



INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM - CHENNAI
ACCREDITED BY **NAAC** WITH '**A**' GRADE
Marching Beyond 25 Years Successfully

B.Sc., Computer Science

Curriculum and Syllabus

Regulations 2021

(Based on Choice Based Credit System (CBCS)

and

Learning Outcomes based Curriculum Framework (LOCF))

Effective from the Academic year

2021-2022

Department of Computer Science

School of Computing Sciences

VELS INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES

SCHOOL OF COMPUTING SCIENCES

DEPARTMENT OF COMPUTER SCIENCE

VISION AND MISSION OF THE DEPARTMENT

VISION

Aims to provide quality education in the field of Computer Science with state of art facilities and handle quality research in association with industry and other Universities to produce well trained IT professionals to cater the need of society.

MISSION

- To provide knowledge through teaching and training in the field of Computer Science.
- To concentrate on teaching-learning, research, project and consultancy help to increase the growth of IT and IT Enabled Services.
- To train students to get best opportunities and tackle challenges in IT industry.
- To equip students with communication skill, Leadership quality, ability to work with team help to improve the society.
- To provide value based and technical oriented related students help to build the nation.

PROGRAMME EDUCATIONAL OUTCOMES (PEO)

PEO1: Graduates are prepared to be employed in IT industries by providing expected Domain Knowledge.

PEO2: Graduates are provided with practical training, hands-on and project experience to meet the industrial needs.

PEO3: Graduates are motivated in career and entrepreneurial skill development to become global leaders.

PEO4: Graduates are trained to demonstrate creativity, develop innovative ideas and to work in teams to accomplish a common goal.

PEO5: Graduates are addressed with social issues and guided to operate problems with Solution.

PROGRAMME OUTCOMES (PO)

PO1: Computing Knowledge: Understand the basic concepts, fundamental principles, and the theories related to various computer science phenomena and their relevancies in the day-to-day life.

PO2: Problem Analysis: Analysed the given logic critically and systematically and the ability to draw the objective conclusions.

PO3: Design/Solution: An ability to design, implement, and evaluate a computational system to meet desired needs within realistic constraints.

PO4: Programming Skills: Serve as the Programmers or the Software Engineers with the sound knowledge of practical and theoretical concepts for developing software

PO5: Modern tools Usage: To use current techniques, skills, and modern tools necessary to develop application and method for the cultural, societal, environmental considerations and demonstrate the knowledge need for sustainable development.

PO6: Communication skills: An ability to communicate and engage effectively with diverse stakeholders.

PO7: Ethics: An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1: Professionally trained in the areas of programming, multimedia, animation, web designing, networking and to acquire knowledge in various domain based electives.

PSO2: Abet students to communicate effectively and to improve their competency skills to solve real time problems.

PSO3: The ability to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies.

Board of Studies - List of Members

School of Computing Sciences

S.No	Name & Designation	Address	Role
1	Dr.P.Mayilvahanan Professor & Head	Department of Computer Science, School of Computing Sciences, VISTAS, Chennai.	Chairman
2	Dr. T. Velmurugan Associate Professor & Head	Department of Computer Science, DG Vaishnav College, Chennai.	Industry Expert (External Member)
3	Dr. P. Magesh Kumar Managing Director	Calibsoft Technologies Pvt Ltd., Chennai.	Academic Expert (External Member)
4	Mr.R. Balamurugan Software Engineer	SCOPUS Technologies Ltd., Chennai	Alumni Member
5	Dr.S.Prasanna Professor & Head	Department of Computer Applications, School of Computing Sciences, VISTAS, Chennai	Internal Member
6	Dr. T. Kamalakannan Professor & Head	Department of Information Technology, School of Computing Sciences, VISTAS, Chennai	Internal Member

**VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED
STUDIES (VISTAS), CHENNAI**

CHOICE BASED CREDIT SYSTEM (CBCS)

and

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (LOCF)

B.Sc.,(Computer Science)- REGULATIONS 2021

(Applicable to all the candidates admitted from the academic year 2021-22 onwards)

1. DURATION OF THE PROGRAMME

Three years (six semesters)

Each academic year shall be divided into two semesters. The odd semesters shall consist of the period from July to November of each year and the even semesters from January to May of each year.

1.3 There shall be not less than 90 working days for each semester.

2. ELIGIBILITY FOR ADMISSION

2.1 Candidates for admission to the first year of the Degree of Bachelor of Computer Science shall be required to have passed the Higher Secondary Examinations (Academic Stream) conducted by the Government of Tamil Nadu or an Examination with Mathematics or Computer Science/ Business Mathematics/ Statistics accepted as equivalent thereof by the Syndicate of the Vels Institute of Science, Technology & Advanced Studies.

3. MEDIUM OF INSTRUCTION

The medium of instruction is English excluding Tamil, Hindi and French Language Papers

4. CREDIT REQUIREMENTS AND ELIGIBILITY FOR AWARD OF DEGREE

A Candidate shall be eligible for the award of Degree only if he/she has undergone the prescribed course of study in VISTAS for a period of not less than three academic years and passed the examinations of all the prescribed courses of Six Semesters earning a minimum of 140 credits as per the distribution given in for Part I, II, III and also fulfilled such other conditions as have been prescribed thereof.

5. COURSE

Each course / subject is to be designed under lectures / tutorials / laboratory or field work / seminar / practical training / Assignments / Term paper or Report writing etc., to meet effective teaching and learning needs.

6. COURSE OF STUDY AND CREDITS

The Course Components and Credit Distribution shall consist Part I, II & III:

The UG 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 courses suggested for the UG programmes.

Part I – Language Courses (LC) (any one of Tamil, Hindi, French or special subject designed in lieu of the above).

Part II – English Language courses (ELC) or special subject designed in lieu of.

The Language courses and English Language Courses are 4 each / 2 each in number and the LC and ELC are meant to develop the students communicative skill at the UG level.

Part III – Core courses i.e. major courses that compulsorily required for each of the programme of study (CC), Ability Enhancement Course (AHC), Discipline Specific Elective Course (DSE) and Skill Enhancement Course (SEC).

For each course, credit is assigned based on the following:

Contact hour per week		CREDITS
1 Lecture hour	-	1 Credit
1 Tutorial hour	-	1 Credit
2 Practical hours	-	1 Credit

(Laboratory / Seminar / Project Work / etc.)

7. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER

Eligibility: Students shall be eligible to go to subsequent semester only if they earn sufficient attendance as prescribed therefor by the Board of Management from time to time.

Attendance: All Students must earn 75% and above of attendance for appearing for the University Examination. (Theory/Practical)

Condonation of shortage of attendance: If a Student fails to earn the minimum attendance (Percentage stipulated), the HODs shall condone the shortage of attendance on medical grounds up to a maximum limit of 10% (i.e. between 65% and above and less than 75%) after paying the prescribed fee towards the condonation of shortage of attendance. The students with attendance of less than 65 and more than 50% shall be condoned by VC on the recommendation of HODs on genuine grounds, will be permitted to appear for the regular examination on payment of the prescribed condonation fee.

Detained students for want of attendance: Students who have earned less than 50% of attendance shall be permitted to proceed to the next semester and to complete the Program of study. Such Students shall have to repeat the semester, which they have missed by rejoining after completion of final semester of the course, by paying the fee for the break of study as prescribed by the University from time to time.

Transfer of Students and Credits: The strength of the credits system is that it permits inter Institutional transfer of students. By providing mobility, it enables individual students to develop their capabilities fully by permitting them to move from one Institution to another in accordance with their aptitude and abilities.

Transfer of Students is permitted from one Institution to another Institution for the same program with same nomenclature, provided, there is a vacancy in the respective program of Study in the Institution where the transfer is requested.

The marks obtained in the courses will be converted into appropriate grades as per the University norms.

The transfer students are not eligible for Ranking, Prizes and Medals.

Students who want to go to foreign Universities upto two semesters or Project Work with the prior approval of the Departmental / University Committee are allowed to transfer of their credits. Marks obtain in the courses will be converted into Grades as per the University norms and the students are eligible to get CGPA and Classification.

8. EXAMINATION AND EVALUATION

EXAMINATION:

- i) 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) shall be permitted to appear in such failed courses in the subsequent examinations to be held in October / November or April / May.
- ii) A candidate should get registered for the first semester examination. If registration is not possible owing to shortage of attendance beyond condonation limit / regulations 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.
- iii) The results of all the examinations will be published through University Website. In the case of passed out candidates, their arrear results, will be published through University Website.

8.2 To Register for all subjects: Students shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination, except for the shortage of attendance programs. For this purpose, Students shall register for all the arrear subjects of earlier semesters along with the current (subsequent) Semester Subjects.

Marks for Continuous Internal Assessment (CIA) Examinations and End Semester Examinations (ESE) for PART I, II, III

There shall be no passing minimum for Continuous Internal Assessment (CIA) Examinations.

For End Semester examination, passing minimum shall be 40% (Forty Percentage) of the maximum marks prescribed for the Course/Practical/Project and Viva-Voce.

