> <li>STRING MATCHING CLASS</li> <li>USING CONSTRUCTOR AND DESTRUCTOR</li> <li>MATRIX MULTIPLICATION USING ARRAYS</li> <li>MULTIPLE INHERITANCE</li> <li>RECURSIVE FUNCTION</li> <li>USING TEMPLATES</li> </ol>				
<b>Suggested Readings:</b> E.Balagurusamy, Object oriented programming in C++, Third Edition, Tata McGraw Hill Publications, 2007. Robert Lafore, Object Oriented Programming in Turbo C++, Galgotia Publications, 2003					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>

SEMESTER – I					
Core	Course Code: 541106	RDBMS Lab	P	Credits: 2	Hours: 4
<b>Objectives</b>	<p>The main objectives of this course are to:</p> <ol style="list-style-type: none"> <li>1. To study the features of commercial RDBMS packages such as Oracle and Developer 2000.</li> <li>2. To give Foundation knowledge in database concepts, technology and practice to groom students into well informed database application developers</li> <li>3. To give strong practice in SQL programming through a variety of database problems.</li> <li>4. To practice host language interface with embedded SQL.</li> <li>5. Develop database applications using front-end tools and back-end DBMS</li> <li>6. To create forms and report writer package</li> </ol>				
<b>LIST OF PROGRAMS</b>	<p>Study the features of commercial RDBMS packages such as Oracle and Developer 2000.</p> <p>Laboratory exercise should include defining scheme of applications, creation of a database, writing SQL queries to retrieve information from database.</p> <p>Use of host language interface with embedded SQL.</p> <p>Use of forms and report writer package. Some sample applications, which may be programmed, are given below.</p> <ol style="list-style-type: none"> <li>1. DDL COMMANDS</li> <li>2. DML COMMANDS</li> <li>3. TCL COMMANDS</li> <li>4. IMPLEMENTATION OF CHARACTER FUNCTION</li> <li>5. BUILT IN FUNCTION</li> <li>6. NESTED QUERIES</li> <li>7. JOINS</li> <li>8. VIEWS</li> <li>9. FUNCTIONS</li> <li>10. SET OPERATORS</li> <li>11. IMPLEMENTATION OF CURSOR</li> <li>12. IMPLEMENTATION OF TRIGGER</li> <li>13. SYNONYMS</li> </ol>				
<b>Suggested Readings</b>					
<p>Raghu Ramakrishnan, Johannes Gehrke –“Database Management Systems”, Third Edition, McGraw-Hill Higher Education.</p> <p>Silberschatry, Korth, Sundarshan, “Database system Concepts”, Fourth Edition, Mc GrawHill Higher Education</p> <p>Elmasri, Navathe, “Fundamentals of Database Systems”, Third Edition, Pearson Education Asia</p> <p>S.S. Khandare, “Database Management and Oracle Programming”, First Edition, 2004, S.Chand and Company Ltd.</p> <p>Nilesh Shah, “Database Systems using Oracle”, 2002, Prentice Hall of India.</p> <p>4. Rajesh Narang, “Database Management Systems”, 2004, Prentice Hall of India</p>					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	3	3	3	2	2	3	3
CO2	3	3	3	3	3	3	3	2	3	3
CO3	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	3	3	3
W.AV	3	3	2.75	3	3	3	2.75	2.25	3	3

Low-1      Medium-2      High-3

### Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3
CO2	3	3	3	3
CO3	3	3	3	3
CO4	3	3	3	3
W.AV	3	3	2.75	3

Low-1      Medium-2      High-3



SEMESTER - I					
<b>DSE I</b>	<b>Course Code:</b> <b>541551</b>	<b>COMPUTER NETWORKS</b>	<b>T</b>	<b>Credits: 3</b>	<b>Hours: 3</b>
<b>Unit - I</b>					
<b>Objective 1</b>	<b>To know the general principles of data communication.</b>				
<b>Building a Networks:</b> Requirements - Layering and protocols – Internet Architecture- Line configuration - Topology - Transmission Modes - Categories of Network: LAN, MAN, WAN- Layering and protocols- OSI Layer. <b>Physical Layer:</b> Analog and Digital Signals Performance - Transmission Media.					
<b>Outcome 1</b>	<b>Students can understand the general principles of data communication.</b>				<b>K2</b>
<b>Unit II</b>					
<b>Objective 2</b>	<b>To know how computer networks are organized with the concept of layered approach.</b>				
<b>Data Link Layer:</b> Internet Architecture – Network software – Performance ; Link layer Services, Error Detection and correction – Introduction – Block Coding – Cyclic Redundancy Check – Framing – Flow and error Control – Data link layer protocols: stop - wait protocol and sliding window protocol - <b>Multiple Access Protocols:</b> ALOHA – CSMA – CSMA/CD – CSMA/CA.					
<b>Outcome 2</b>	<b>Lerner’s can understand Organization of computer networks with the concept of layered approach.</b>				<b>K4</b>
<b>Unit III</b>					
<b>Objective 3</b>	<b>To know the networking concepts and basic communication model</b>				
<b>Network Layer:</b> Circuit switching - packet switching - message switching – Virtual circuit and Datagram subnets - <b>Routing algorithm :</b> Static routing -shortest path routing, Flooding, Flow based routing - Dynamic routing - distance vector routing, link state routing - Hierarchical routing, Broad cast, Multi cast routing – Congestion Control Algorithms- Qos.					
<b>Outcome 3</b>	<b>Students know about the networking concepts and basic communication model.</b>				<b>K4</b>
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To analyze the contents in a given data link layer packet, based on the layer concept.</b>				
<b>Transport Layer:</b> Process to process delivery – UDP – TCP - Connection oriented Vs connection less services. <b>Applications and services:</b> Remote Logon – Mail Exchange - File Transfer - Remote Procedure Call - Remote File Access – Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS – SNMP.					
<b>Outcome 4</b>	<b>Students should know contents in a given data link layer packet, based on the layer concept.</b>				<b>K2</b>

Unit V					
<b>Objective 5</b>	<b>To study the concepts of Network Security</b>				
Network Security – Cryptography – Encryption model – Transposition and Substitution Chipers– Symmetric key cryptography: DES – AES – Asymmetric key Cryptography: RSA – Security services - El Gamal Cryptosystem- Elliptic Curve.					
<b>Outcome 5</b>	<b>Learners can understand the concepts of Network Security, Cryptography and Encryption model.</b>				<b>K5</b>
<b>Suggested Readings:</b> Andrew Tanenbaum.S. (2012). Computer Networks, 5e, Pearson Education Behrouz Forouzan.A. (2017). Data Communications and Networking, 4e, TMH. Keshav.S. (2019). An Engineering Approach to Computer Networks, 5e, Pearson Education, Peterson.L, Bruce S.Davie (2011). Computer Networks: A Systems Approach, 5e, Morgan Kaufmann Publishers. William Stallings. (2013). Data and Computer Communications, 10e, Prentice Hall.					
<b>Online Resources:</b> <a href="https://www.coursera.org/search?query=computer%20networks&amp;indices">https://www.coursera.org/search?query=computer%20networks&amp;indices</a> <a href="https://www.coursera.org/courses?query=computer%20network">https://www.coursera.org/courses?query=computer%20network</a> <a href="https://www.classcentral.com/course/comnetworks-824">https://www.classcentral.com/course/comnetworks-824</a>					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course Designed by: Dr.P.Eswaran</b>					

#### Course Outcome VS Programme Outcomes

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

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

#### Course Outcome VS Programme Specific Outcomes

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

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

SEMESTER - I					
DSE I	Course Code: 541552	MOBILE COMMUNICATIONS	T	Credits: 3	Hours: 3
<b>Unit - I</b>					
<b>Objective 1</b>	<b>To know the evolution of Mobile communication and cell concept to improve capacity of the system.</b>				
<b>Introduction:</b> Applications - A Simplified reference model. Wireless transmission: Frequencies for radio transmission - Signals – Antennas - Signal propagation – Multiplexing - Modulation - Spread spectrum - Cellular systems.					
<b>Outcome 1</b>	<b>Students can Develop a comprehensive understanding of wireless communication principles, encompassing signal transmission.</b>				<b>K4</b>
<b>Unit II</b>					
<b>Objective 2</b>	<b>To know the fading mechanism and types of fading and effect of fading on Mobile communication.</b>				
<b>Telecommunications Systems:</b> GSM: Mobile services - System architecture - Radio interface – Protocols – Security. UMTS: UMTS system architecture - UMTS radio interface. Satellite Systems: Applications - Basic Types of Satellite Orbits - GEO - LEO - MEO - Routing - Localization – Handover					
<b>Outcome 2</b>	<b>Analyze and evaluate advanced telecommunications systems, including GSM, UMTS.</b>				<b>K5</b>
<b>Unit III</b>					
<b>Objective 3</b>	<b>To know the role of equalization in Mobile communication and to study different types of Equalizers and Diversity techniques.</b>				
<b>Wireless LAN:</b> IEEE - System architecture - Protocol architecture. Bluetooth: User scenarios - Architecture - Radio layer - Baseband layer - Link manager protocol - L2CAP - Security – SDP - Profiles.					
<b>Outcome 3</b>	<b>Understand and apply wireless LAN technologies like IEEE standards and Bluetooth, including architecture, protocols, security, and layers, to analyze, design, and secure effective wireless communication systems</b>				<b>K4</b>
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To know the types of channel coding techniques, data transmission modes and services.</b>				
<b>Mobile Network Layer:</b> Mobile IP - Goals, assumptions and requirements - Entities and terminology - IP packet delivery - Agent discovery - Registration - Tunneling and encapsulation - Optimizations - Reverse tunneling - IPv6. Mobile ad-hoc networks: Routing - Destination sequence distance vector - Dynamic source routing - Overview ad-hoc routing protocols- Wireless Application Protocol: Architecture.					
<b>Outcome 4</b>	<b>Analyze and comprehend mobile network layers including Mobile IP, mobile ad-hoc networks, and Wireless Application Protocol (WAP), considering goals.</b>				<b>K3</b>

Unit V					
<b>Objective 5</b>	<b>To understand about Android and 4G networks.</b>				
<b>Android:</b> Android Components – Android Development Tools – Android Application Architecture – Installation – Android Virtual Devices–Emulator– Create and Run Android Virtual Device – Your First Android Project – Starting an Installed Application. Dynamic content: 4G Networks: Introduction – 4G vision – 4G features and challenges – Applications of 4G.4G Technologies: Multicarrier modulation – Smart antenna techniques – OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.					
<b>Outcome 5</b>	<b>Comprehend Android development components, tools, and architecture, alongside exploring dynamic content and 4G network technologies.</b>				<b>K5</b>
<b>Suggested Readings:</b> Jochen Schiller, “Mobile communications”, Pearson Education, Second Edition 2008. Vijay Garg ,” Wireless communication and Networking” ,First Edition ,Elsevier 2007. Lars Vogel, Android Development Tutorial Based on Android 4.0, tutorial. 2012 ( <a href="http://www.vogella.com/articles/Android/article.html">http://www.vogella.com/articles/Android/article.html</a> ). Asoke K. Talukder , Hasan Ahmed and Roopa R Yavagal, Mobile Computing, McGraw Hill, Second Edition, 2011. Wei–Meng Lee, Beginning Android Application Development, John Wiley and Sons, Inc, 2012.					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course Designed by: Dr.K.Mahesh</b>					

#### Course Outcome VS Programme Outcomes

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

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)	L(1)
CO2	S(3)	M(2)	M(2)	M(2)	M(2)
CO3	M(2)	S(3)	M(2)	M(2)	L(1)
CO4	L(1)	M(2)	S(3)	S(3)	L(1)
CO5	L(1)	M(2)	M(2)	L(1)	M(2)
<b>W.AV</b>	<b>1.8</b>	<b>2</b>	<b>2</b>	<b>1.8</b>	<b>1.4</b>