In the aggregate (CIA and ESE) the passing minimum shall be of 40%.

8.3.4. He / She shall be declared to have passed the whole examination, if he/she passes in all the courses wherever prescribed in the curriculum by earning 140 CREDITS in Part I, II, III.

9. Question Paper Pattern for End Semester Examination

SECTION – A 10 questions 10 X 2 = 20 Marks

SECTION – B 5 questions either or pattern X 16 = 80 Marks

Total 100 Marks

10. SUPPLEMENTARY EXAMINATION: Supplementary Examinations are conducted for the students who appeared in the final semester examinations. Eligible criteria for appearing in the Supplementary Examinations are as follows:

Eligibility: A Student who is having a maximum of two arrear papers is eligible to appear for the Supplementary Examination.

Non-eligibility for those completed the program: Students who have completed their Program duration but having arrears are not eligible to appear for Supplementary Examinations.

11. RETOTALLING, REVALUATION AND PHOTOCOPY OF THE ANSWER SCRIPTS:

Re-totalling: All UG Students who appeared for their Semester Examinations are eligible for applying for re-totalling of their answer scripts.

Revaluation: All current batch Students who have appeared for their Semester Examinations are eligible for Revaluation of their answer scripts. Passed out candidates are not eligible for Revaluation.

Photocopy of the answer scripts: Students who have applied for revaluation can download their answer scripts from the University Website after fifteen days from the date of publication of the results.

12. The examination and evaluation for MOOCs will be as per the requirements of the regulatory bodies and will be specified at the beginning of the Semester and notified by the university NPTEL-SWAYAM Coordinator (SPOC).

13. CLASSIFICATION OF SUCCESSFUL STUDENTS

PART I TAMIL / OTHER LANGUAGES; PART II ENGLISH AND PART III CORE SUBJECTS, ALLIED, ELECTIVES COURSES AND PROJECT: Successful Students passing the Examinations for the Part I, Part II and Part III courses and securing the marks

- a) CGPA 9.00 to 10.00 shall be declared to have passed the examination in **First class with Outstanding.**
- b) CGPA 7.50 to 8.99 shall be declared to have passed the examination in **First class with distinction.**
- c) CGPA 6.00 to 7.49 shall be declared to have passed the examination in **First Class.**
- d) CGPA 5.00 to 5.99 in the aggregate shall be declared to have passed the examination in the **SECOND** Class.
- e) CGPA 4.00 to 4.99 shall be declared to have passed the examination in the **THIRD** Class.

14. MARKS AND GRADES: The following table shows the marks, grade points, lettergrades and classification to indicate the performance of the Student:

Computation of Grade Point Average (GPA) in a Semester, Cumulative Grade Point Average (CGPA) and Classification

GPA for a Semester: = $\sum_i C_i G_i \div \sum_i C_i$ That is, GPA is the sum of the multiplication of grade points by the credits of the courses divided by the sum of the credits of the courses in a semester.

Where, C_i = Credits earned for course i in any semester,

G_i = Grade Points obtained for course i in any semester

n = Semester in which such courses were credited.

CGPA for the entire programme: = $\sum_n \sum_i C_{ni} G_{ni} \div \sum_n \sum_i C_{ni}$ That is, CGPA is the sum of the multiplication of grade points by the credits of the entire programme divided by the sum of the credits of the courses of the entire programme

Grade Conversion Table – UG

Range of Marks	Grade Points	Letter Grade	Description
90 - 100	10	O	Outstanding
82 - 89	9	A+	Excellent
75 - 81	8	A	Very Good
67 - 74	7	B+	Good
60 - 66	6	B	Above Average
50 - 59	5	C	Average
40 - 49	4	D	Minimum for pass
0 - 39	0	RA	Reappear
		AAA	Absent

Letter Grade and Class CGPA**Overall Performance – UG**

CGPA	GRADE	CLASS
4.00 - 4.99	D	Third Class
5.00 - 5.99	C	Second Class
6.00 - 6.69	B	First Class
6.70 - 7.49	B+	
7.50 - 8.19	A	First Class with Distinction*
8.20 - 8.99	A+	
9.00 - 10.00	O	First Class - Outstanding*

- The Students who have passed in the first appearance and within the prescribed semester of the UG Programme (Major, Allied and Elective courses only) are eligible.

15. RANKING

- Students who pass all the examinations prescribed for the Program in the FIRST APPEARANCE ITSELF ALONE are eligible for Ranking / Distinction.
- In the case of Students who pass all the examinations prescribed for the Program with a break in the First Appearance are only eligible for Classification.
- Students qualifying during the extended period shall not be eligible for RANKING.

16. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAMS TO QUALIFY FOR A DEGREE

A Student who for whatever reasons is not able to complete the programs within the normal period (N) or the Minimum duration prescribed for the programme, may be allowed two years period beyond the normal period to clear the backlog to be qualified for the degree. (Time Span = N + 2 years for the completion of programme)

In exceptional cases like major accidents and child birth an extension of one year considered beyond maximum span of time (Time Span= N + 2 + 1 years for the completion of programme).

17. REVISION OF REGULATIONS, CURRICULUM AND SYLLABI

The University may from time to time revise, amend or change the Regulations, Curriculum, Syllabus and Scheme of examinations through the Academic Council with the approval of the Board of Management.

Vels Institute of Science and Technology and Advanced studies (VISTAS)

B.Sc.,(Computer Science)

Courses of Study and Scheme of Assessment

B.Sc.,(Computer Science) Course Components

Component	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	Total Credits
Core Courses & Languages	16 +6	16+6	14+6	15+6	3	-	88
Ability Enhancement Courses (AEC)	2	-	2	-	-	-	4
Discipline Specific Elective (DSE) & Generic Elective(GEC)	-	-	-	-	17	19	36
Skill enhancement Course(SEC)	-	2	2	3	2	3	12
Total Credits	24	24	24	24	22	22	140

2. Learning Outcomes based Curriculum Framework

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1. Introduction

Computer Science (CS) has been evolving as an important branch of science and engineering throughout the world in last couple of decades and it has carved out a space for itself like any other disciplines of basic science and engineering. Computer science is a discipline that spans theory and practice and it requires thinking both in abstract terms and in concrete terms. Nowadays, practically everyone is a computer user, and many people are even computer programmers. Computer Science can be seen on a higher level, as a science of problem solving and problem solving requires precision, creativity, and careful reasoning. The ever-evolving discipline of computer science also has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers, but finding a solution requires both computer science expertise and knowledge of the particular application domain.

Computer science has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics, Artificial Intelligence, Computational Science, and Software Engineering. Drawing from a common core of computer science knowledge, each specialty area focuses on specific challenges. Computer Science is practiced by mathematicians, scientists and engineers. Mathematics, the origins of Computer Science, provides reason and logic. Science provides the methodology for learning and refinement. Engineering provides the techniques for building hardware and software.

Universities and other HEIs introduced programmes of studies in computer science as this discipline evolved itself to a multidisciplinary discipline. Information Technology is growing rapidly. Increasing applications of computers in almost all areas of human endeavour has led to vibrant industries with concurrent rapid change in technology. Unlike other basic disciplines, developing core competency in this discipline that can be reasonably stable becomes a challenge. In India, it was initially introduced at the Master (postgraduate) level as MCA and M.Tech. Later on, engineering programmes such as B.Tech and B.E in Computer Science & Engineering and in Information Technology were introduced in various engineering College/Institutions to cater to the growing demand for trained engineering manpower in IT industries. Parallely, BSc and MSc programmes with specialisation in Computer Science were introduced to train manpower in this highly demanding area. B.Sc in Computer Science are being planned and introduced in different colleges and institutions.

Computer Science education at undergraduate level (+3) will result in earning a Bachelor of Arts (BA) or Bachelor of Science (BS) degree in CS. The coursework required to earn a BSc is equally weighted in mathematics and science. B.Sc with CS aimed at undergraduate level training facilitating multiple career paths. Students so graduated, can take up postgraduate programmes in CS leading to research as well as R&D, can be employable at IT industries, or can pursue a teachers' training programme such BEd in Computer Education, or can adopt a business management career. BSc with CS aims at laying a strong foundation of CS at an early stage of the career along with two other subjects such as Physics, Maths, Electronics, Statistics etc. There are several employment opportunities and after successful completion of an undergraduate programme in CS, graduating students can fetch employment directly in companies as Web Developer, Software Engineer, Network Administrator, Data Scientist, or AI/ML personnel.

The Learning Outcome-based Curriculum Framework in Computer Science is aimed at allowing flexibility and innovation in design and development of course content, in method of imparting training, in teaching learning process and in assessment procedures of the learning outcomes. The emphasis in computer science courses, in outcome-based curriculum framework, help students learn solving problems, accomplishing IT tasks, and expressing creativity, both individually and collaboratively. The proposed framework will help Students learn programming techniques and the syntax of one or more programming languages.