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



SEMESTER - I				
<b>DSE I</b>	<b>Course Code:</b> <b>541553</b>	<b>PROFESSIONAL ETHICS</b>	<b>T</b>	<b>Credits: 3</b> <b>Hours: 3</b>
UNIT I				
<b>Objective 1</b>	To know the fundamentals of ethics, right and Duties			
<b>INTRODUCTION TO ETHICS:</b> Definition of Ethics- Right, Good, Just- The Rational Basis of Ethics -Theories of Right: Intuitionist vs. End-Based vs. Duty-Based -Rights, Duties, Obligations - Theory of Value - Conflicting Principles and Priorities -The Importance of Integrity - The Difference Between Morals, Ethics, and Laws -Ethics in the Business World - Corporate Social Responsibility - Creating an Ethical Work Environment -Including Ethical Considerations in Decision Making.				
<b>Outcome 1</b>	<b>To understand the importance of ethical work environment</b>			<b>K1, K2</b>
UNIT II				
<b>Objective 2</b>	To list the concepts of computer ethics in Information Technology			
<b>ETHICS IN INFORMATION TECHNOLOGY, INTERNET CRIME:</b> IT Professionals - Are IT Workers Professionals- Professional Relationships That Must Be Managed -Professional Codes of Ethics - Professional Organizations - Certification - IT Professional Ethics, Three Codes of Ethics, Management Conflicts. The Reveton Ransom ware Attacks -IT Security Incidents: A Major Concern - Why Computer Incidents Are So Prevalent - Types of Exploits -Types of Perpetrators-Federal Laws for Prosecuting Computer Attacks- Implementing Trustworthy Computing -Risk Assessment -Establishing a Security Policy - Educating Employees and Contract Workers				
<b>Outcome 2</b>	<b>To understand the code of ethics and standards of computer professionals</b>			<b>K2</b>
UNIT III				
<b>Objective 3</b>	To acquire knowledge about intricacies of accessibility issues			
<b>FREEDOM OF EXPRESSION, PRIVACY:</b> First Amendment Rights -Obscene Speech-Defamation -Freedom of Expression: Key Issues - Controlling Access to Information on the Internet -Strategic Lawsuit Against Public Participation (SLAPP)-Anonymity on the Internet-Hate Speech- Privacy Protection and the Law- Information Privacy- Privacy Laws, Applications, and Court Rulings-Key Privacy and Anonymity Issues- Data Breaches -Electronic Discovery-Consumer Profiling- Workplace Monitoring –Advanced Surveillance Technology				
<b>Outcome 3</b>	<b>To apply privacy laws in working environment</b>			<b>K3</b>
UNIT IV				
<b>Objective 4</b>	To analysis intellectual property rights			
<b>FREEDOM OF EXPRESSION, INTELLECTUAL PROPERTY RIGHTS:</b> Intellectual Property Rights-Copyrights-Copyright Term - Eligible Works -Fair Use Doctrine - Software Copyright Protection –Copyright Laws and the internet-Copyright and Piracy–Patents- -Software Patents -Cross-Licensing Agreements -Trade Secrets-Trade Secret Laws -Employees and Trade Secrets-Key Intellectual Property Issues-Plagiarism -Reverse Engineering-Open Source Code- Competitive Intelligence -Trademark Infringement -Cyber squatting				
<b>Outcome 4</b>	<b>To develop a responsible attitude towards the use of computers as well as the technology.</b>			<b>K3</b>

UNIT V					
<b>Objective 5</b>	<b>Envision the societal impact on the products/ projects they develop in their career</b>				
<b>SOCIAL NETWORKING ETHICS AND ETIQUETTES:</b> Social Networking Web Site- Business Applications of Online Social Networking-Social Network Advertising-The Use of Social Networks in the Hiring Process-Social networks Ethical Issues – Cyber bullying- Online Virtual Worlds-Crime in Virtual Worlds-Educational and Business Uses of Virtual Worlds.					
<b>Outcome 5</b>	<b>Determine the Social Networking Ethics and Etiquettes</b>				<b>K5</b>
<b>Suggested Readings:</b>					
Barger, Robert. (2008). Computer ethics: A case-based approach, Cambridge University Press 1 <sup>st</sup> Ed.					
Caroline Whitback, Ethics in Engineering Practice and Research“, Cambridge University Press, 2 <sup>nd</sup> Edition 2011.					
George Reynolds, 2018, “Ethics in Information Technology”, Cengage Learning, 6 <sup>th</sup> Edition.					
John Weckert and Douglas Adeney, 1997, Computer and Information Ethics, Greenwood Press, First Edition.					
Penny Duquenoy, Simon Jones and Barry G Blundell, 2008, “Ethical, legal and professional issues in computing”, Middlesex University Press, First Edition.					
Sara Baase, 2018, “A Gift of Fire: Social, Legal, and Ethical Issues for Computing Technology”, 4 <sup>th</sup> Edition, Pearson India.					
<b>Online Resources</b>					
<a href="http://www.infosectoday.com/Articles/Intro_Computer_Ethics.html">http://www.infosectoday.com/Articles/Intro_Computer_Ethics.html</a>					
<a href="https://en.wikibooks.org/wiki/Ethics_for_IT_Professionals">https://en.wikibooks.org/wiki/Ethics_for_IT_Professionals</a>					
<a href="https://onlineethics.org/cases/ethics-and-professional-responsibility-computing">https://onlineethics.org/cases/ethics-and-professional-responsibility-computing</a>					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course designed by: Dr. G. Shanthi</b>					

### Course Outcome VS Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	S(3)	L(1)	L(1)	L(1)
<b>CO2</b>	M(2)	M(2)	S(3)	M(2)	L(1)	M(2)	M(2)	M(2)	M(2)	M(2)
<b>CO3</b>	M(2)	M(2)	M(2)	L(1)	L(1)	M(2)	M(2)	L(1)	L(1)	L(1)
<b>CO4</b>	M(2)	M(2)	M(2)	L(1)	M(2)	L(1)	S(3)	M(2)	L(1)	L(1)
<b>CO5</b>	S(3)	M(2)	L(1)	L(1)	L(1)	L(1)	S(3)	M(2)	L(1)	L(1)
<b>W. AV</b>	<b>2.4</b>	<b>2</b>	<b>2</b>	<b>1.4</b>	<b>1.4</b>	<b>1.4</b>	<b>2.6</b>	<b>1.6</b>	<b>1.2</b>	<b>1.2</b>

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

### Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	S(3)	M(2)	M(2)	M(2)
CO2	M(2)	M(2)	S(3)	S(3)	M(2)
CO3	S(3)	M(2)	L(1)	M(2)	M(2)
CO4	M(2)	S(3)	L(1)	L(1)	L(1)
CO5	M(2)	M(2)	L(1)	L(1)	L(1)
W. AV	2.4	2.4	1.6	1.8	1.6

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



SEMESTER-II					
Core	Course Code :	DESIGN AND ANALYSIS OF ALGORITHM	T	Credits: 4	Hours: 4
<b>UNIT I</b>					
<b>Objective 1</b>	<b>To understand the basics of Algorithm</b>				
Introduction: What is Algorithm? – Fundamentals of Algorithmic problem solving – important problem types – Fundamentals of Analysis of Algorithm efficiency– Mathematical Analysis of Non Recursive Algorithms-Mathematical Analysis of Recursive Algorithms – Algorithm for Computing Fibonacci Numbers – Empirical Analysis of Algorithms.					
<b>Outcome 1</b>	<b>To list the fundamental concepts of Algorithm</b>				<b>K1,K2</b>
<b>UNIT II</b>					
<b>Objective 2</b>	<b>To demonstrate a familiarity with major algorithms and data structures</b>				
Brute Force – Selection Sort, Bubble sort, Sequential Search – Closet-Pair and Convex-Hull Problems-Depth first search and Breadth first search – Divide and Conquer – Merge sort, Quick sort, Binary Search, Strassen’s matrix multiplication.					
<b>Outcome 2</b>	<b>To develop efficient algorithm for a given problem and able to analyze its time and space complexity</b>				<b>K3</b>
<b>UNIT III</b>					
<b>Objective 3</b>	<b>To apply important algorithmic design paradigms and methods of analysis</b>				
Dynamic Programming – General Method – Computing a Binomial Coefficient – Warshall’s and Floyd’s Algorithms- Optimal Search Binary trees – Knapsack Problem – Greedy Technique - General Method, Applications - Prim’s Algorithm, Kruskal’s Algorithm, Dijkstra’s Algorithm.					
<b>Outcome 3</b>	<b>To apply design and development principles in the construction of software systems of varying complexity</b>				<b>K3, K4</b>
<b>UNIT IV</b>					
<b>Objective 4</b>	<b>To explain about the various algorithm design techniques</b>				
Decrease and Conquer–Insertion sort–Depth First Search, Breadth First Search - Topological Sorting – Algorithm for generating Combinatorial Objects. Transform and Conquer – Presorting – Heap and Heap sort – Problem Reduction – Computing Least Common Multiple – Counting Paths in a Graph- Reduction of Optimization Problem – Reduction to Graph Problems.					
<b>Outcome 4</b>	<b>To apply the algorithm design techniques to any of the real world problem.</b>				<b>K3</b>
<b>UNIT V</b>					
<b>Objective 5</b>	<b>To determine the various problem types</b>				
Back Tracking – General Method – 8 Queen’s Problem – Sum of Subsets – Graph Colouring – Hamiltonian cycle – Branch and Bound – General Method – Assignment Problem - Knapsack problem – Travelling Salesman Problem. P, NP and NP-complete Problems					
<b>Outcome 5</b>	<b>To use current techniques, skills, and tools necessary for computing practice</b>				<b>K5</b>

<b>Suggested Readings:</b> AnanyLevitin, 2012. Introduction to Design and Analysis of Algorithms, Pearson education, 3e. Lee.R.C.T, Shian-Shyong Tseng, Ruei-Chuan Chang, Tsai.Y.T, 2005, Introduction to the Design and Analysis of Algorithms: A Strategic Approach, McGraw-Hill Sridhar.S, 1e, Design and Analysis of Algorithms, 2014 oxford university press.					
<b>Online Resources</b> www.geeksfor geeks.org/design-and-analysis-of-algorithms https://ocw.mit.edu/courses/6-046j-design-and-analysis-of-algorithms-spring-2015 https://onlinecourses.nptel.ac.in/noc20_cs71/preview					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course designed by: Dr.G. Shanthi</b>					

### Course Outcome VS Programme Outcomes

<b>PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO</b>										
<b>CO1</b>	S(3)	M(2)	M(2)	L(1)	L(1)	L(1)	L(1)	L(1)	M(2)	L(1)
<b>CO2</b>	M(2)	S(3)	S(3)	M(2)	M(2)	L(1)	L(1)	L(1)	M(2)	M(2)
<b>CO3</b>	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
<b>CO4</b>	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)
<b>CO5</b>	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	L(1)	L(1)
<b>W. AV</b>	<b>2.6</b>	<b>2.4</b>	<b>2.4</b>	<b>2.2</b>	<b>1.6</b>	<b>1.4</b>	<b>1.6</b>	<b>1.6</b>	<b>1.6</b>	<b>1.4</b>

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

### Course Outcome VS Programme Specific Outcomes

<b>PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO</b>					
<b>CO1</b>	S(3)	S(3)	S(3)	M(2)	M(2)
<b>CO2</b>	M(2)	S(3)	M(2)	M(2)	L(1)
<b>CO3</b>	S(3)	M(2)	S(3)	M(2)	M(2)
<b>CO4</b>	M(2)	S(3)	M(2)	M(2)	M(2)
<b>CO5</b>	M(2)	M(2)	M(2)	M(2)	M(2)
<b>W. AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.4</b>	<b>2</b>	<b>1.8</b>

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

SEMESTER-II					
Core	Course Code: 541202	ADVANCED JAVA ROGRAMMING	T	Credits: 4	Hours :4
<b>UNIT I</b>					
<b>Objective 1</b>	<b>To provide an overview of Object Oriented Programming concepts and Java Programming Language</b>				
Fundamentals of Object-Oriented Programming: - Basic concepts of OOP – Benefits – Applications Java Evolution: Features – how java differs from C and C++ - java and internet- java support system – java environment - Overview of Java Language –constants variables and data types- Operators and Expressions - Decision Making and Branching - Looping					
<b>Outcome 1</b>	<b>Students can summarize Object Oriented Programming</b>				K1
<b>UNIT II</b>					
<b>Objective 2</b>	<b>To create programs using classes, methods, Inheritance, Interface and packages</b>				
Classes, Objects and Methods: - Defining a class –fields –methods –creating objects – accessing class members – constructors – methods overloading –static members – nesting of methods – Inheritance –overriding methods –final variables-classes – methods- Arrays, Strings and Vectors: One dimensional Arrays –creating of array – Two dimensional arrays- strings –vectors –Wrapper classes – Enumerated Types - Packages: Defining interface –Extending interfaces – Implementing Interfaces.					
<b>Outcome 2</b>	<b>Learners can create programs using inheritance, interfaces and Packages</b>				K6
<b>UNIT III</b>					
<b>Objective 3</b>	<b>To build Java applications using JDBC</b>				
JDBC Overview - Connection Class –Meta Data Function –SQL Exception– SQLwarning - Statement –Result Set - Other JDBC Classes.					
<b>Outcome 3</b>	<b>Learners can construct Java applications using JDBC</b>				K6
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To create applications using RMI</b>				
Inet Address - TCP/ IP client sockets - TCP/ IP server sockets - URL – URL Connection - Datagrams - Client/ Server application using RMI.					
<b>Outcome 4</b>	<b>Students can design applications to remotely invoke services using RMI</b>				K3
<b>Unit V</b>					
<b>Objective 5</b>	<b>To develop application programs using AWT and swing packages</b>				
JApplet - Button - Combo - Trees - Tables – Panes. Introduction to AWT - Working with windows, Graphics, Text using AWT Controls and Layout managers.					
<b>Outcome 5</b>	<b>Students can build interactive applications using AWT and swing</b>				K6
<b>Suggested Readings:</b> Balagurusamy.E, 2011, 5e, Tata McGraw-Hill. Herbert Schildt, 2017, “Java Programming with Java -The Complete Reference”, 9E, McGraw-Hill. Krishnamoorthy.R and Prabhu.S, 2004, <i>Internet and Java Programming</i> , New Age International Publishers Wigglesworth and Wandra, 2011, "Java Programming Advance Topics", 3e, Cengage.					