Many of the learning outcomes of Computer Science can be achieved only by programming a computer for several different meaningful purposes. All students must, therefore, have access to a computer with a modern programming language installed. The computer science framework does not prescribe a specific language. The teacher and students will decide which modern programming languages students will learn. More importantly, students will learn to adapt to changes in programming languages and learn new languages as they are developed.

The present Learning Outcome-based Curriculum Framework for bachelor's degrees in CS is intended to facilitate the students to achieve the following.

- To develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory,

systems and applications such as algorithms, data structures, data handling, data communication and computation.

- To develop the ability to use this knowledge to analyse new situations
- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.
- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems
- To learn skills and tools like mathematics, statistics, physics and electronics to find the solution, interpret the results and make predictions for the future developments.

2. Curriculum Planning- Learning Outcomes-based Approach

Nature and Extent of the B.Sc-Computer Science Programme

The undergraduate programs in Computer Science builds on science-based education at +2 level. The +2 senior secondary school education aims and achieves a sound grounding in understanding the basic scientific temper with introduction to process of computation by introducing some programming languages. This prepares a young mind to launch a rigorous investigation of exciting world of computer science.

Framing and implementation of curricula and syllabi is envisaged to provide an understanding of the basic connection between theory and experiment and its importance in understanding the foundation of computing. This is very critical in developing a scientific temperament and to venture a career which a wide spectrum of applications as well as theoretical investigations. The undergraduate curriculum provides students with theoretical foundations and practical experience in both hardware and software aspects of computers. The curriculum in computer science is integrated with courses in the sciences and the humanities to offer an education that is broad, yet of enough depth and relevance to enhance student employment opportunities upon graduation. As a Bachelor's degree program, the curriculum is based on the criterion that graduates are expected to function successfully in a professional employment environment immediately upon graduation.

The undergraduate program in Computer Science is presently being offered though the

courses designed for granting the following degrees by various colleges and universities in India. All the courses are of 3-year duration spread over six semesters.

- i. B.Sc with Computer Science

B. Sc. with Computer Science

B.Sc. or Bachelor of Science with Computer Science is a general multidiscipline bachelor programme. The programme has a balanced emphasis on three science subjects, one of which is computer science. A student studying B.Sc. with Computer Science is required to choose two other subjects from a pool of subjects which include Physics, Mathematics, Statistics, Electronics, Chemistry. Different institutions offer different choice of combinations of subjects. Most popular combinations are Physics and Mathematics, Physics and Electronics, Mathematics and Electronics, but there are also combinations like Statistics and Economics or Commerce and Economics along with Computer Science.

Types of Courses

Core Course (CC)

A core course is a mandatory course required in degree. **Core course** of study refers to a series or selection of courses that all students are required to complete before they can move on to the next level in their education or earn a diploma. The general educational purpose of a core course of study is to ensure that all students take and complete courses that are academically and culturally essential. These are the courses that teach students the foundational knowledge and skills they will need in securing the specific degree or diploma. The core courses are designed with an aim to cover the basics that is expected of a student to imbibe in that particular discipline. Thus, a course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. The present document specifies the core courses for B.Sc. The courses (papers, as referred popularly) under this category are going to be taught uniformly across all universities with 30% deviation proposed in the draft. The purpose of fixing core papers is to ensure that all the institutions follow a minimum common curriculum so that each institution/ university adheres to common minimum standard.

Electives

Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course. Different types of elective courses mandated in the present framework are the following.

- Domain Specific Elective (DSE)
- Generic Elective (GE)
- Ability Enhancement Elective (AEEC)

Discipline Specific Elective (DSE)

Elective courses offered under the main discipline/subject of study is referred to as Discipline Specific Elective. The list provided under this category are suggestive in nature and HEI has freedom to suggest its own papers under this category based on their expertise, specialization, requirements, scope and need. The University/Institute may also offer discipline related elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).

Generic Elective (GE)

An elective course chosen from another discipline/subject, with an intention to seek exposure beyond discipline/s of choice is called a Generic Elective. The purpose of this category of papers is to offer the students the option to explore disciplines of interest beyond the choices they make in Core and Discipline Specific Elective papers. The list provided under this category are suggestive in nature and HEI can design its own papers under this category based on available expertise, specialization, and contextual requirements, scope and need.

Dissertation/Project

An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his/her own with an advisory support by a teacher/faculty member is called dissertation/project.

Ability Enhancement Courses(AEC)

The Ability Enhancement Courses may be of two kinds:

A. **Ability Enhancement Compulsory Courses (AECC):** AECC are the courses based upon the content that leads to knowledge enhancement. These are mandatory for all disciplines. Ability Enhancement Compulsory Courses (AECC) are the following.

- AECC-I English
- AECC-II English/Hindi/ MIL Communications
- AECC-III Environment Science

B. **Skill Enhancement Courses (SEC):** SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc. SEC are 4 courses for General bachelor programmes. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge and should contain both theory and lab/hands-on/training/field work.

C. Generic Elective Courses(GE)

The main purpose of these courses is to provide students life-skills in hands-on mode to increase their employability. The list provided under this category are suggestive in nature and each university has freedom to suggest their own papers under this category based on their expertise, specialization, requirements, scope and need.

Practical/Tutorial

For each core course and DSE course there will be one practical. The list of practical provided is suggestive in nature and each university has the freedom to add/subtract/edit practical from the list depending on their faculty and infrastructure available. Addition will however be of similar nature.

Aims of Bachelor of Science Programmes in Computer Science

The Bachelor of Science degree in Computer Science emphasizes problem solving in the context of algorithm development and software implementation and prepares students for effectively using modern computer systems in various applications. The curriculum provides required computer science courses such as programming languages, data structures, computer architecture and organization, algorithms, database systems,

operating systems, and software engineering; as well as elective courses in artificial intelligence, computer-based communication networks, distributed computing, information security, graphics, human-computer interaction, multimedia, scientific computing, web technology, and other current topics in computer science. The main aim of this Bachelor's degree is to deliver a modern curriculum that will equip graduates with strong theoretical and practical backgrounds to enable them to excel in the workplace and to be lifelong learners. The purpose of the BS programs in computer science are twofold: (1) to prepare the student for a position involving the design, development and implementation of computer software/hardware, and (2) to prepare the student for entry into a program of postgraduate study in computer science/engineering and related fields.

The Bachelor of Science program with Computer Science as one subject (BSc with CS) focus on the concepts and techniques used in the design and development of software systems. Students in this program explore the conceptual underpinnings of Computer Science -- its fundamental algorithms, programming languages, operating systems, and software engineering techniques. In addition, students choose from a rich set of electives that includes data science, computer graphics, artificial intelligence, database systems, computer architecture, and computer networks, among other topics.

3. Graduate Attributes

Graduate Attributes (GA) are the qualities, skills and understandings that students should develop during their time with the HEI. These are qualities that also prepare graduates as agents of social good in future. Graduate Attributes can be viewed as qualities in following subcategories.

- Knowledge of the discipline
- Creativity
- Intellectual Rigour
- Problem Solving and Design
- Ethical Practices
- Lifelong Learning
- Communication and Social Skills

Among these attributes, categories attributes under *Knowledge of the Discipline* are specific to a programme of study.

Knowledge of Discipline of CS

Knowledge of a discipline is defined as "command of a discipline to enable a smooth transition and contribution to professional and community settings. This Graduate Attribute describes the capability of demonstrating comprehensive and considered knowledge of a discipline. It enables students to evaluate and utilise information and apply their disciplinary knowledge and their professional skills in the workplace.

Creativity

Creativity is a skill that underpins most activities, although this may be less obvious in some disciplines. Students are required to apply imaginative and reflective thinking to their studies. Students are encouraged to look at the design or issue through differing and novel perspectives. Creativity allows the possibility of a powerful shift in outlook and enables students to be open to thinking about different concepts and ideas.

Intellectual Rigour

Intellectual Rigour is the commitment to excellence in all scholarly and intellectual activities, including critical judgement. The students are expected in having clarity in thinking. This capability involves engaging constructively and methodically when exploring ideas, theories and philosophies. It also relates to the ability to analyse and construct knowledge with depth, insight and intellectual maturity.

Problem Solving and Design

Problem solving skills empower students not only within the context of their programmes, but also in their personal and professional lives. Many employers cite good problem

solving skills as a desired attribute that they would like graduates to bring to the workplace. With an ability to seek out and identify problems, effective problem solvers are able to actively engage with a situation, think creatively, to consider different perspectives to address identified challenge, to try out possible solutions and subsequently evaluate results as a way to make decisions. Through this process they can consolidate new and emergent knowledge and develop a deeper understanding of their subject discipline.

Ethical Practices

Ethical practice is a key component of professionalism and needs to be instilled

in curricula across courses. When operating ethically, graduates are aware that we live in a diverse society with many competing points of view. Ethical behaviour involves tolerance and responsibility. It includes being open-minded about cultural diversity, linguistic difference, and the complex nature of our world. It also means behaving appropriately towards colleagues and the community and being sensitive to local and global social justice issues.