**Online Resources:**

<https://gfgc.kar.nic.in/sirmv-science/GenericDocHandler/138-a2973dc6-c024-4d81-be6d-5c3344f232ce.pdf>

<https://www.iitk.ac.in/esc101/share/downloads/javanotes5.pdf>

<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
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**Course Designed by: Dr.M.Vanitha**

### Course Outcomes 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)	S(3)	M(2)	L(1)	M(2)	L(1)
CO2	S(3)	S(3)	S(3)	M(2)	M(2)	L(1)	L(1)	L(1)	M(2)	M(2)
CO3	S(3)	M(2)	S(3)	M(2)	M(2)	L(1)	L(1)	L(1)	M(2)	M(2)
CO4	S(3)	M(2)	S(3)	M(2)	L(1)	L(1)	L(1)	L(1)	L(1)	S(3)
CO5	S(3)	M(2)	S(3)	M(2)	L(1)	M(2)	L(1)	L(1)	L(1)	M(2)
W.AV	3	2.4	3	2	1.6	1.6	1.2	1	1.6	2

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

### Course Outcome VS Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S(3)	M(2)	S(3)	L(1)	L(1)
CO2	S(3)	M(2)	L(1)	L(1)	M(2)
CO3	S(3)	M(2)	S(3)	S(3)	L(1)
CO4	S(3)	L(1)	L(1)	L(1)	L(1)
CO5	S(3)	M(2)	S(3)	L(1)	L(1)
W.AV	3	1.8	2.2	1.4	1.2

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

Semester - II					
Core	CourseCode: 541203	Accounting and Financial Management	T	Credits:4	Hours: 4
<b>Unit -I</b>					
<b>Objective 1</b>	<b>To familiarize the scope, principles and conventions of accounting and financial management.</b>				
<b>Financial Accounting:</b> Meaning and Scope – Principles – Concepts – Conventions – Accounting process: Journal - Ledger – Trail Balance – Trading Account – Profit and Loss Account–Balance Sheet–Accounting Ratio Analysis–Funds Flow Analysis –Cash Flow Analysis – Computerized account.					
<b>Outcome1</b>	<b>Learners understand the knowledge about final accounts</b>				<b>K2</b>
<b>Unit II</b>					
<b>Objective 2</b>	<b>To educate on the process and use of cost and management accounting.</b>				
<b>Cost and Management Accounting:</b> Meaning Scope and uses of cost and management accounting – Elements of Cost – Cost Sheet – Marginal Costing and Cost Volume Profit Analysis – Break Even Analysis: Concept, Applications and Limitations.					
<b>Outcome 2</b>	<b>Students identify about costing and break even analysis.</b>				<b>K3</b>
<b>Unit III</b>					
<b>Objective 3</b>	<b>To educate on the process and use of cost and management accounting.</b>				
<b>Standard Costing and budgeting:</b> Concept and importance standard costing – Variance Analysis – Material – Labor – Overhead – Sales – Profit Variances - Budgets and Budgetary Control – Meaning and Types of budgets – Sales Budget – Production Budget – Cash Budget – Master Budget – Flexible budgeting – Zero Base Budgeting					
<b>Outcome 3</b>	<b>Students analyze about costing and break even analysis.</b>				<b>K4</b>
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To provide knowledge about the functions of financial management.</b>				
<b>Financial Management:</b> Objective and Functions of Financial Management – Risk – Return Relationship –Time Value of Money – Capital Budgeting: Basic Methods of Appraisal of investments – Concepts of working Capital - Factors Affecting working Capital – Estimation of working capital requirements.					
<b>Outcome4</b>	<b>Learners able to assess about various investment opportunities</b>				<b>K5</b>
<b>Unit V</b>					
<b>Objective 5</b>	<b>To Learn the types of cost of capital and computation of cost of debt and equity shares.</b>				
<b>Cost of Capital, Capital Structure and Dividend:</b> Meaning and types of Cost of Capital – computation of cost for debt and equity sources of capital and weighted average cost of capital – Meaning and types of capital structure – determinants of capital structure – types of Dividend Policy – Types of Dividend decision.					
<b>Outcome5</b>	<b>Learners critically evaluate an optimum capital structure</b>				<b>K5</b>



**Suggested Readings:**

Chand.S, 2016, Advanced Accounts Vol. II by Shukla,M.C, Grewal.T.C and Gupta.S.C  
 Pandey I M, 2002, Financial Management, 4th Edition, Vikas Publications.  
 Khan and Jain, 2011. *Management accounting: Text problems and cases.*  
 Ravi M.Kishore, 2010. *Management accounting and financial analysis*”, Taxmons,  
 S.N.Maheswari, 2010. “*Management accounting & Financial accounting*”, Vikas Publications  
 Shula and T.S. Grewal, 2010 “*Advanced Accounting*”, S.Chand and company.

**Online resources**

<https://www.slideshare.net/ashu1983/financial-accounting>  
<https://www.slideshare.net/NEETHUSJAYAN/financial-analysis-and-types-of-financial-analysis>  
<https://www.slideshare.net/lovelynisha01/overview-of-cost-management-accounting>  
<https://slideplayer.com/slide/12380931/>  
<https://www.slideshare.net/Jasirgemz/capital-structure-decisions-cost-of-capital-weighted-average-cost-of-capital-theories-of-capital-structure>

<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
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Course designed by: **Dr.B.Menaka**

**Course Outcome VS Programme Outcomes**

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

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

**Course Outcome VS Programme Specific Outcomes**

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

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

II - SEMESTER					
Core	Course Code: 541204	OPERATING SYSTEM	T	Credits: 4	Hours: 4
<b>Unit - I</b>					
<b>Objective 1</b>	<b>To study memory management functions and file system implementation</b>				
<b>Introduction:</b> Definition of Operating System – Computer System Organization – Computer System Architecture – Operating System Structure – Operating System Operations. <b>Operating System Structures:</b> Operating System Services – System Calls – System Programs – Operating System Design and Implementation.					
<b>Outcome 1</b>	<b>Students can understand the memory management functions and file system implementation.</b>				<b>K2</b>
<b>Unit II</b>					
<b>Objective 2</b>	<b>To learn how Operating System is Important for Computer System.</b>				
<b>Process Management:</b> Process Concept – Process Scheduling – Operations on Processes – Inter Process Communication. <b>Process Synchronization:</b> The Critical Section Problem – Synchronization Hardware – Semaphores – Classic Problems of Synchronization – Monitors.					
<b>Outcome 2</b>	<b>Lerner’s can understand and implement the algorithms in process management and solving the issues.</b>				<b>K4</b>
<b>Unit III</b>					
<b>Objective 3</b>	<b>To make aware of different types of Operating System and their services.</b>				
<b>CPU Scheduling:</b> Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple Processor Scheduling. <b>Deadlocks:</b> Deadlocks Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.					
<b>Outcome 3</b>	<b>Students know about the Principles of Deadlock, processor scheduling and memory management.</b>				<b>K4</b>
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.</b>				
<b>Memory Management:</b> Swapping – Contiguous Memory Allocation – Segmentation – Paging. <b>Mass Storage Structure:</b> Overview of Mass Storage Structure – Disk Structure – Disk Attachment – Disk Scheduling – Disk Management.					
<b>Outcome 4</b>	<b>Students should know process scheduling algorithms, Mass storage structure and virtual memory concepts.</b>				<b>K2</b>
<b>Unit V</b>					
<b>Objective 5</b>	<b>To learn secondary memory management.</b>				
<b>File Concept:</b> Access Methods – Directory and Disk Structure – File – System Mounting – File Sharing – Protection. <b>File System Implementation:</b> File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free Space Management.					
<b>Outcome 5</b>	<b>Learners can understand Disk scheduling, Disk management, File system implementations.</b>				<b>K5</b>
<b>Suggested Readings:</b> Abraham Silberschatz, Peter Baer Galvin and Greg Gagne. (2013). Operating System Concepts: 9 <sup>th</sup> Edition, Wiley India Edition, Bhatt. P. C (2013). An Introduction to Operating Systems: Concepts and Practice (GNU/Linux), 4 <sup>th</sup>					

Edition, Prentice Hall India Learning Private Limited.

**Online Resources:**

[https://drive.uqu.edu.sa/\\_/mskhayat/files/MySubjects/2017SS%20Operating%20Systems/Abraham%20Silberschatz-Operating%20System%20Concepts%20\(9th,2012\\_12\).pdf](https://drive.uqu.edu.sa/_/mskhayat/files/MySubjects/2017SS%20Operating%20Systems/Abraham%20Silberschatz-Operating%20System%20Concepts%20(9th,2012_12).pdf)

<http://www.cs.pdx.edu/~walpole/class/cs533/papers/RPC.pdf>

<http://www.cs.pdx.edu/~walpole/class/cs533/papers/lrpc.pdf>

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

**Course Designed by: Dr.P.Eswaran**

**Course Outcome VS Programme Outcomes**

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

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

**Course Outcome VS Programme Specific Outcomes**

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

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

<b>SEMESTER- II</b>					
<b>Core</b>	<b>Course Code: 541205</b>	<b>Advanced JAVA PROGRAMMING Lab</b>	<b>P</b>	<b>Credits: 2</b>	<b>Hours: 4</b>
Objectives of the Course	This course gives practical training in basics and advanced Java programming like JDBC, RMI and swing.				
Course Outline	<ol style="list-style-type: none"> <li>1. Classes and objects</li> <li>2. Implementing classes</li> <li>3. Strings</li> <li>4. Collection</li> <li>5. Inheritance</li> <li>6. Packages</li> <li>7. Exception handling</li> <li>8. Threads</li> <li>9. JDBC</li> <li>10. Swing</li> <li>11. RMI</li> </ol>				
<b>Suggested Readings:</b> Bruce W Perry (2004), Java Servlets & JSP Cook Book, Second edition, O'reilly Media. Herbert Schildt, 2017, "Java Programming with Java -The Complete Reference", 9E, McGraw-Hill. Krishnamoorthy.R and Prabhu.S, 2004, Internet and Java Programming, New Age International Publishers					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course Designed by: Dr.M.Vanitha</b>					

### Course Outcome VS Programme Outcomes

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	2	2	2	2	3
CO2	3	3	2	2	2	3	3	3	2	2
CO3	3	2	3	3	2	2	2	3	3	2
CO4	3	3	2	2	3	2	3	2	3	3
CO5	3	2	3	2	1	2	2	2	3	2
W. AV	3	2.6	2.6	2.4	2.2	2.2	2.4	2.4	2.6	2.4

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

### Course Outcome VS Programme Specific Outcomes

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	2	2
CO2	3	2	2	2	3
CO3	3	2	3	3	2
CO4	3	2	2	2	2
CO5	3	3	3	2	3
W. AV	3	2.4	2.6	2.2	2.4