Life-Long Learning

The skill of being a lifelong learner means a graduate is open, curious, willing to investigate, and consider new knowledge and ways of thinking. This flexibility of mind means they are always amenable to new ideas and actively seek out new ways of learning or understanding the world.

Communication and Social Skills

The ability to communicate clearly and to work well in a team setting is critical to sustained and successful employment. Good communication and social skills involve the ability to listen to, as well as clearly express, information back to others in a variety of ways - oral, written, and visual - using a range of technologies.

Self-Management

Graduates must have capabilities for self-organisation, self-review, personal development and life-long learning.

LIST OF GRADUATE ATTRIBUTES for B.Sc.CS

Afore-mentioned GAs can be summarized in the following manner.

GA 1. A commitment to excellence in all scholarly and intellectual activities, including critical judgement

GA 2. Ability to think carefully, deeply and with rigour when faced with new knowledge and arguments.

GA 3. Ability to engage constructively and methodically, when exploring ideas, theories and philosophies

GA 4. Ability to consider other points of view and make a thoughtful argument

GA 5. Ability to develop creative and effective responses to intellectual, professional and social challenges

GA 6. Ability to apply imaginative and reflective thinking to their studies

- GA 7. Commitment to sustainability and high ethical standards in social and professional practices.
- GA 8. To be open-minded about cultural diversity, linguistic difference, and the complex nature of our world
- GA 9. Ability to be responsive to change, to be inquiring and reflective in practice, through information literacy and autonomous, self-managed learning.
- GA 10. Ability to communicate and collaborate with individuals, and within teams, in professional and community settings
- GA 11. Ability to communicates effectively, comprehending and writing effective reports and design documentation, summarizing information, making effective oral presentations and giving and receiving clear oral instructions
- GA 12. Ability to demonstrates competence in the practical art of computing in by showing in design an understanding of the practical methods, and using modern design tools competently for complex real-life IT problems
- GA 13. Ability to use a range of programming languages and tools to develop computer programs and systems that are effective solutions to problems.
- GA 14. Ability to understand, design, and analyse precise specifications of algorithms, procedures, and interaction behaviour.
- GA 15. Ability to apply mathematics, logic, and statistics to the design, development, and analysis of software systems
- GA 16. Ability to be equipped with a range of fundamental principles of Computer Science that will provide the basis for future learning and enable them to adapt to the constant rapid development of the field.
- GA 17. Ability of working in teams to build software systems.
- GA 18. Ability to identify and to apply relevant problem-solving methodologies
- GA 19. Ability to design components, systems and/or processes to meet required specifications
- GA 20. Ability to synthesis alternative/innovative solutions, concepts and procedures
- GA 21. Ability to apply decision making methodologies to evaluate solutions for efficiency, effectiveness and sustainability

GA 22. A capacity for self-reflection and a willingness to engage in self-appraisal

GA 23. Open to objective and constructive feedback from supervisors and peers

GA 24. Able to negotiate difficult social situations, defuse conflict and engage positively in purposeful debate.

4. Qualification Descriptors

Qualification descriptors are generic statements of the outcomes of study. Qualification descriptors are in two parts. The first part is a statement of outcomes, achievement of which a student should be able to demonstrate for the award of the qualification. This part will be of interest to those designing, approving and reviewing academic programmes. They will need to be satisfied that, for any programme, the curriculum and assessments provide all students with the opportunity to achieve, and to demonstrate achievement of, the outcomes. The second part is a statement of the wider abilities that the typical student could be expected to have developed. It will be of assistance to employers and others with an interest in the general capabilities of holders of the qualification. The framework has the flexibility to accommodate diversity and innovation, and to accommodate new qualifications as the need for them arises. It should be regarded as a framework, not as a straitjacket.

Qualification Descriptor for B.Sc. withCS

On completion of B.Sc. with Computer Science, the expected learning outcomes that a student should be able to demonstrate are the following.

- QD-1.** Fundamental understanding of the principles of Computer Science and its connections with other disciplines
- QD-2.** Procedural knowledge that creates different types of professionals related to Computer Science, including research and development, teaching and industry, government and public service;
- QD-3.** Skills and tools in areas related to computer science and current developments in the academic field of study.
- QD-4.** Use knowledge, understanding and skills required for identifying problems and issues, collection of relevant quantitative and/or qualitative data drawing on a wide range of sources, and their application, analysis

And evaluation using methodologies as appropriate to Computer Science for formulating solutions

QD-5. Communicate the results of studies undertaken in Computer Science accurately in a range of different contexts using the main concepts, constructs and techniques

QD-6. Meet one's own learning needs, drawing on a range of current research and development work and professional materials

QD-7. Apply Computer Science knowledge and transferable skills to new/unfamiliar contexts,

QD-8. Demonstrate subject-related and transferable skills that are relevant to industry and employment opportunities.

5. Programme Learning Outcomes

These outcomes describe what students are expected to know and be able to do by the time of graduation. They relate to the skills, knowledge, and behaviours that students acquire in their graduation through the program

Programme Learning Outcomes for BSc.,(CS)

The Bachelor of Science with Computer Science (BSc with CS) program enables students to attain, by the time of graduation:

- PLO-A. Demonstrate the aptitude of Computer Programming and Computer based problem solving skills.
- PLO-B. Display the knowledge of appropriate theory, practices and tools for the specification, design, implementation
- PLO-C. Ability to learn and acquire knowledge through online courses available at different MOOC Providers.
- PLO-D. Ability to link knowledge of Computer Science with other two chosen auxiliary disciplines of study.
- PLO-E. Display ethical code of conduct in usage of Internet and Cyber systems.
- PLO-F. Ability to pursue higher studies of specialization and to take up technical employment.
- PLO-G. Ability to formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate.
- PLO-H. Ability to operate, manage, deploy, configure computer network, hardware, software operation of an organization.
- PLO-I. Ability to present result using different presentation tools.

PLO-J. Ability to appreciate emerging technologies tool

6. Teaching-Learning Process

The teaching-learning process should be in-line with the course objective and outcomes. Teaching has to ensure that the suggested outcomes are ensured for each course and overall programme. Teaching-aids should be used wherever required to facilitate proper and impactful learning. Blended learning is recommended with the use of MOOC platforms and classroom teaching. To meet the set objectives of the course and enable students achieve the expected outcomes of the course the teaching-learning process should be appropriately chosen. Though the teachers are best positioned to create innovative models suitable for teaching the course, certain well accepted and widely tested processes are suggested to achieve the desired outcomes

CLASSROOM TEACHING - Regular classroom and face to face teaching and tutorials can be primarily used for imparting theoretical foundations of Computer Science. Applications of the same may be explained from time to time so that the student can appreciate the theory.

LABORATORY - Lab exercises in programming and usage of package / software tools should be made mandatory and integral part. Open source software/Packages should be preferred over proprietary tools wherever available.

SEMINARS - Guest lectures and seminars involving industry experts and eminent teachers should be arranged to help the students understand the practices in the industry and developments in the field.

MOOCS - Teacher should choose appropriate lecture materials and videos on similar courses available online through Massive Open Courses Online in the world wide web (such as NPTEL) to provide good perspective of the course and use cases and promote blended learning.

PROJECT - Wherever possible the laboratory assignments can be designed in the form of a mini project. For example, the database course lab assignments can be designed to build a complete system for library management. Similarly, summer/ Semester breaks can be utilized for guiding students to develop live projects with industry orientation/ industry problem. Teamwork work should be encouraged,

ASSIGNMENTS - Home assignments should be designed to make student collect information from various sources and solve unfamiliar problems and make comparisons of solutions

MAJOR PROJECT - The major project should be defined based on the student proposals keeping in mind that opportunity to demonstrate the knowledge and skills gained during the course. One-One mentoring support should be provided.

7. Assessment Methods

The committee recommends that assessment should be viewed not only merely as a testing by the institution to evaluate the students' progress, but also as a valuable tool for a student to learn what is expected of him/her, where their level of knowledge and skill is lacking, and perhaps most importantly, what he/she could do to improve these levels with the valuable inputs of the lecturers. Assessment methods are the strategies, techniques, tools and instruments for collecting information to determine the extent to which students demonstrate desired learning outcomes.

In the Bachelor's programmes leading to degrees such as BSc with Computer Science , the assessment and evaluation methods focus on testing the conceptual understanding of the basic ideas of computer hardware and software, development of programming skills and experimental techniques, retention and ability to apply the knowledge acquired to real-life applications, and to solve new problems and communicate the results and findings effectively.

Based on the Learning Objectives defined for each course as proposed in detail, assessment methods can be designed to monitor the progress in achieving the Learning Objectives during the course and test the level of achievement at the end of the course. Several methods can be used to assess student learning outcomes. Relying on only one method to provide information about the program will only reflect a part of students' achievement.

Modular Assessment As the courses are broken up into a smaller more cohesive learning outcomes a module will consist of a number of these smaller, finer grained assessments of which the majority can be considered to be formative assessments that aid the learning process rather than assessments aimed at solely being used to evaluate the student.