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

SEMESTER - II					
Core	Course Code: 541206	Algorithms Lab	P	Credits: 2	Hours:4
<b>Objectives:</b>		<ul style="list-style-type: none"> <li>• To understand the importance of algorithm and its complexities.</li> <li>• To implement various divide and conquer techniques examples.</li> <li>• To implement various Greedy techniques examples.</li> <li>• To implement various Dynamic Programming techniques examples.</li> <li>• To provide a practical exposure of all algorithms.</li> </ul>			
LIST OF EXPERIMENTS					
<ol style="list-style-type: none"> <li>1. Write a program to find <b>GCD and LCM</b> of given numbers</li> <li>2. Write a program to display <b>Fibonacci series</b> using recursion</li> <li>3. Write a to sort given set of numbers using <b>Selection Sort</b></li> <li>4. Write a program to sort given set of numbers using <b>Bubble Sort</b></li> <li>5. Write a program to search the given number using <b>Linear Search</b></li> <li>6. Write a program to search the given number using <b>Binary Search</b></li> <li>7. Write a program to perform <b>Stack operations</b> (Push, Pop, and Display) using arrays.</li> <li>8. Write a program to find <b>Binomial coefficient</b></li> <li>9. Write a program to implement <b>Warshall's Algorithm</b> for finding transitive closure of the given graph</li> <li>10. Write a program to implement all-pairs shortest paths problem using <b>Floyd's algorithm</b></li> <li>11. Write a program to implement <b>Knapsack Problem</b> using Dynamic Programming</li> <li>12. Find Minimum Cost Spanning Tree of a given connected undirected graph using <b>Prim's algorithm.</b></li> <li>13. Find Minimum Cost Spanning Tree of a given connected undirected graph using <b>Kruskal's algorithm.</b></li> <li>14. Write a program to implement <b>Topological Ordering</b> for Directed Acyclic Graph (DAG)</li> <li>15. Write a program to print all the nodes reachable from a given starting node in a digraph using <b>Breadth First Search</b> method.</li> <li>16. Write a program to check whether a given graph is connected or not using <b>Depth First Search</b> method</li> <li>17. Write a program to sort set of n integer elements using the <b>Quick sort</b> method and compute its time complexity.</li> <li>18. Write a program to sort set of n integer elements using the <b>Merge Sort</b> method and compute its time complexity.</li> <li>19. Write a program to design and implement in java to find a <b>Subset</b> of a given set <math>S = \{S_1, S_2, \dots, S_n\}</math> of n positive integers whose SUM is equal to a given positive integer d.</li> <li>20. Write a program to implement <b>Traveling Salesman Problem</b></li> <li>21. Write a program to find all <b>Hamiltonian Cycle</b> in a connected undirected Graph G of n vertices using the backtracking principle</li> </ol>					

<b>Outcomes:</b>	<ul style="list-style-type: none"> <li>• CO1: To calculate the time complexity of algorithm.</li> <li>• CO2: To sort the given numbers using various sorting algorithms.</li> <li>• CO3: To write programs for the problems using divide and conquer and greedy method.</li> <li>• CO4: To write programs for the problems using dynamic programming.</li> <li>• CO5: To write programs for the problems using backtracking</li> </ul>				
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course designed by: Dr. G. Shanthi</b>					

### Course Outcome VS Programme Outcomes

PO \ CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
<b>CO1</b>	3	2	2	2	1	1	-	-	-	1
<b>CO2</b>	2	2	3	2	1	-	-	-	2	2
<b>CO3</b>	2	2	2	1	1	-	-	-	-	1
<b>CO4</b>	2	2	2	1	2	-	-	-	1	1
<b>CO5</b>	3	2	2	1	1	1	-	-	1	1
<b>W. AV</b>	2.4	2	2.2	1.4	1.2	1	-	-	1.3	1.2

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

### Course Outcome VS Programme Specific Outcomes

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	2	2	2
<b>CO2</b>	2	2	3	3	2
<b>CO3</b>	3	2	2	2	1
<b>CO4</b>	2	3	1	1	1
<b>CO5</b>	2	2	1	1	1
<b>W. AV</b>	2.4	2.4	1.8	1.8	1.4

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

SEMESTER - II					
DSE II	Course Code: 541554	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	T	Credits: 3	Hours: 3
<b>Unit – I</b>					
<b>Objective 1</b>	<b>To Understand the basic concepts in Artificial Intelligence and Knowledge</b>				
Artificial Intelligence - The AI Problems – The Underlying Assumptions – AI Techniques Problems: Problems Spaces and Search – Defining the Problems as a State Space Search – Production Systems – Problem Characteristics – Production System Characteristics – Issues in the Design of Search Programmes - Generate – and-Test – Hill Climbing – Best-First Search – Problem Reduction – Constraint Satisfaction – Means – Ends – Analysis.					
<b>Outcome 1</b>	<b>Analyze the foundational concepts of AI, including problem spaces, search techniques, production systems, and constraint satisfaction.</b>				<b>K4</b>
<b>Unit II</b>					
<b>Objective 2</b>	<b>Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.</b>				
<b>Knowledge Representation Issues:</b> Representation and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame Problem - Using predicate logic – Representing Simple facts in Logic – Representing Instance and Is a relationships – Computable functions and Predicates – Resolutions – Natural Deductions – Representing Knowledge Using Rules: Procedural versus Declarative Knowledge – Forward versus Backward Reasoning – Matching – Control Knowledge.					
<b>Outcome 2</b>	<b>Comprehend knowledge representation approaches, logic-based representation of facts and relationships</b>				<b>K2</b>
<b>Unit III</b>					
<b>Objective 3</b>	<b>To know about the basic concepts of Machine Learning</b>				
<b>Introduction to Machine Learning :</b> Human Learning - Types of Human Learning - Machine Learning - Types of Machine Learning - Problems Not to be Solved using Machine Learning - Applications of Machine Learning - State of the Art Languages / Tools in Machine Learning - Issues in Machine Learning					
<b>Outcome 3</b>	<b>Gain a solid understanding of machine learning concepts, distinguish between human and machine learning types.</b>				<b>K4</b>
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To acquire knowledge about various tools of Machine Learning</b>				
<b>Preparing to Model:</b> Introduction - Machine Learning Activities - Basic Types of Machine Learning - Exploring Structure of Data - Data Quality and Remuneration - Data Pre-processing. Modelling and Evaluation : Introduction - Selecting a Model - Training a Model - Model Representation and Interpretability – Evaluating Performance of a Model - Improving Performance of a Model.					
<b>Outcome 4</b>	<b>Prepare to model by understanding fundamental machine learning activities and exploring data structure</b>				<b>K3</b>



<b>Unit V</b>					
<b>Objective 5</b>	<b>To understand about Probability and statistical tools</b>				
Overview of Probability : Introduction - Importance of Statistical Tools in Machine Learning - Concept of Probability - Random Variables - Common Discrete Distributions - Multiple Random Variables - Central Limit Theorem - Sampling Distributions - Hypothesis Testing - Monte Carlo Approximation - Bayesian Concept Learning : Introduction - Importance of Bayesian Methods - Bayes Theorem - Bayes Theorem and Concept Learning - Bayesian Belief Network.					
<b>Outcome 5</b>	<b>Understand probability's role in machine learning, including concepts like random variables, distributions, Bayesian methods.</b>				<b>K5</b>
<b>Suggested Readings:</b> Anuradha Srinivasaraghavan, Vincy Elizabeth, 2019, Machine Learning, Wiley Publications. Kevin Night and Elaine Rich, Nair B, 2017, "Artificial Intelligence", Mc Graw Hill - (Unit I, II) Russel, Artificial Intelligence, 2015, A Modern Approach, Pearson Education India; 3 <sup>rd</sup> Edition. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, 2018 "Machine Learning" – Pearson Education; First Edition, (Unit III, IV and V)					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course Designed by: Dr.K.Mahesh</b>					

### Course Outcome VS Programme Outcomes

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

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)	L (1)
CO2	S (3)	M (2)	M (2)	M (2)	M (2)
CO3	M (2)	S (3)	M (2)	M (2)	L (1)
CO4	L (1)	M (2)	S (3)	S (3)	L (1)
CO5	L (1)	M (2)	M (2)	L (1)	M (2)
<b>W.AV</b>	<b>1.8</b>	<b>2</b>	<b>2</b>	<b>1.8</b>	<b>1.4</b>

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

SEMESTER - II					
DSE II	Course Code: 541555	BLOCKCHAIN TECHNOLOGY	T	Credits: 3	Hours: 3
<b>Unit – I</b>					
<b>Objective 1</b>	<b>To Introduce the Basic Concepts and Types</b>				
Fundamentals of Blockchain: Introduction - Origin of Blockchain - Blockchain Solution - Components of Blockchain - Components of Blockchain - Block in Blockchain - The Technology and the Future.					
<b>Outcome 1</b>	<b>Grasp the core concepts of blockchain, including its origins, components, and the technology.</b>				<b>K2</b>
<b>Unit II</b>					
<b>Objective 2</b>	<b>To understand the concept of Private and Public Blockchain.</b>				
Blockchain types and Consensus Mechanism: Introduction - Decentralization and Distribution - Types of Blockchain - Consensus Protocol - CRYPTOCURRENCY - BITCOIN, ALTCOIN and TOKEN: Introduction - Bitcoin and Crypto currency Basics - Types of Crypto currency – Crypto currency Usage.					
<b>Outcome 2</b>	<b>Comprehend blockchain types, consensus mechanisms, and the concepts of cryptocurrencies including Bitcoin, altcoins, and tokens.</b>				<b>K3</b>
<b>Unit III</b>					
<b>Objective 3</b>	<b>Develop smart contracts in Ethereum framework</b>				
Public Blockchain System: Introduction - Public Blockchain - Popular Public Blockchains – The Bitcoin Blockchain - Ethereum Blockchain.					
<b>Outcome 3</b>	<b>Comprehend the fundamentals of public blockchain systems, including their nature, popular examples like Bitcoin and Ethereum.</b>				<b>K4</b>
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To know about Security and Applications of Blockchain Technology.</b>				
<b>Private Blockchain System</b> : Introduction - Key Characteristics of Private Blockchain - Why We Need Private Blockchain - Private Blockchain Examples - Private Blockchain and Open Source - E-Commerce Site Examples - Various Commands in E-Commerce Blockchain - Smart Contract in Private Environment - State Machine - Different Algorithms of Permissioned Blockchain - Byzantine Fault – Multichain.					
<b>Outcome 4</b>	<b>Understand the key attributes of private blockchain systems, their significance, and examples including E-Commerce applications.</b>				<b>K2</b>
<b>Unit V</b>					
<b>Objective 5</b>	<b>To know about how to perform a transaction in bitcoin</b>				
<b>Security in Blockchain</b> : Introduction - Security Aspects in Bitcoin - Security and Privacy Challenges of Blockchain in General - Performance and Scalability - Identity Management and Authentication - Regularity Compliance and Assurance - Safeguarding Blockchain Smart Contract - Security Aspects in Hyper ledger Fabric - Applications Of Blockchain : Blockchain in Banking and Finance - Blockchain in Healthcare.					
<b>Outcome 5</b>	<b>Understand security, privacy, scalability, identity management, and real-world applications in blockchain technology</b>				<b>K5</b>

**Suggested Readings:**

Chandramouli Subramaniam, Asha A George, Abhilash K A, Meera Karthikeyan, Blockchain Technology,2020, University Press

Daniel Drescher Blockchain Basics, 2017,: A Non-Technical Introduction, Apress

Debjani Mohanty ,2018, BlockChain From Concept to Execution, BPB

<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
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**Course Designed by: Dr.K.Mahesh**

### Course Outcome VS Programme Outcomes

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

**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)	L (1)	L (1)
CO2	M (2)	M (2)	L(1)	L (1)	L (1)
CO3	L(1)	L (1)	L(1)	L (1)	L (1)
CO4	L (1)	M (2)	M(2)	M(2)	L (1)
CO5	M (2)	L (1)	M (2)	L (1)	L (1)
<b>W.AV</b>	<b>1.6</b>	<b>1.6</b>	<b>1.4</b>	<b>1.2</b>	<b>1</b>