Continuous Assessment The continuous assessment occurs on a regular and continuous basis, it is an ongoing formative and summative process, involves the monitoring of students, is integrated with teaching, involves a systematic collection of marks or grades into a final score, may be used to determine the students' final grades.

Direct methods of assessment ask students to demonstrate their learning while indirect methods ask students to reflect on their learning. Tests, essays, presentations, etc. are generally direct methods of assessment, and indirect methods include surveys and interviews. For each Learning Objective, a combination of direct and indirect assessment methods should be used.

Formative Assessment While formative assessment is to gather feedback from formal or informal processes that can be used by the instructor and the students to gather evidence for the purpose of improving learning, summative assessment measures the level of success or proficiency that has been obtained at the end of an instructional unit, by comparing it against some standard or benchmark. Nevertheless, the outcome of a summative assessment can be used formatively when students or faculty use the results to guide their efforts and activities in subsequent courses.

Daily programming assignments or home-assignments is a good way of implementing formative assessment and gives an idea of how well the students understood and could apply each programming concept. Another way of formative assessment can be that at the end of each class period, a student response system can be used to ask students one or more questions about the topic taught on that day. Regular tutorial Assignment, Term-paper, Seminar Presentation, Surprise Quizzes, Open-book Quizzes should be adopted for formative assessments.

B.Sc. COMPUTER SCIENCE

CURRICULUM

Total number of Credits: 140

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER I						
LANG		Tamil- I/ Hindi-I / French-I	3	0	0	3
ENG		English- I	3	0	0	3
CORE1	21CBCS11	Digital Logic Fundamentals	3	1	0	4
CORE2	21CBCS12	Programming in C	3	1	0	4
CORE3	21CBCS13	Mathematics- I	4	1	0	4
CORE	21PBCS11	Programming in C lab	0	0	4	2
CORE	21PBCS12	Fundamentals of Computer Lab	0	0	4	2
AECC		Communication Skills	1	0	2	2
SEC		Orientation/Induction programme / Life skills	-	-	-	-
TOTAL			17	3	10	24

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER II						
LANG		Tamil- II / Hindi-II / French- II	3	0	0	3
ENG		English- II	3	0	0	3
CORE4	21CBCS21	Object Oriented programing using C++	3	1	0	4
CORE5	21CBCS22	Database Management System	3	1	0	4
CORE6	21CBCS23	Mathematics – II	4	1	0	4
CORE	21PBCS21	RDBMS Lab	0	0	4	2
CORE	21PBCS22	Object Oriented programing using C++Lab	0	0	4	2
SEC		Soft Skills - I / Sector Skill Council Course	2	0	0	2
SEC		NSS / NCC / Swachh Bharat / Inplant Training	-	-	-	-
TOTAL			18	3	8	24

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER III						
LANG		Tamil III / Hindi / French	3	0	0	3
ENG		English – III	3	0	0	3
CORE7	21CBCS31	Problem solving using Python	4	0	0	4
CORE8	21CBCS32	Data structures and algorithms	4	0	0	4
CORE9	21CBCS33	Statistics-I	4	1	0	4
AECC		Environmental Studies	2	0	0	2
CORE	21PBCS31	Data structure Using Python Lab	0	0	4	2
SEC		Soft Skills - II / Sector Skill Council Course	2	0	0	2
SEC		Swayam / NPTEL / Value Added Course	-	-	-	-
TOTAL			22	1	4	24

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER IV						
LANG		Tamil/Hindi / French	3	0	0	3
ENG		English IV	3	0	0	3
CORE10	21CBCS41	Modern Operating System	3	0	0	3
CORE11	21CBCS42	Applications of Java	4	0	0	4
CORE12	21CBCS43	Statistics-II	4	1	0	4
CORE	21PBCS41	Operating System Lab	0	0	4	2
CORE	21PBCS42	Applications of Java Lab	0	0	4	2
SEC		Soft Skills III / Sector Skill Council Course	2	0	0	2
SEC		Internship / Capability Enhancement Programme	0	0	2	1
TOTAL			19	1	10	24

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER V						
CORE	21CBCS51	Advanced Java Programming	3	0	0	3
DSE	21DBCS51	DSE-I	3	0	0	3
DSE	21DBCS52	DSE-II	4	0	0	4
DSE	21DBCS53	DSE-III	3	0	0	3
DSE	21DBCS54	DSE-IV	3	0	0	3
DSE	21PBCS51	Advanced Java Programming Lab	0	0	4	2
DSE	21PBCS52	Dot Net Programming Lab	0	0	4	2
SEC		Internship / Mini Project / Sector Skill Council Course	0	0	4	2
SEC		Skill Enhancement Training / Student Club Activities	-	-	-	-
TOTAL			16	0	12	22

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
SEMESTER VI						
DSE	21DBCS61	DSE-V	4	0	0	4
DSE	21DBCS62	DSE-VI	3	1	0	4
DSE	21DBCS63	DSE-VII	4	0	0	4
DSE / GE		Generic Elective	3	0	0	3
SEC		Entrepreneurship Development	2	0	0	2
DE	21RBCS61	Project Work	0	0	8	4
SEC		Technical Seminar / Innovation Council / Start up Initiative	0	0	2	1
TOTAL			16	1	10	22

CA - Continuous Assessment

SEE - Semester End Examination

List of Discipline Specific Elective Courses

21BCS101	Data Communication & Networking
21BCS102	Software Engineering
21BCS103	Open source Technology
21BCS104	Dot net Programming
21BCS105	Data mining
21BCS106	Network Security
21BCS107	Artificial Intelligence
21BCS108	Computer graphics
21BCS109	Multimedia and its application
21BCS110	Software testing
21BCS111	Internet of Things
21BCS112	E-Commerce
21BCS113	Mobile computing
21BCS114	Software project Management
21BCS115	Machine learning
21BCS116	Cloud Computing
21BCS117	Big data analytics
21BCS118	Data Science Using R
21BCS119	Microprocessor & Its Applications
21BCS120	Modern Computer Organization
21BCS121	Deep Learning

List of Generic Elective Courses

21BCS151	Web Designing
21BCS152	Office Automation Tools
21BCS153	Desktop Publishing

List of Ability Enhancement Compulsory Courses

	Communication Skill
	Environmental Science

List of Skill Enhancement Courses

21SSKU21	Soft Skills-I
21SSKU31	Soft Skills-II
21SSKU41	Soft Skills-III
21SSKU51	Responsive Web designing
21SSKU61	Entrepreneurship Development
21SSKU62	Technical Seminar

SEMESTER-I

TAMIL - I				L	T	P	Credits
				3	0	0	3

**இக்காலக் கவிதைகள் - உதைநதை - பண் பாடு - ம
ாழிண்திறண்**

அலகு 1: ஸ்புக்கவிதை
நேரம்

9 மணி

1. பாரதியார் - பாரத நதசம் என் னும் தலைப்பிண் ஆறு பாடை கள் .
(பாடண் எண் கள் 1, 6, 7, 9, 12, 13)
2. பாரதிதாசன் - தமிழுக்கும் அமுததன்று நபர் என் னும்
தலைப்பிண்ானகவிலத.
3. நதசிக வி஁ாயகம்பிள்ளள - உடை ஁ண்ம்
நபண் என் னும் தலைப்பிண்ான கவிலத
4. முடரியரசன் - காவியப் பாலை - "புண் படுமா" என் னும்
கவிலத.

அலகு 2: புதுக்கவிதை
நேரம்

9 மணி

1. ஁ா. காமராசன் - கறுப்பு ளண்கள்
ததாகுப்பிண் காகி஁ப்புக்கள்
என் னும் தலைப்பிண்ான கவிலத.
2. அப்துண் ரகுமான் - ஆலாபதன
ததாகுப்பிண் பபாண்டி என் னும்
தலைப்பிண்ான கவிலத
3. ஈநராடு தமிழண் பண் - ஒரு வண் டி மண்
஁ரிய ததாகுப்பிண்
நதரண் ததடுக்கபபட்ட தசண் ரியு கவிலதகள
4. ஆண் டாள் பிரியதரணி - முண்ண்ங்கள்
஁ண்ந்துவிண்னை ததாகுப்பிண்
'இந்பக வரு' பபாது' என் னும் தலைப்பிண்ான கவிலத

அலகு 3: உதைநதை
நேரம்

9 மணி

1. ஁ணாக்ர஁ ஁ண்யம் ஁ாழிய஁ - திர஁.வி.க.,
2. ஁ வலித பவண் டு - ம஁.வண்ண்஁ண்஁ண்
3. ம஁ ம ஁ாழிண் ம஁ிழின் ஁ிறப்ப஁கள்
4. பண் தண்ண் ம஁ிழின் ஁ண்஁தண்ண் ஁வடுகள்

அலகு 4: ம஁ிழை வ஁ழ்வ஁ பண் பாடு
நேரம்

9 மணி

பண் பாடு - ஁ண்஁வரியண் முலை - அகம், ப஁ண்ம் -
உண்வு முலை - விருண்நதாம் பை - ஁ண் பிக்லககள் - விழாவும்
஁ழிபாடும் - கலைகள் - கட்டடம் - ஁ிண்஁ம் - ஁வரியம் - இலச -
஁஁த்து - தத஁ழிலும் ஁ண்஁கமும் - அறிவியை ந஁க்கு.

அலகு 5: ம ாழிஐ஑்திஒன் , இலக஑்கிய வ஑ல஑ஒறு, இலக஑்கண ஑்
9 மணி

நேரம்

1. ஂழுத்துப் பிலழ, தத஑஑ரப் பிலழக஑

2. நெற்றுலம இக்கணம்
3. தசய்யுள் னேம் பாராட்டை
4. பாடம் தழுவிய இக்கிய னைராறு (மரபுக் கவிலத, புதுக்கவிலத, உலரேலட)

தமாத்தம்: 45 மணி நேரம்

COURSE OUTCOME: (Employability)

At the end of this course the students will be able to,

CO 1: Recall and recognize heritage and culture of Tamils through History of Tamil Language.

CO 2: Interpret the cultural life style of Ancient Tamils.

CO 3: Evaluate social and individuals moral value after studying Ethics In modern Literature.

CO 4: Build the humanistic concept and moral life skills after studying divine and minor Literature.

CO 5: Improve their own creativity and writing skills after studying history of Modern Tamil Literature.

பாதைவநுல்கள்

1. மைமிழ்நாகணிகமு பண் பாடு ஂ, டாக்டர் அ.தட்சிணாமூரத்தி, ஜேதிலணப்பதிப்பகம்
2. வைறின் றிண்மைமிழ் எழுதுபவா ஂ, மா. னேன் னன், ஏகம் பதிப்பகம்
3. வைறின் றிண்மைமிழ் எழுது-மருதாரஅரங்கராசன், ஜேதிலணப்பதிப்பகம்
4. மைமிழ் இலக்கியவைலாறு, ரைதராசன், மு., புதுதிண்லி : சாகித்தியஅக்காதமி,
5. புதியமைமிழ் இலக்கியவைலாறு, னேண். பத்மோபன், சிண்லிபாசுப்ரமணியம், சாகித்தியஅக்காதமி
6. மெம் ாழிமைமிழின் சிறப்பியல்புகள் - முலனைரமலைமலைஇக்குணார; ஂ <https://www.youtube.com/watch?v=HHZnmJb4jSY>

பாநுல்களைலுக்கானஇதணய ஂ - <https://archive.org/>

HINDI - I		L	T	P	Credits
		3	0	0	3

Course Objective: (Skill Development)

- To enable the students to develop communication skills
- To train students in official language
- To enrich their knowledge in Hindi literature
- To teach them human values & create awareness towards exploitation

Unit I	- ' Ek atuut kadi' by shri Rajkishore letter writing (application), Technical words (prashasanik vakyansh:1-50).	9
Unit II	'Devi singh' by agyeya , letter writing (bank A/C opening&closing), Technical words (prashasanik vakyansh:51-100).	9
Unit III	' kabiraa ki kaashi 'by Kumar Ravindra	9
Unit IV	' bharathiya vigyan ki kahaani - 'hamne diyaa ,hamne liyaa' 'by Gunakar mule, letter writing (shikayath pathra, gyapan) Technical words: takniki shabd-25.	9
Unit V	letter writing (sarkari pathra, ardha sarkaari pathra, kaaryalaya aadesh), Technical words: takniki shabd-25.	9

TOTAL HOURS: 45

COURSE OUTCOME

At the end of this course students will be able to,

CO 1: Students will be familiar with official letter writing

CO 2: will understand their responsibility in the society

CO 3: students will be moulded with good character understand human values

CO 4: students will gain knowledge about ancient &, rich culture of India

CO 5: will know the equivalent Hindi words for scientific terms

Text /Reference Books :

Agyeya ki sampoorna kahaniyaa - Rajpal &sons, year 2017,

Yatraye our bhi ,Kumar Ravindra Rashmi prakashan ,Lucknow

Bharathiya vigyan ki kahani, Hindi book centre, NewDelhi

Gadya Khosh

Weblinks:

<http://www.hindisamay.com/content/1321/1/%E0%A4%B0%E0%A4%BE%E0%A4>

<http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0>

<http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0>

<http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0>

	FRENCH - I	L	T	P	Credits
		3	0	0	3

Course Objective: (Skill Development)

- To introduce French language.
- To enable the students to understand and to acquire the basic knowledge of French language with elementary grammar.

UNIT I INTRODUCTION

9

Introduction-Alphabet-comment prononcer, écrire et lire les mots-base: les prénoms personnel de 1er , 2eme et 3eme personnes-conjugaisons les verbes être et avoir en forme affirmative, négativeEt interrogative.

UNIT II- LECON 1-3

9

Leçon 1 :Premiers mots en français- 2.Les hommes sont difficiles 3.Vive la liberté-Réponsesaux questions tires de la leçon-Grammaire: Les adjectives masculines ou féminines-Les article définies et indéfinis-Singuliers et pluriels.

UNIT III-LECON 4-6

9

Leçons 4. L'heure c'est l'heure 5.Elle va revoir sa Normandie 6.Mettez-vous d'accord groupe de nom-Réponses aux questions tires de la leçon-Grammaire :A placer et accorder l'adjectif en groupe de nom-Préposition de lieu-A écrire les nombres et l'heure en français

UNIT IV-LECON 7-9

9

Leçon 7.Trois visage de l'aventure , 8. A moi Auvergne 9.Recit de voyage-Réponses auxquestions tires de la leçon- Grammaire : Adjectif processif- Les phrases au présent de l'indicatif-Les phrases avec les verbes pronominaux au présent.

UNIT V- COMPOSITION :

9

A écrire une lettre a un ami l'invitant a une célébration différente ex: mariage-A faire ledialogue- A lire le passage et répondre aux questions.

TOTAL HOURS: 45

COURSE OUTCOME

At the end of this course students will be able to,

CO1: The content of the unit 1 aids the students to explore the basics of the new foreign language.

CO2: The content of unit 2 to experience the basic formations of words and its basic grammar by differentiating with English.

CO3: This imparts the additional information in terms of general in the sense of geographical and culture.

CO4: Enable students for framing the basics sentence.

CO5: Making the students community to know the French format of letter writing and essay writing.

Text Book:

Jack GIRARDER & Jean Marie GRIDLIG,<<Méthode de Français PANORAMA>>, Clé Internationale, Goyal Publication ,New Delhi Edition 2014.

Reference Books:

1. DONDO Mathurin, "Modern French Course", Oxford University Press, New Delhi Edition 2014.
2. Nithya Vijayakumar get ready French grammar-Elementary Goyal publications, New Delhi Edition 2014.

Web Sources:

1. <https://www.thoughtco.com/french-reading-tips-1369373>
2. <https://www.bnf.fr/fr>
3. <https://www.laits.utexas.edu/tex/>

ENGLISH – I				L	T	P	Credits
				3	0	0	3

ENGLISH I – PROSE

Course Objective: (Skill Development)

- To enable students to develop their communication skills effectively. To make students familiar with usage skills in English Language.
- To enrich their vocabulary in English
- To develop communicative competency.

UNIT I		09
1. Dangers of Drug Abuse - Hardin B Jones		
2. Tight Corners - E. V. Lucas		
UNIT II		09
3. Futurology - Aldous Huxley		
4. If You are Wrong, Admit it - Dale Breckenridge Carnegie		
UNIT III		09
5. Industry - Dr.M.Narayana Rao & Dr.B.G.Barki		
6. Turning Point of My Life - A.J Cronin		
UNIT IV		09
7. Excitement - Mack R. Douglas		
8. The Kanda Man Eater - Jim Corbett		
UNIT V		09
9. Vocabulary and Exercises under the Lessons		

Note: Lessons prescribed are from various anthologies and respective exercises therein will be taught.

TOTAL HOURS: 45

COURSE OUTCOME

At the end of this course the students will be able to,

- CO1: Examine the language of prose.
 CO2: Utilize instructions on fundamentals of grammar
 CO3: Develop their own style of writing after studying diverse prose essays.
 CO4: Classify different essays on the basis of their types.
 CO5: Critically comment on the textual content of prose.

Books Prescribed:

- English for Communication Enrichment: by Jeya Santhi June 2015.
- Dr. M. Narayana Rao and Dr. B. G. Barki – Anu’s Current English for Communication (AnuChitra). June 2012.
- Dr. Ananthan , R. Effective Communication. Ed. Chennai : Anu Chithra Pub.2010.

Web Sources:

- <https://www.gradesaver.com/>
- <https://www.enotes.com/>
- <https://www.jstor.org/>
- <https://www.sparknotes.com/>
- <https://www.cliffsnotes.com/>

Text Book:

1. D.P. Leach & A.P. Malvino, Digital Principles and Application, THM Fifth Edition ,2002

Reference Books:

1. M.M. Mano, Digital Logic and Computer Design, PHI,2001
2. T.C. Bartee, Digital Computer Fundamentals, 6th Edition, Tata McGraw Hill,1991
3. Digital Principles and Design – Donald D.Givone, Tata McGraw – Hill Publishing Company Limited, 2004.