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

<b>SEMESTER - II</b>					
<b>DSE II</b>	<b>Course Code: 541556</b>	<b>INTERNET OF THINGS</b>	<b>T</b>	<b>Credits: 3</b>	<b>Hours: 3</b>
<b>UNIT I</b>					
<b>Objective 1</b>	<b>To understand the basics of Internet of Things &amp; levels</b>				
<b>INTRODUCTION TO IoT:</b> Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.					
<b>Outcome 1</b>	<b>Learners understand the fundamental concepts of IoT system design.</b>				<b>K1, K2</b>
<b>UNIT II</b>					
<b>Objective 2</b>	<b>To explain about the IoT Architecture and Models</b>				
<b>IoT ARCHITECTURE:</b> 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.					
<b>Outcome 2</b>	<b>Students analyze various models in IoT.</b>				<b>K3</b>
<b>UNIT III</b>					
<b>Objective 3</b>	<b>To learn about the basics of IoT protocols</b>				
<b>IoT PROTOCOLS:</b> 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.					
<b>Outcome 3</b>	<b>Students discuss the various protocols used in IoT.</b>				<b>K3, K4</b>
<b>UNIT IV</b>					
<b>Objective 4</b>	<b>To build a small low-cost embedded system using Raspberry Pi</b>				
<b>BUILDING IoT WITH RASPBERRY PI &amp; ARDUINO:</b> Building IOT with RASPBERRY 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.					
<b>Outcome 4</b>	<b>Student Design and build a portable IoT using Raspberry Pi</b>				<b>K3</b>
<b>UNIT V</b>					
<b>Objective 5</b>	<b>To know the real-world applications of IoT</b>				
<b>CASE STUDIES AND REAL-WORLD APPLICATIONS:</b> 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 Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.					
<b>Outcome 5</b>	<b>Analyze applications of IoT in real time scenario</b>				<b>K5</b>

<b>Suggested Readings:</b>		<b>SEMESTER-III</b>			
ArshdeepBahga, Vijay Madiseti, 2015, “Internet of Things: A hands-on approach”, Universities Press.					
Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), 2011, “Architecting the Internet of Things”, Springer.					
Honbo Zhou, 2012, “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press.					
Jan Ho” Iler, VlasiosTsiatsis , 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.					
Olivier Hersent, David Boswarthick, Omar Elloumi, 2012, “The Internet of Things – Key applications and Protocols”, Wiley.					
<b>Online Resources</b>					
<a href="https://geekflare.com/internet-of-things-iot-learning-resources/">https://geekflare.com/internet-of-things-iot-learning-resources/</a>					
<a href="https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/">https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/</a>					
<a href="https://onlinecourses.nptel.ac.in/noc22_cs53/preview">https://onlinecourses.nptel.ac.in/noc22_cs53/preview</a>					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course designed by: Mr.S. Balasubramanian</b>					

**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)	L(1)	L(1)	M(2)	L(1)
CO2	M(2)	S(2)	S(3)	M(2)	M(2)	L(1)	L(1)	L(1)	M(2)	M(2)
CO3	S(3)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	M(2)	M(2)	L(1)
CO4	M(2)	M(2)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	M(2)
CO5	S(3)	M(2)	M(2)	S(3)	L(1)	L(1)	M(2)	M(2)	L(1)	L(1)
<b>W. AV</b>	<b>2.6</b>	<b>2.4</b>	<b>2.4</b>	<b>2.2</b>	<b>1.6</b>	<b>1.4</b>	<b>1.6</b>	<b>1.6</b>	<b>1.6</b>	<b>1.4</b>

**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)	M(2)	M(2)
CO2	M(2)	S(3)	M(2)	M(2)	L(1)
CO3	S(3)	M(2)	S(3)	M(2)	M(2)
CO4	M(2)	S(3)	M(2)	M(2)	M(2)
CO5	M(2)	M(2)	M(2)	M(2)	M(2)
<b>W. AV</b>	<b>2.4</b>	<b>2.6</b>	<b>2.4</b>	<b>2</b>	<b>1.8</b>

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

<b>Core</b>	<b>Course Code :</b> <b>541301</b>	<b>DATA SCIENCE AND BIG DATA ANALYTICS</b>	<b>T</b>	<b>Credits: 4</b>	<b>Hours: 4</b>
<b>UNIT I</b>					
<b>Objective 1</b>	<b>To understand the basics of Big data analytics</b>				
<b>Introduction to Big Data Analytics :</b> 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 – Model Building– Communicate Results–Operationalize.					
<b>Outcome 1</b>	<b>To know the fundamental concepts of Analytics</b>				<b>K1</b>
<b>UNIT II</b>					
<b>Objective 2</b>	<b>To demonstrate various basic data preparation analytics methods</b>				
Data Analytic Methods: 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 – Wilcoxon Rank-Sum Test – Type I and Type II Errors–Power and Sample Size–ANOVA.					
<b>Outcome 2</b>	<b>Acquire skills in the field of data preparation methods for analytics.</b>				<b>K2</b>
<b>UNIT III</b>					
<b>Objective 3</b>	<b>To apply important algorithmic and methods on various use cases</b>				
Advanced Methods: 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: A Priori 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.					
<b>Outcome 3</b>	<b>To apply various clustering algorithms, association rule algorithms in uses cases.</b>				<b>K3</b>

UNIT IV					
<b>Objective 4</b>	<b>To explain about the various classification models</b>				
<b>CLASSIFICATION :</b> Decision Trees – Overview – Genetic Algorithm – Decision Tree Algorithms – Evaluating Decision Tree – Decision Trees in R - Na'ive Bayes – Bayes Theorem – Naïve Bayes Classifier – Smoothing – Diagnostics – Naïve Bayes in R – Diagnostics of Classifiers – Additional Classification Methods -Time Series Analysis : Overview – Box – Jenkins Methodology – ARIMA Model – Autocorrelation Function – Autoregressive Models – Moving Average Models – ARMA and ARIMA Models – Building and Evaluating and ARIMA Model - Text Analysis : Text Analysis Steps – Example – Collecting – Representing Term Frequency – Categorizing – Determining Sentiments – Gaining Insights.					
<b>Outcome 4</b>	<b>To prove and evaluate the classification models</b>				<b>K5</b>
UNIT V					
<b>Objective 5</b>	<b>To examine various analytics tools and technology</b>				
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 – In Database Text Analysis- Advanced SQL – Windows Functions – User Defined Functions and Aggregates – ordered aggregates- MADiib –Analytics Reports Consolidation – Communicating and operationalizing and Analytics Project – Creating the Final Deliverables : Developing Core Material for Multiple Audiences – Project Goals – Main Findings - Approach Model Description – Key points support with Data - Model details – Recommendations – Data Visualization.					
<b>Outcome 5</b>	<b>To use current techniques, skills, and tools necessary for data analytics</b>				<b>K4</b>
<b>Suggested Readings:</b> Anil Maheshwari, 2017 ,“ Data Analytics”, McGraw HillEducation, John Wiley & Sons, 2015, Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data”, EMC Education Services. Noreen Burlin game, 2012, “The little book on Big Data”, NewStreet publishers. Norman Matloff, 2011, “The Art of R Programming: A Tour of Statistical Software Design”,Starch Press, 1edition,. Sandip Rakshit, 2017, “R for Beginners”, McGraw Hill Education.					
<b>Online Resources</b> <a href="http://www.johndcook.com/R_language_for_programmers.html">http://www.johndcook.com/R_language_for_programmers.html</a> . <a href="http://bigdatauniversity.com/">http://bigdatauniversity.com/</a> .					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course designed by: Dr.P. Prabhu</b>					

### Course Outcome VS Programme Outcomes

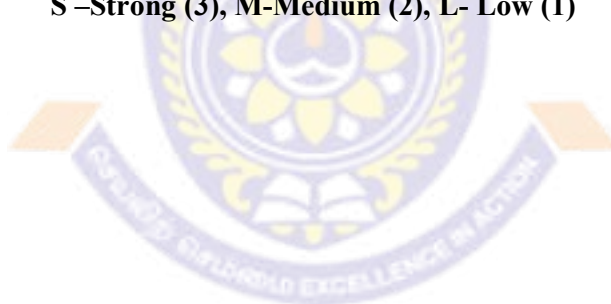
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S(3)	S(3)	M(2)	L(1)	M(2)	M(2)	L(1)	L(1)	M(2)	L(1)
CO2	S(3)	S(3)	S(3)	M(2)	S(3)	M(2)	L(1)	L(1)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	M(2)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)
CO4	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)
CO5	S(3)	S(3)	M(2)	S(3)	S(3)	M(2)	M(2)	M(2)	M(2)	S(3)
W. AV	3	3	2.4	2.2	2.8	2	1.6	1.6	2	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)	M(2)	M(2)	M(2)	M(2)
CO2	S(3)	S(3)	M(2)	M(2)	S(3)
CO3	S(3)	S(3)	S(3)	M(2)	S(3)
CO4	S(3)	S(3)	S(3)	M(2)	S(3)
CO5	S(3)	S(3)	S(3)	M(2)	S(3)
W. AV	2.8	2.8	2.6	2	2.8

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





<b>Core</b>	<b>Course Code:</b> 541302	<b>PYTHON PROGRAMMING</b>	<b>T</b>	<b>Credits:4</b>	<b>Hours: 4</b>
<b>Unit I</b>					
<b>Objective 1</b>	To obtain basic knowledge in Python				
<b>Introduction to Python:</b> Introduction-Python Overview-Comments-Identifiers-Reserved Keywords-Variables-Standard Data type-Operators -Statements and Expressions-String. Operations-Boolean Expressions-Control Statements-Iteration Statements-Input from Keyboard.					
<b>Outcome 1</b>	Summarize the overview of python programming concepts			K1, K2, K3, K6	
<b>Unit II</b>					
<b>Objective 2</b>	To develop knowledge on creating Python programs				
<b>Creating Python Programs:</b> String -String handling functions-String Formatting operator and functions, Tuples, Dictionary, Date & Time, Modules, Defining Functions, Exit function, Lists: Introduction-Built-in Functions-User defined Functions-Python Recursive Function-Writing Python Scripting.					
<b>Outcome 2</b>	Create programs using string Handling and formatting functions, built-in and user defined functions.			K3, K6	
<b>Unit III</b>					
<b>Objective 3</b>	To develop Python programs with conditionals, loops and functions.				
<b>Control Structures:</b> Input and Output Statements, Control Statements - Looping while Loop, for Loop, Loop Control, Conditional Statement-if...else, Difference between break, continue and pass.					
<b>Outcome 3</b>	Build programs using control structures			K3, K5, K6	
<b>Unit IV</b>					
<b>Objective 4</b>	To define a class with attributes and methods in python				
<b>Classes &amp; Objects:</b> Introduction-class Definition-creating Objects-Objects as a Arguments- Object as Return Values-Built-in Class Attributes-Inheritance-Method Overriding-Data Encapsulation-Data Hiding.					
<b>Outcome 4</b>	Design applications using classes and objects			K3, K6	
<b>Unit V</b>					
<b>Objective 5</b>	<b>To develop database connection oriented Python programs</b>				
<b>Python Libraries and Database Connectivity :</b> Reading and Writing CSV Files in Python using CSV Module- Python-Database Connectivity-Establishing Connection and Cursor Object - The importance of python programming in getting employment opportunities in bigdata-discussions					
<b>Outcome 5</b>	Build libraries and database connectivity			K3,K6	
<b>Suggested Readings:</b>					
Charles Dierbach, 2016 Introduction to Computer Science using Python, 1 <sup>st</sup> Edition, Wiley India Edition.					
Martin C.Brown, 2018 Python: The Complete Reference, 1 <sup>st</sup> Edition, McGraw Hill India.					
Reema Thareja, 2017 Python Programming using Problem Solving Approach, 1 <sup>st</sup> Edition Oxford University Press.					
Sheetal Taneja, Naveen Kumar, 2017, Python Programming, 1 <sup>st</sup> Edition, Pearson India.					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course Designed by: Dr.M.Vanitha</b>					