Web Sources:

1. www.tutorialspoint.com/computer_logical_organization
2. www.geeksforgeeks.org/digital-electronics-logic-design-tutorials

Course Objective: The learner understands the basic concepts of programming languages. Also can learn reading and writing of data using arrays and pointers. This approaches a proper method for File Manipulations such as creating, processing, opening and closing.

Unit I: INTRODUCTION**12**

History of C - Importance of C - Basic structure of C - overview of C – C fundamentals: Character Set - C primitive input output - Identifier and Keywords – Tokens-Declaration. Data Types - Constants - Variables - Expressions – Statements- Library Functions.

Unit II: OPERATORS AND CONTROL STATEMENT**12**

Operators: Arithmetic, Unary, Relational and Logical, Assignment And Conditional Operators- Comma Operator - Bit Wise Operators - Flow Of Control If, If Else, While, Do-While, For Loop, Nested Control Structures - Switch, Break And Continue, Go To Statements.

Unit III: FUNCTIONS AND STORAGE CLASSES**12**

Functions –Definition – Types of functions - Passing Arguments – Recursions- Storage Classes - Automatic, External, Static, Register Variables.

Unit IV: ARRAYS AND STRUCTURES**12**

Arrays - Defining And Processing of Arrays-Types of Arrays - 2D Arrays-3D Arrays – Multi-Dimension Arrays- Passing Arrays To Functions - Structures – Defining and processing of Structure - Passing Structures To Functions - Self-Referential Structures – Unions.

Unit V: POINTERS AND FILES**12**

Pointers - Declarations - Passing Pointers to Functions - Operation in Pointers- Files: Creating, Processing, Opening and Closing a Data File- Case Studies.

Total: 60 hours**Course Outcomes:**

At the end of this course, the student will be able to:

CO-1: Evaluate real life applications developed by using C.

CO-2: Analyze the concepts of array, pointer, structure, union in C language.

CO-3: Apply control statements in various applications.

CO-4: Apply the knowledge of data types.

CO-5: Understand the concepts of tokens in C

Text Book:

1. Programming in ANSI C, E.Balaguruswamy, TMH Publishing Company Ltd, 7th Edition, 2017.

Reference Books:

1. Let us C solutions, Yashavant kanetkar, 15th Edition, Kindle edition (2016) from BPB Publications.
2. The Complete Reference in C, H. Schildt, C, TMH, 4th Edition, 2017.

Web Sources:

1. www.studytonight.com
2. www.javatpoint.com

Course objective: To develop the skills of the students in the areas of Algebra, Numerical methods Trigonometry and Calculus. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT – I ALGEBRA AND NUMERICAL METHODS

12

Algebra: Summation of series simple problems. Numerical Methods: Operators E, Δ, ∇ , difference tables -Newton's forward and backward interpolation formulae for equal intervals, Lagrange's interpolation formula.

UNIT- II MATRICES

12

Introduction-Basic operations-Symmetric-skew symmetric-Hermitian-Skew Hermitian –Unitary-orthogonal-Inverse of a matrix -Solution of linear system(Cramer's rule)- Finding the Eigen roots and Eigen vectors of a matrix-Cayley Hamilton theorem(without proof)

UNIT- III THEORY OF EQUATIONS

12

Polynomial equations with real coefficients, irrational roots, complex roots, symmetric functions of roots, transformation of equation by increasing or decreasing roots by a constant, reciprocal equation. Newton's method to find a root approximately - simple problems.

UNIT IV TRIGONOMETRY

12

Introduction- Expansions of $\sin n\theta$ and $\cos n\theta$ in a series of powers of $\sin\theta$ and $\cos\theta$ - Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ in a series of sines, cosines and tangents of multiples of " θ " - Expansions of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in a series of powers of " θ " – Hyperbolic and inverse hyperbolic functions - Logarithms of complex numbers.

UNIT V DIFFERENTIAL CALCULUS

12

Differentiation-Successive differentiation, n^{th} derivatives, Leibnitz theorem (without proof) and applications, Jacobians, Curvature and radius of curvature in Cartesian co-ordinates, maxima and minima of functions of two variables.

TOTAL: 60 HOURS

Course Outcome:

At the end of this course, the students will be able to:

CO1.Critically evaluate the underlying assumptions of analysis tools and relations of Set Theory

CO2. . Understand and discuss the applications of matrices and utilizes.

CO3.Discuss critically the uses and limitations of Theory of equations

CO4. Describe and discuss the key terminology, concept tools and techniques used in trigonometry

CO5. Discuss and describe the maxima and minima in detailed ways and the applications of partial differential equations .

TEXT BOOKS

2. P. Kandaswamy and K.Thilagavathy, Allied Mathematics paper I, 1st Semester, S.Chand Publishing Pvt. Ltd. 1st Edition,2003.
3. S. Narayanan and T.K. ManickavasagamPillai – Ancillary Mathematics, S. Viswanathan Printers, 1986, Chennai.

REFERENCE BOOKS

1. P.R. Vittal, Allied Mathematics, Margham Publications, 4th Edition 2009.
2. A. Singaravelu, Allied Mathematics, Meenakshi Agency, 2007.
3. P. Duraipandian and S.UdayaBaskaran, Allied Mathematics, Vol. I & II Muhil Publications, Chennai.

WEB RESOURCES:

1. machinelearningmastery.com/gentle-introduction-linear-algebra/
2. www.geeksforgeeks.org/trigonometry/

Course Objective: This course is emphasizes the nature of C language using many applications and helps to understand the need to choose the language for solving the problem. The students can understand the art of computer programming.

1. a) Write a program to print first ten natural numbers.
b) Write a program to find greatest of three numbers.
2. Write a program to find grade of a list of students given their marks.
3. Write a program to find gross salary of a person.
4. Write a program for counting the number of vowels, consonants, words, white spaces in a line of text and array of lines.
5. Write a program for palindrome.
6. Write a program for Fibonacci sequence.
7. Write a program to find GCD of two numbers.
8. Write a program to find NCR and NPR.
9. a) Write a program to find Towers of Hanoi.
b) Write a program to find Maximum & Minimum.
10. Write a program for a) $\sin(x)$.
11. Write a program for $\cos(x)$.
12. Write a program for Addition and Subtraction of Matrix.

Total: 30 Hours

Course Outcomes:

At the end of this course, the student will be able to:

- CO-1:** Create Matrix addition and subtraction program using C.
- CO-2:** Evaluate String manipulation program using C.
- CO-3:** Apply recursive function to generate Fibonacci Sequence.
- CO-4:** Apply maths knowledge to find $\sin x$ and $\cos x$.
- CO-5:** Apply control structure concept to find max min numbers.

Text Book:

1. Programming in ANSI C, E.Balaguruswamy, TMH Publishing Company Ltd, 7th Edition, 2017.

Reference Books:

1. Let us C solutions, Yashavant kanetkar, 15th Edition, Kindle edition (2016) from BPB Publications.
2. The Complete Reference in C, H. Schildt, C, TMH, 4th Edition, 2017.

Web Sources:

1. www.studytonight.com
2. www.javatpoint.com

Course Objective: The student learns to work in macros, mail merge, formatting document in word, working with charts, functions in excel and database creation for various applications in access. Applying sound effects and animation to images in power point can be easily done by students.

MS-Word

1. Working with formatting Document using different styles and table.
2. Working with mail merge
3. Working with macros.

Ms- Excel

4. Working with formatting, protection, goal seek and scenarios in worksheet
5. Working with Import external data, sort &filter, functions in worksheet
6. Working with types of charts
7. Working with calculations in various applications

Ms- Access

8. Working with inventory system with report
9. Working with payroll system with report
10. Working with Student information system with report

Ms- PowerPoint

11. Create text and images with various effects
12. Create animation and sound effects

Total: 30 Hours

Course Outcomes:

At the end of this course, the student will be able to:

- CO-1:** Create presentation using text and images.
- CO-2:** Create presentation using animation and sound effects.
- CO-3:** Create various type of report using MS-ACCESS.
- CO-4:** Evaluate various Mathematical function using MS-Excel.

CO-5: Apply mail merge concept in MS-Word.