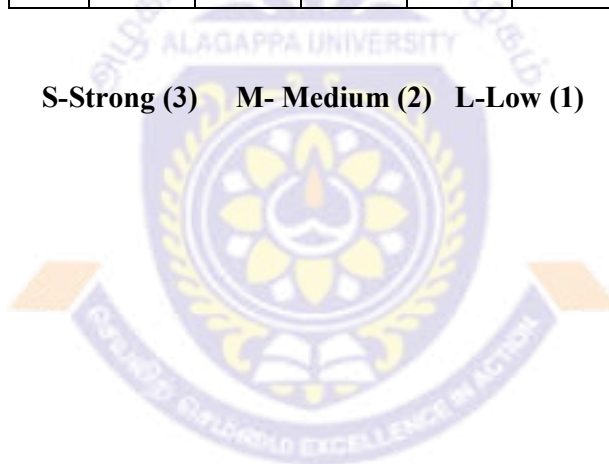
### Course Outcomes Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	2	1	1	1	1	1	1	2	2
CO2	3	3	2	1	2	1	1	2	3	2
CO3	3	3	2	1	1	1	2	1	2	2
CO4	3	3	3	2	1	1	1	1	2	2
CO5	3	3	3	3	2	1	1	1	1	1
W.AV	2.6	2.8	2.4	1.6	1.4	1	1.2	1.2	2	1.8

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

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	1	1
CO2	3	2	1	1	1
CO3	3	2	3	3	2
CO4	3	1	1	1	2
CO5	3	2	3	1	2
W.AV	3	1.8	2.2	1.4	1.6

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



III - SEMESTER					
Core	Course Code: 541303	SOFTWARE ENGINEERING	T	Credits: 4	Hours: 4
<b>Unit - I</b>					
<b>Objective 1</b>	<b>To understand and practice the various fields such as analysis, design, development, testing of Software Engineering.</b>				
<b>Introduction:</b> Role of software, Software myths. Generic view of process: A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, Process assessment, Personal and Team process models. <b>Process model:</b> The waterfall model, Incremental process models, Evolutionary process models, The Unified process.					
<b>Outcome 1</b>	<b>Students can understand the various fields such as analysis, design, development, testing of Software Engineering.</b>				<b>K2</b>
<b>Unit II</b>					
<b>Objective 2</b>	<b>To develop skills to construct software of high quality with high reliability.</b>				
<b>Requirement Engineering:</b> Design and Construction, Requirement Engineering Tasks, Requirements Engineering Process, Validating Requirements. <b>Building the Analysis Model:</b> Requirement analysis, Data Modeling concepts, Object-Oriented Analysis, Scenario-Based Modeling, and Flow-Oriented Modeling Class-Based Modeling, Creating a Behavioral Model.					
<b>Outcome 2</b>	<b>Lerner's develop skills to construct high quality software with reliability.</b>				<b>K4</b>
<b>Unit III</b>					
<b>Objective 3</b>	<b>To understand Design engineering and User interface design principles</b>				
<b>Design Engineering:</b> Design process and quality, Design concepts, The Design model. Architectural Design: Software architecture, Data design, Architectural styles and patterns, Architectural Design. <b>User interface design:</b> The Golden rules, User interface analysis and design, Interface analysis, Interface design steps, Design evaluation.					
<b>Outcome 3</b>	<b>Students know about the Design engineering and User interface design principles</b>				<b>K4</b>
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To apply metrics and testing techniques to evaluate the software.</b>				
<b>Testing Strategies:</b> Approach to Software Testing, Unit Testing, Integration Testing, Test strategies for Object-Oriented Software, Validation Testing, System Testing, the art of Debugging, Black-Box and White-Box testing. <b>Product Metrics:</b> Software Quality, Product Metrics, Metrics for Analysis Model, Design Model, Source code and Metrics for testing, Metrics for maintenance. <b>Metrics for Process and Projects Domains:</b> Software Measurement, Metrics for Software Quality and Software Process.					
<b>Outcome 4</b>	<b>Students should know to apply metrics and testing techniques to evaluate the software.</b>				<b>K2</b>

<b>Unit V</b>					
<b>Objective 5</b>	<b>To know about AGILE technology.</b>				
<p><b>Quality Management and AGILE technology:</b> Quality concepts, Software quality assurance, Software Reviews, Formal Technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards. <b>Agile and its significance:</b> Agile Story - Evolutionary delivery ,Scrum Demo, Planning game, Sprint back log, adaptive planning, Agile Motivation – Problems With The Waterfall Research Evidence, Scrum : Method Overview, Life cycle phases and Work product roles and practices-Agile methodology – Extreme Programming: Method Overview, Life cycle phases and Work product roles and practices, Agile Project management, Agile Environment, Agile Requirements- Agility and quality assurance Agile product development – Agile Metrics – Feature Driven Development(FDD), Agile approach to Quality Assurance, Test Driven Development – Agile approach in Global Software Development.</p>					
<b>Outcome 5</b>	<b>Learners can understand AGILE technology.</b>				<b>K5</b>
<p><b>Suggested Readings:</b>            Roger Pressman.S and Bruce Maxim.R. (2014). Software Engineering, A practitioner’s Approach: Tata McGraw-Hill, 8<sup>th</sup> Edition.            Craig Larman. (2006). Agile and Iterative Development – A Manager’s Guide: Pearson Education.            Ian Sommerville. (2011). Software Engineering: For VTU: 8e Pearson Education.            Lisa Crispin, Janet Gregory, Mike Cohn, Brain Marick. (2009). Agile Testing: A practical guide for Testers and Agile Teams: Addison-Wesley publication.            Rod Stephens. (2015). Beginning Software Engineering: Wrox.</p>					
<p><b>Online Resources:</b> <a href="https://www.coursera.org/articles/software-engineer">https://www.coursera.org/articles/software-engineer</a>  <a href="https://www.udemy.com/courses/development/software-engineering/">https://www.udemy.com/courses/development/software-engineering/</a></p>					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course Designed by: Dr.P.Eswaran</b>					

### Course Outcome VS Programme Outcomes

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

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

### Course Outcome VS Programme Specific Outcomes

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

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

SEMESTER III					
Core	Course Code :	INFORMATION AND CYBER SECURITY	T	Credits:4	Hours:4
<b>UNIT I</b>					
<b>Objective 1</b>	<b>To understand the concepts of Information security and their use.</b>				
Information Security and Cryptography – Security Goals, Services and Mechanisms - Classical Encryption Methods – Transposition Ciphers – Substitution Ciphers – Caesar Ciphers – Mono alphabetic Substitution – Homophonic Substitution – Polygram Substitution – Playfair Ciphers - Hill Ciphers – Poly alphabetic Substitutions - Vigenere Ciphers – Compound Vigenere – Auto-key Cipher – Running-key Cipher – Vernam Cipher – One-time Pad – Cryptographic codes – Machine Ciphers – Jefferson Cylinder – Rotor-based Machines.					
<b>Outcome 1</b>	<b>To list the fundamental concepts of Information Security</b>				<b>K1, K2</b>
<b>UNIT II</b>					
<b>Objective 2</b>	<b>To describe the principles of symmetric and asymmetric cryptography.</b>				
Symmetric Key Cryptography – Symmetric Cipher Model – Types of Attacks – Block Ciphers Vs Stream Ciphers – Synchronous Stream Ciphers – Asynchronous Stream Ciphers – Evaluating Block Ciphers – Modes of Operations – Cascades of Ciphers and Multiple Encryption – DES – AES - Public Key Cryptography – Introduction – Basic Principles – The Chinese Remainder Theorem – RSA – Integer Factorization Problem – Knapsack Public Key Encryption – Probabilistic Public Key Encryption – Elliptic Curve Cryptography – Quantum.					
<b>Outcome 2</b>	<b>To understand the various encryption and decryption techniques</b>				<b>K2</b>
<b>UNIT III</b>					
<b>Objective 3</b>	<b>To study the topics in information security concepts like hashing, steganography and watermarking</b>				
Information Hiding –Steganography – Evolution and System – Modern Techniques – Audio – Video – Textual Steganography – Real-time Steganography – Steganalysis – Applications – Digital Watermarking – Data Integrity – Introduction – Preventing Unauthorized Manipulation – Hash Functions – Essential Properties – Types - The Birthday Attack – Estimate of Probability of Finding a Collision – Hash Function Design Issues – Cryptanalysis and the Security of Hash Functions – Attacks on Hash Functions – Standard Hashing Algorithms					
<b>Outcome 3</b>	<b>To apply security concepts for providing security to the information.ata</b>				<b>K3</b>
<b>UNIT IV</b>					
<b>Objective 4</b>	<b>To analysis biometric systems used in information security</b>				
Authentication – Objectives of Identification Protocols – Entity Authentication Techniques – Applications of Identification Protocols – Properties of Identification Protocols – Authentication Mechanisms – Challenge-Response Identification – Digital Signature – Digital Certificates – X.509 Protocol – RFC 2459 – RADIUS – CAPTCHA – Introduction to Biometrics – Definition – Features – Applications – Technological Issues in Biometric Systems – Face Recognition – Fingerprint Recognition – Iris Recognition – Voice – DNA as a Biometric Identifier – Multimodal Biometric Systems					
<b>Outcome 4</b>	<b>To apply the biometric system to any of the real world problem.</b>				<b>K3</b>
<b>UNIT V</b>					
<b>Objective 5</b>	<b>Understand and use the various key management and remote authentication mechanisms, cybercrime, forensics.</b>				

Introduction to Cybercrime: Definition, Classification of Cybercrime:- Introduction- Cybercrime against Individuals-Cybercrime Against Property- Cybercrime Against Nation. Introduction to cyber forensics: Introduction among Cybercrime, Cyber Forensics, and Cyber Security- Cyber Forensics- Disk Forensics- Network Forensics—Wireless Forensics- Database Forensics- Malware Forensics-Mobile Forensics-GPS Forensics Email Forensics-Memory Forensics-Incident and Incident Handling- Computer Security Incident Response Team.

**Outcome 5** | **To interpret and forensically investigate security incidents.** | **K5**

**Suggested Readings:**

- Behrouz Forouzan.A, *Cryptography and Network Security*, Tata McGraw Hill, 2014.
- Dejey and S.Murugan “Cyber Forensics“, OXFORD University Press, ISBN: 0-19-48944-0.
- Patel. R, *Information Security: Theory and Practice*, Abe Books, 2017.
- William Stallng, *Cryptography and Network Security*, Prentice Hall, 2016.

**Online Resources**

- [https://mrcet.com/pdf/Lab%20Manuals/IT/CYBER%20SECURITY%20\(R18A0521\).pdf](https://mrcet.com/pdf/Lab%20Manuals/IT/CYBER%20SECURITY%20(R18A0521).pdf)
- <https://www.uou.ac.in/sites/default/files/slm/Introduction-cybersecurity.pdf>
- [https://onlinecourses.nptel.ac.in/noc20\\_cs71/preview](https://onlinecourses.nptel.ac.in/noc20_cs71/preview)

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

**Course designed by: Dr.G. Shanthi**

**Course Outcome VS Programme Outcomes**

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

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

**Course Outcome VS Programme Specific Outcomes**

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	M(2)	S(3)	M(2)	L(1)	M(2)
<b>CO2</b>	M(2)	M(2)	L(1)	L(1)	M(2)
<b>CO3</b>	M(2)	M(2)	M(2)	S(3)	L(1)
<b>CO4</b>	S(3)	M(2)	M(2)	M(2)	L(1)
<b>CO5</b>	M(2)	L(1)	M(2)	L(1)	M(2)
<b>W. AV</b>	<b>2.2</b>	<b>2</b>	<b>1.8</b>	<b>1.6</b>	<b>1.6</b>

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

Semester- III					
Core	Course Code: 541305	PYTHON PROGRAMMING Lab	P	Credits:2	Hours:4
<b>Objectives of the Course</b>	This course gives practical experience in Python basics, Object Oriented programming like Classes, Inheritance, and Polymorphism, GUI Applications and Database connection.				
<b>Course Outline</b>	<ol style="list-style-type: none"> <li>1. Python Basic programs</li> <li>2. Control Structures</li> <li>3. Lists</li> <li>4. Functions and Recursions</li> <li>5. Modules</li> <li>6. String Processing</li> <li>7. Dictionaries and Sets</li> <li>8. Classes and Objects</li> <li>9. Polymorphism</li> <li>10. Inheritance</li> <li>11. CSV Module</li> <li>12. Working with Database</li> </ol>				
<b>Recommended Text</b>					
Wesley J. Chun, (2007), “Core Python Programming”, Pearson Education, Second Edition –					
<b>Reference Books</b>					
Mark Lutz, (2013), “Learning Python Powerful Object Oriented Programming”, O’reillyMedia, 5 th Edition.					
Timothy A. Budd, (2011), “Exploring Python”, Tata MCGraw Hill Education Private Limited, First Edition.					
Allen Downey, Jeffrey Elkner, Chris Meyers, (2012), “How to think like a computer scientist: learning with Python”					
Charles Dierbach, 2016 <i>Introduction to Computer Science using Python</i> , 1 <sup>st</sup> Edition , Wiley IndiaEdition.					
Martin C.Brown, 2018 <i>Python : The Complete Reference</i> , 1 <sup>st</sup> Edition, McGraw Hill India.Reema Thareja, 2017 <i>Python Programming using Problem Solving Approach</i> , 1 <sup>st</sup> EditionOxford University Press.					
Sheetal Taneja, Naveen Kumar, 2017, <i>Python Programming</i> , 1 <sup>st</sup> Edition, Pearson India.					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course Designed by: Dr.M.Vanitha</b>					

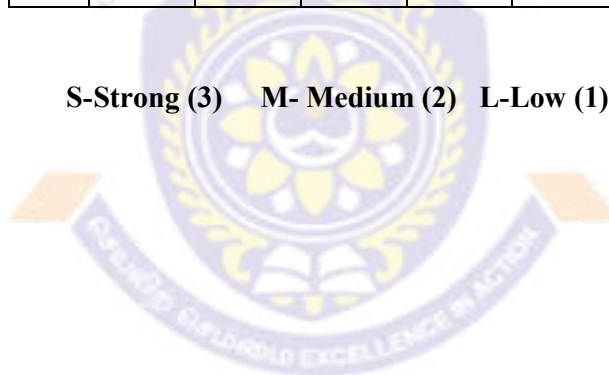
### Course Outcomes Vs Programme Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	1	2	1	1	1	1	1	1	2	2
CO2	3	3	2	1	2	1	1	2	3	2
CO3	3	3	2	1	1	1	2	1	2	2
CO4	3	3	3	2	1	1	1	1	2	2
CO5	3	3	3	3	2	1	1	1	1	1
W.A V	2.6	2.8	2.4	1.6	1.4	1	1.2	1.2	2	1.8

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

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	1	1
CO2	3	2	1	1	1
CO3	3	2	3	3	2
CO4	3	1	1	1	2
CO5	3	2	3	1	2
W.AV	3	1.8	2.2	1.4	1.6

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





SEMESTER III					
Core	Course Code: 541306	Data Science and Big Data Analytics Lab	P	Credits:2	Hours:4
<b>Objectives:</b>		<ul style="list-style-type: none"> <li>• To understand the python libraries for data science</li> <li>• To understand the basic Statistical and Probability measures for data science.</li> <li>• To learn descriptive analytics on the benchmark data sets.</li> <li>• To apply correlation and regression analytics on standard data sets.</li> <li>• To present and interpret data using visualization packages in Python.</li> </ul>			
LIST OF EXPERIMENTS					
<ol style="list-style-type: none"> <li>1. Working with Numpy arrays</li> <li>2. Working with Pandas data frames</li> <li>3. Develop python program for Basic plots using Matplotlib</li> <li>4. Develop python program for Frequency distributions</li> <li>5. Develop python program for Variability</li> <li>6. Develop python program for Averages</li> <li>7. Develop python program for Normal Curves</li> <li>8. Develop python program for Correlation and scatter plots</li> <li>9. Develop python program for Correlation coefficient</li> <li>10. Develop python program for Simple Linear Regression</li> <li>11. File Management tasks in Hadoop</li> <li>12. Word Count Map Reduce program</li> <li>13. Weather Report - Map Reduce</li> <li>14. Hive - Databases, Tables, Views, Functions and Indexes</li> <li>15. HIVE Functions</li> </ol>					
<b>Outcomes:</b>		<ul style="list-style-type: none"> <li>• CO1: Make use of the python libraries for data science</li> <li>• CO2: Make use of the basic Statistical and Probability measures for data science.</li> <li>• CO3: Perform descriptive analytics on the benchmark data sets.</li> <li>• CO4: Perform correlation and regression analytics on standard data sets</li> <li>• CO5: Present and interpret data using visualization packages in Python.</li> </ul>			
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course designed by: Dr. G. Shanthi</b>					

### Course Outcome VS Programme Outcomes

<b>PO</b> <b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>
<b>CO1</b>	S(3)	M(2)	M(2)	M(2)	M(2)	L(1)	-	-	-	L(1)
<b>CO2</b>	M(2)	M(2)	S(3)	M(2)	L(1)	M(2)	-	-	L(1)	M(2)
<b>CO3</b>	M(2)	S(3)	M(2)	L(1)	L(1)	M(2)	M(2)	L(1)	L(1)	L(1)
<b>CO4</b>	M(2)	M(2)	M(2)	L(1)	M(2)	L(1)	-	M(2)	L(1)	L(1)
<b>CO5</b>	S(3)	M(2)	L(1)	L(1)	L(1)	L(1)	-	M(2)	L(1)	L(1)
<b>W. AV</b>	<b>2.4</b>	<b>2.2</b>	<b>2</b>	<b>1.4</b>	<b>1.4</b>	<b>1</b>	<b>2</b>	<b>1.7</b>	<b>1</b>	<b>1.2</b>

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

### Course Outcome VS Programme Specific Outcomes

<b>PSO</b> <b>CO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	S(3)	M(2)	M(2)	M(2)	M(2)
<b>CO2</b>	M(2)	M(2)	S(3)	S(3)	M(2)
<b>CO3</b>	S(3)	M(2)	L(1)	M(2)	M(2)
<b>CO4</b>	M(2)	M(2)	L(1)	L(1)	L(1)
<b>CO5</b>	M(2)	M(2)	L(1)	L(1)	L(1)
<b>W. AV</b>	<b>2.4</b>	<b>2</b>	<b>1.6</b>	<b>1.8</b>	<b>1.6</b>

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

SEMESTER III					
DSE III	Course Code: 541557	Mobile Application Development	T	Credits: 3	Hours: 3
<b>Unit - I</b>					
<b>Objective 1</b>	<b>To learn the characteristics of mobile applications</b>				
<b>INTRODUCTION TO MOBILE APPLICATIONS:</b> Introduction – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications.					
<b>Outcome 1</b>	<b>Students can understand the basic concepts of mobile application.</b>				<b>K2</b>
<b>Unit II</b>					
<b>Objective 2</b>	<b>To study about the design aspects of mobile application</b>				
<b>BASIC DESIGN:</b> Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications – User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.					
<b>Outcome 2</b>	<b>Lerner’s can Generate mobile application design.</b>				<b>K4</b>
<b>Unit III</b>					
<b>Objective 3</b>	<b>To learn development and programming of mobile applications</b>				
<b>ADVANCED DESIGN:</b> Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.					
<b>Outcome 3</b>	<b>Students know to implement the design using specific mobile development frameworks.</b>				<b>K4</b>
<b>Unit IV</b>					
<b>Objective 4</b>	<b>To acquire knowledge about Android architecture.</b>				
<b>ANDROID :</b> Introduction – Establishing the development environment – Android architecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and WiFi – Integration with social media applications.					
<b>Outcome 4</b>	<b>Students know to deploy the mobile applications in marketplace for distribution</b>				<b>K2</b>
<b>Unit V</b>					
<b>Objective 5</b>	<b>To study and understand about IOS features</b>				
<b>IOS:</b> Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.					
<b>Outcome 5</b>	<b>Learners gain the Knowledge about Android and IOS.</b>				<b>K5</b>

**Suggested Readings:**

Charlie Collins, Michael Galpin and Matthias Kappler, 2016 Android in Practice, Wiley India Publications

David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, 2013, Beginning iOS 6 Development: Exploring the iOS SDK, Apress

<http://developer.android.com/develop/index.html>.

James Dovey and Ash Furrow, 2012 Beginning Objective C, Apress,

John Horton, 2018, Android Programming for Beginners, 2nd Edition, Packt Publishing

Zigurd Mednieks, Laird Dornin, G, Blake Meike and Masumi Nakamura, 2012 “Programming Android”, O’Reilly.

K1- Remember	K2- Understand	K3- Apply	K4- Analyze	K5-Evaluate	K6-Create
<b>Course Designed by: Dr.P.Eswaran</b>					

**Course Outcome VS Programme Outcomes**

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

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

**Course Outcome VS Programme Specific Outcomes**

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

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

SEMESTER III				
DSE III	Course Code: 541558	VIRTUAL REALITY AND AUGMENTED REALITY	T	Credits: 3 Hours: 3
UNIT I				
Objective 1	To make students know the basic concept and framework of virtual reality			
Introduction of Virtual Reality: Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality				
Outcome 1	Students gain the Knowledge about fundamental concepts in Virtual Reality			K1, K2
UNIT II				
Objective 2	To teach students the about Input, Output Devices and virtual computation used in VR.			
Multiple Modals of Input and Output Interface in Virtual Reality: Input -- Tracker, Sensor, Digital Glove, Movement Capture, Video-based Input, 3D Menus & 3DScanner etc. Output -- Visual / Auditory / Haptic Devices. Visual Computation in Virtual Reality (4 hours): Fundamentals of Computer Graphics. Software and Hardware Technology on Stereoscopic Display. Advanced Techniques in CG: Management of Large-Scale Environments & Real Time Rendering				
Outcome 2	Students use the technology for multimodal user interaction and perception in VR, the visual, audial, and haptic interface and behaviour.			K3
UNIT III				
Objective 3	To teach students the technology for multimodal user interaction and Environment modelling in VR.			
Environment Modelling in Virtual Reality: Geometric Modeling, Behavior Simulation, Physically Based Simulation. Interactive Techniques in Virtual Reality: Body Track, Hand Gesture, 3D Manus, Object Grasp				
Outcome 3	Understand the interactive techniques of Virtual Reality			K3, K4
UNIT IV				
Objective 4	To make students know the basic concept and framework of virtual reality.			
Introduction of Augmented Reality (AR): System Structure of Augmented Reality, Key Technology in AR, Augmented City Maps, Geo Location in AR Technology, Customization and Development of AR technologies				
Outcome 4	Understand the basic concepts of Augmented Reality			K3
UNIT V				
Objective 5	Students able to know the AR system framework and development tools			
Development Tools and Frameworks in Virtual Reality: Frameworks of Software, Development Tools in VR. X3D Standard; Vega, MultiGen, Virtools etc. Application of VR in Digital Entertainment: VR Technology in Film & TV Production. VR Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR.				
Outcome 5	Able to work with Virtual Reality and Augmented Reality development tools.			K5

**Suggested Readings:**

Burdea, G. C. and P. Coffet. 2003/2006, Virtual Reality Technology, Second Edition. Wiley-IEEE Press.

Fei GAO, 2006, Design and Development of Virtual Reality Application System, Tsinghua Press, March 2012.

Guanran LIU. 2011, Virtual Reality Technology, Tsinghua Press, Jan.

Rajib Mall, "Real-Time Systems: Theory and Practice", Pearson Education India.

Sherman, William R. and Alan B. Craig. 2002, Understanding Virtual Reality – Interface, Application, and Design, Morgan Kaufmann.

**Online Resources**

<https://archive.nptel.ac.in/courses/121/106/121106013/>

<https://tutorials.one/virtual-reality/>

<https://www.geeksforgeeks.org/basics-augmented-reality/>

[https://ocw.mit.edu/courses/mas-961-ambient-intelligence-spring-2005/86a1935536aec416b944de0b6ab678d5\\_week8\\_ss\\_arpers.pdf](https://ocw.mit.edu/courses/mas-961-ambient-intelligence-spring-2005/86a1935536aec416b944de0b6ab678d5_week8_ss_arpers.pdf)

[https://www.fusionvr.in/virtual-reality?gclid=EA1aIQobChMIjsLMYr7RgAMVRZJmAh0HPwUgEAMYASAAEgIFivD\\_BwE](https://www.fusionvr.in/virtual-reality?gclid=EA1aIQobChMIjsLMYr7RgAMVRZJmAh0HPwUgEAMYASAAEgIFivD_BwE)

<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
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Course designed by: **Mr. S. BALASUBRAMANIAN**

**Course Outcome VS Programme Outcomes**

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

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

**Course Outcome VS Programme Specific Outcomes**

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

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

SEMESTER III					
DSE III	Course Code : 541559	DIGITAL IMAGE PROCESSING	T	Credits: 3	Hours: 3
<b>Unit I</b>					
<b>Objective 1</b>	To provide the fundamental techniques and algorithms used for acquiring, processing and extracting useful information from digital images.				
<b>DIGITAL IMAGE FUNDAMENTALS:</b> Element of Digital Image Processing- Elements of Visual Perception -Psycho Visual Model Brightness-Contrast-Hue- Saturation, Machband Effect, Color Image Fundamentals - RBG- His Models, Image Sampling, Quantization, Dither, Matrix Theory Result, Block Matrices and Kronecker Products.					
<b>Outcome 1</b>	Summarize the fundamentals of digital images			K1, K2, K3	
<b>UNIT II</b>					
<b>Objective 2</b>	To introduce the methods for image sampling and quantization				
<b>IMAGE TRANSFORMS:</b> 2-D Orthogonal And Unitary Transforms,1-D And 2-D: Discrete Fourier Transformation, Cosine, Sine, Walsh, Hadamard, Slant, Kurhunen- Loeve, Singular Value Decomposition Transforms.					
<b>Outcome 2</b>	Understand 2D transformation concepts			K2, K3, K4	
<b>Unit III</b>					
<b>Objective 3</b>	To understand about image transforms and image enhancement				
<b>IMAGE ENHANCEMENT:</b> Point Operation-Contrast Stretching, Clipping and Thresholding Density Slicing, Histogram Equalization, Modification and Specification, Spatial Operation-Spatial Averaging, Low Pass, Highpass Band Pass Filtering, Direction Smoothing, Medium Filtering and Homomorphic Filtering					
<b>Outcome 3</b>	Acquire knowledge about enhancing the images			K2, K3, K4	
<b>Unit IV</b>					
<b>Objective 4</b>	To acquire knowledge about restoration and principles				
<b>IMAGE RESTORATION:</b> Image Observation Model, Sources of Degradation, Inverse and Wiener Filtering, Geometric Mean Filter, Non Linear Filter, Smoothing Splines and Interpolation, Constrained Least Squares Restoration.					
<b>Outcome 4</b>	Cultivate the knowledge about restoration of images			K4, K5	
<b>Unit V</b>					
<b>Objective 5</b>	To introduce Image compression and video compression standards.				
<b>IMAGE DATA COMPRESSION:</b> 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, Still Image Compression Standards, Video Compression Standards.					
<b>Outcome 5</b>	Understand and gain knowledge about Image Compression			K3, K6	
<b>Suggested Readings:</b> Anil K.Jain, 2015 <i>Fundamentals of Digital Image Processing</i> , Pearson. Jayaraman.S, Veerakumar.T and Esakkirajan.S, 2009, <i>Digital Image Processing</i> , 1e McGrawHill Education. Khalid sayood, 2018. Introduction to Data Compression, 5 <sup>th</sup> Edition published by Morgan Kaufmann. Rafael Gonzalez.C and Richard Woods E. 2014, <i>Digital Image Processing</i> , 3e, Pearson.					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>
<b>Course Designed by: Dr.M.Vanitha</b>					

### Course Outcomes Vs Programme Outcomes

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

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

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

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





SEMESTER IV					
Core	Course Code: 541999	Project Work Programme		Credits: 15	Hours: 30



SEMESTER II					
NME	Course Code:	INTRODUCTION TO INFORMATION TECHNOLOGY	T	Credits: 2	Hours: 3
<b>Unit I</b>					
<b>Objective 1</b>	To teach the fundamental concepts of information technology.				
<b>Information technology:</b> An Introduction-Information Systems-Types of computers- Anatomy of a computer-Binary numbers 0's and 1's-Bits and Bytes –The binary code-Memory-RAM And ROM, Other forms of memory-Buses for input and output- Communication with peripherals.					
<b>Outcome 1</b>	Understand the information technology concepts				<b>K2</b>
<b>Unit II</b>					
<b>Objective 2</b>	To educate the beginners the fundamentals of computer hardware and software.				
<b>Input and output devices-</b> Inputting text-Keyboards, Direct input devices-inputting graphics picture essay-pointing devices-Display screens-types of screens-LASER printers-other printers-color printers.					
<b>Outcome 2</b>	Able to know the hardware and software fundamentals.				<b>K2</b>
<b>Unit III</b>					
<b>Objective 3</b>	To make them understand how to create MS-Office applications.				
<b>Word processing and desktop publishing:</b> Entering and editing documents-Other Word processing features-Formatting documents-Desktop publishing for print, screen. Spread sheet Applications-Introduction-Entering data-Charts and Graphs.					
<b>Outcome 3</b>	Develop document using Word processing.				<b>K6</b>
<b>Unit IV</b>					
<b>Objective 4</b>	To teach them the basic concepts of networks and internet				
<b>Communications :</b> Local Area Networks-Introduction-Architecture-Wide Area Networks- Introduction-Dial Up Access-Multimedia-Introduction-Tools of Multimedia-Multimedia and Authoring tools-Network applications.					
<b>Outcome 4</b>	Understand the basic concepts of communications.				<b>K2</b>
<b>Unit V</b>					
<b>Objective 5</b>	To educate about programming principles				
<b>Programming and System development-</b> Programs –Introduction-Programming languages- Procedural languages-Programming methods-How programs are developed- Programming techniques.					
<b>Outcome 5</b>	Understand Programming and System development concepts				<b>K2</b>
<b>Suggested Readings:</b>					
Dennis P.Curtin, Kim Foley, Kunal Sen, Cathleen Morin, 2017, <i>Information Technology The Breaking Wave</i> , Tata McGraw Hill Publication,					
Rajaraman.V, 2018, <i>Introduction to Information Technology</i> published by PHI Learning Pvt Ltd					
<b>K1- Remember</b>	<b>K2- Understand</b>	<b>K3- Apply</b>	<b>K4- Analyze</b>	<b>K5-Evaluate</b>	<b>K6-Create</b>

## COURSE OUTCOMES

After the completion of this course the students will be able to,

S. No.	Course Outcomes	Level	Unit Covered
CO1	Understand the concepts of Information Technology	K1,K2	I
CO2	Understand the fundamentals of Hardware and Software	K2	II
CO3	Create a document using Word Processing	K6	III
CO4	Understand the concepts of communication	K2	IV
CO5	Understand the concepts of Programming and System development concepts	K4	V

### Course Outcome Vs. Programme Outcomes

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

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)
CO2	S(3)	M(2)	M(2)	M(2)	M(2)	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)	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)	S(3)	S(3)	S(3)	S(3)	S(3)	-	S(3)	S(3)	M(2)
<b>W.AV.</b>	<b>3</b>	<b>2.6</b>	<b>2.6</b>	<b>2.6</b>	<b>2.6</b>	<b>2.6</b>	<b>0.4</b>	<b>2.6</b>	<b>2.6</b>	<b>2</b>

### Course Outcome Vs. Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M(2)	M(2)	M(2)	-	M(2)
CO2	M(2)	M(2)	M(2)	-	M(2)
CO3	S(3)	S(3)	S(3)	-	M(2)
CO4	M(2)	M(2)	M(2)	M(2)	M(2)
CO5	S(3)	S(3)	S(3)	-	M(2)
<b>W.AV.</b>	<b>2.4</b>	<b>2.4</b>	<b>2.4</b>	<b>0.4</b>	<b>2</b>

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

SEMESTER III				
NME	Course Code:	OFFICE AUTOMATION	T	Credits: 2 Hours: 3
<b>Unit I</b>				
<b>Objective 1</b>	To educate the beginners the fundamentals of computer hardware and software.			
<b>MS Windows</b> – Concepts – Features – Windows Structure – Desktop – Task bar – Start Menu– My Computer, My Pictures –Recycle Bin – Managing files and folders: Exploring hard disk – Creating new folder, Searching files and Folders – Disk- Navigating between folders – Copying and moving files and folder from one drive to another –Windows Accessories – Calculator – Notepad – Paint – Word pad				
<b>Outcome 1</b>	The beginners Understand the windows operating system concepts			<b>K2</b>
<b>Unit II</b>				
<b>Objective 2</b>	To understand how to create document using word			
<b>MS Word:</b> Introduction to MS Office – Features & area of use – Starting Word – Parts of Word Window – Mouse operations – Keyboard operations – Menus & Commands – Tool bars and their icons – Shortcut Menus –Creating a New Document – Different Page Views and layouts – Applying various Text Enhancements; Working with – Styles -Paragraph and Page Formatting; Text Editing using various features; Bullets, Numbering, Auto formatting, Printing & various print options <b>Advanced Features:</b> Spell Check, Thesaurus, Find & Replace; Headers & Footers; Inserting– Page Numbers, Pictures, Files, Symbols etc.; Working with Columns, Creation & Working with Tables including conversion to and from text; Margins & Space management in Document; Mail Merge, Envelops & Mailing Labels.				
<b>Outcome 2</b>	The beginners Learn to create Document			<b>K6</b>
<b>Unit III</b>				
<b>Objective 3</b>	To learn how to create Excel worksheet			
<b>MS Excel:</b> Introduction – Area of use – Concepts of Workbook & Worksheets: Using Wizards; Various Data Types – Using different features with Data, Cell and Texts: Selecting cells – Selecting cells with mouse – Entering and Editing text – Entering numbers, formulas and dates – Text alignment – Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.				
<b>Outcome 3</b>	The beginners able to Learn how to create Worksheet			<b>K6</b>
<b>Unit IV</b>				
<b>Objective 4</b>	To create power point presentation			
<b>MS PowerPoint:</b> Introduction & area of use – Creating a New Presentation; Opening – Saving – Closing – Working with Presentation Using Wizards; Slides & its different views: Creating, Inserting, Deleting and Copying of Slides; Menus: File – Edit – View – Insert – Format – Tools – Slide Show – Window – Help – Working with Notes, Handouts, Columns & Lists; Adding Graphics, Sounds and Movies to a Slide; Printing Presentations, Notes, Handouts with print options.				
<b>Outcome 4</b>	The beginners can develop Presentation			<b>K6</b>

<b>Unit V</b>		
<b>Objective 5</b>	To teach them the basic concepts of Database, Query, Forms and Reports	
<b>MS Access:</b> Introduction – Parts of an Access Window – Starting MS Access – Database Creation – Table Creation using Table Wizard – Table Creation using Design view – Saving Database – Query – Form – Reports		
<b>Outcome 5</b>	The beginners able to create database	<b>K6</b>
<b>Suggested Readings:</b>		
Andy Rathbone (August 10, 2020) <i>Windows 10 For Dummies</i> ,; 4th edition		
Archana Kumar 2019, <i>Computer Basics with Office Automation</i> , , Dreamtech press		
Minasi M <i>Mastering Windows XP Professional</i> , John Wiley & Sons; Professional edition		

### COURSE OUTCOMES

After the completion of this course the students will be able to,

S. No.	Course Outcomes	Level	Unit Covered
CO1	Understand the concepts of MS-Windows Operating System	K1,K2,K3	I
CO2	Create a Document using MS-Word	K6	II
CO3	Create an Excel Sheet using MS-Excel	K6	III
CO4	Create a Power Point Presentation using MS-Power Point	K6	IV
CO5	Create a Database using MS-Access	K6	V
<b>K1-Remember, K2-Understand, K3-Apply, K4-Analyze, K5- Evaluate, K6- Create</b>			

### Course Outcome Vs. Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	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)	S (3)	M (2)
CO3	S (3)	S (3)	S (3)	S (3)	S (3)	S (3)	-	S (3)	S (3)	M (2)
CO4	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)	S (3)	-	S (3)	S (3)	M (2)
<b>W.AV.</b>	<b>2.8</b>	<b>2.8</b>	<b>2.8</b>	<b>2.8</b>	<b>2.8</b>	<b>2.8</b>	-	<b>2.8</b>	<b>2.8</b>	<b>2</b>

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

### Course Outcome Vs. Programme Specific Outcomes

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L(1)	L(1)	L(1)	-	L(1)
CO2	M(2)	M(2)	M(2)	-	L(1)
CO3	S(3)	S(3)	S(3)	-	L(1)
CO4	M(2)	M(2)	M(2)	-	L(1)
CO5	S(3)	S(3)	S(3)	-	L(1)
<b>W.AV.</b>	<b>2.2</b>	<b>2.2</b>	<b>2.2</b>	-	<b>1</b>

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



## SCIENCE CAMPUS