Text Book:

1. Madhulika Jain, Shashank Jain, Sathish Jain, PC software Made simple, BPB publications, 2002.

Reference Books:

1. Bittu kumar, Mastering MS-Office, kindle Edition, 2017.
2. Joan Lambert, Curtis Frye, Microsoft Office 2016 step by **step, kindle Edition, 2017.**

Web Sources:

1. www.teachers.tech/microsoft-word-tutorial/
2. www.electricteacher.com/tutorials.htm

SEMESTER-II

	TAMIL - II	L	T	P	Credits
		3	0	0	3

**அற இலக்கியம் - சிறுநூல்களில் - சிறுகதை - பயன்
பாடல்கள் மீட்டர்**

அலகு 1: அற இலக்கியங்கள்
நேரம்

10 மணி

1. திருக்குறள் - னான் சிண்ப்பு(அம்), ஊக்கமுலடலம(தபாருள்), குறிப்பறிதை(இன் பம்) - மூன்று அதிகாரங்கள் முழுமையும்.
2. னாடியார் - மூன்று பாடல்கள். (2, 3, 5)
3. பழதமாழி னானூறு - மூன்று பாடல்கள் (74, 75, 78)
4. திரிகடுகம் - மூன்று பாடல்கள் (10, 12, 22)
5. இனியலை னாண்பது - மூன்று பாடல்கள் (1, 12, 16)

அலகு 2: சிறுநூல்களில்

10 மணி நேரம்

1. முதததாளளாயிரம்
நசரன் - வீரம் 14, 15 பாடல்கள்
நசாழன் - காதை 23, 24 பாடல்கள்
பாண்டியன் - னாடு 87, 88
பாடல்கள்
2. தமிழ்விடு தூது - முதலாம் 20 கண்ணிகள்
3. திருக்குறள்குறள் குறள் - மலைளம் கூறுதை - முதை 5 பாடல்கள்
4. முக்கூடல்கள் - மூத்த பள்ளி னாடல்கள்
கூறுதை 3 பாடல்கள்,
இலைய பள்ளி னாட்டு னைம் கூறுதை 3 பாடல்கள்.
5. கலிங்கத்துப் பரணி - பாலை பாடியது - முதை 5 பாடல்கள்

அலகு 3: சிறுகதை

9 மணிநேரம்

1. அறிஞர் அண்ணா - தசண்டலம்
2. புதுலம்பித்தன் - கடவுளும் கேதசாமிப் பிள்ளையும்
3. தெயகாந்தன் - யுகசேதி
4. கு.அழகிரிசாமி - காண்பு
5. அம்லப - காட்டிணை ஒரு மான்

**அலகு 4: த்தமிழ்
பப**

8 மணி

செ
நேரம்

நபச த்திணை - விளக்கம் த்திணை அடிப்பலகள் -
சு - நபசசு
லைககள் - நமலடபநபசசு - உலடயாடலை - பயிசைசிக் ள

அலகு 5: எழுண்துணை மீட்டர், இலக்கிய வலைாறு, இலக்கணம்
8 மணி நேரம்

1. கலைசு த்தசாண்குறள் - நதலைகள் -

கலசைதசாண்களின் பண்புகள்

– அறிவியல் கலைத் தசாண்கள் – கடிதம் – லைககள் –
அலுக்கக்கடிதங்கள் – உவுமுலைக் கடிதங்கள்.

	HINDI – II	L	T	P	Credits
		3	0	0	3

Course Objective: (Skill Development)

- To train students in translation
- To develop reading & writing skills
- To create interest towards reading different types of literature

Unit I	- ' idgah' by Premchand' (kahani), Translation- Definition,Types	9
Unit II	'pitha ' by gyanranjan (kahani), Translation - Anuvadak ke gun	9
Unit III	- jamun ka ped by Krishna chander ' (kahani) , Translation Practice	9
Unit IV	- adhi rath ke baad by Shankar shesh (naatak), Translation Practice	9
Unit V	- adhi rath ke baad by Shankar shesh (naatak), Translation Practice	9

TOTAL HOURS: 45

COURSE OUTCOME

At the end of this course students will be able to,

- CO 1: Students will know the importance & process of translation
CO 2: understand the values of elders in a family & extend their support
CO 3: will know the different writing skills of authors
CO 4: gain knowledge in Hindi literature
CO 5: will acquire knowledge in Hindi Sahithya

Text/Reference book :

- Adhi rath ke baad ,by Shankar shah ,kitabghar prakashan ,2000
Idgah by Premchand,Bharathiya gyan peeth ,NewDelhi ,
Jamun ka ped by Krishna Chandra, Deepak publishers, Nov. 2019
Pitha by gyan ranjan,Rajkamal publication,Jan 2018
Glossary of Administrative terms ,Commission for scientific terms & Technical Terminology,2007
Patralekhan kala by Dr.Shivshankar Pandey,2018
Gadya khosh

Weblinks:

<https://premchandstories.in/eidgaah-story-munshi-premchand-pdf/>

<https://www.google.com/search?q=pita+by+gyan+ranjan&oq=pitha+by+gya&aqs=chrome.1.69i57j0i13j0i22i30.10387j0j4&sourceid=chrome&ie=UTF-8>

<http://db.44books.com/2020/04/%e0%a4%86%e0%a4%a7%e0%a5%80-%e0%a4%b0%e0%a4%be%e0%a4%a4-%e0%a4%95%e0%a5%87-%e0%a4%ac%e0%a4%be%e0%a4%a6.html>

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF

	FRENCH - II	L	T	P	Credits
		3	0	0	3

Course Objective: (Skill Development)

- To fortify the grammar and vocabulary skills of the students.
- To enable the students have an idea of the French culture and civilization

UNIT I LECON 10-11 **9**

Leçons :10 Les affaires marchent,11 un repas midi a problèmes- Réponses aux questions tiresde la leçon-grammaire ;présent progressif passe récent ou future proche-complément d’Object directe-complément d’objet

UNIT II- LECON 12-13 **9**

Leçons 12 :tout est bien qui fini bien,-13 aux armes citoyens-réponses aux questions tires de la leçon-grammaire :les pronoms<<en ou y>> rapporter des paroles-Les pronoms relatifs que,qui ou ou.

UNIT III-LECON 14-15 **9**

Leçons 14.Qui ne risque rien n’a rien-15.la fortune sourit aux audacieux-réponses aux questions tires de la leçon-grammaire : comparaison-les phrases au passe compose.

UNIT IV-LECON 16-18 **9**

Leçons 16 la publicité et nos rêves 17 la France la monde 18 campagne publicitaire réponsesaux questions tires de la leçon-grammaire :les phrases a l’imparfait-les phrases au future

UNIT V- COMPOSITION : **9**

A écrire une lettre de regret//refus a un ami concernant l’invitation d’une célébration reçue-a écrire un essaie sur un sujet générale-a lire le passage et répondre aux questions.

TOTAL HOURS: 45

COURSE OUTCOME

At the end of this course students will be able to,

CO 1: This enable students to learn the language without any grammatical errors.

CO 2: As a result of the content makes the students to known about the types of pronouns and their usage.

CO 3: This imparts the students in order to develop their basic writing skills.

CO 4: Enable students for framing the basics sentence.

CO 5: Making the students community to know the French format of letter writing and essay writing.

Text Book:

J

ack GIRARDER & Jean Marie GRIDLIG,<<Méthode de Français PANORAMA>>, Clé Internationale, Goyal Publication, New Delhi Edition 2014.

Reference Books:

1. DONDO Mathurin, “Modern French Course”, Oxford University Press, New Delhi Edition 2014.
2. Nithya Vijayakumar get ready French grammar-Elementary Goyal publications, New Delhi Edition 2014.

Web Sources:

1. <https://www.thoughtco.com/french-reading-tips-1369373>
2. <https://www.bnf.fr/fr>
3. <https://www.laits.utexas.edu/tex/>

	ENGLISH - II	L	T	P	Credits
		3	0	0	3

ENGLISH II – POETRY

Course Objective: (Skill Development)

- To enable students to develop their communication skills effectively.
- To enrich their vocabulary in English
- To develop communicative competency.

UNIT I		09
	1. Growing Old - Winston Farewell	
	2. Ecology - A. K. Ramanujan	
UNIT II		09
	3. Stopping by Woods on a Snowy Evening - Robert Frost	
	4. Our Casuarina Tree - Toru Dutt	
UNIT III		09
	5. Goodbye Party for Miss Pushpa T.S. - Nissim Ezekiel	
	6. The Bull - Ralph Hodgson	
UNIT IV		09
	7. If - Rudyard Kipling	
	8. The Drowned Children - Louise Glück	
UNIT V		09
	9. Australia - A.D.Hope	
	10. A Far Cry from Africa - Derek Walcott	

TOTAL HOURS: 45

COURSE OUTCOME

- At the end of this course the students will be able to,
- CO1: Learn to employ Poetic expressions in the course of daily speech.
- CO2: Prove their better communicative ability.
- CO3: Prove their skill in writing sentences with poetic impact.
- CO4: Develop different sensibilities in approaching life.
- CO5: Solve life's problems as highlighted in the selections.

Books Prescribed:

- Selections from Caribbean Literature. Mahaam Publishers, Chennai.
- Our Casuarina Tree - Vasan Publication By Dr.A Shanmugakani

Web Sources:

- <https://www.gradesaver.com/>
- <https://www.enotes.com/>
- <https://www.jstor.org/>
- <https://www.sparknotes.com/>
- <https://www.cliffsnotes.com/>

Course Objective: The course helps the students to know various structures in C++. This makes them familiar with OOPS concepts. To learn the fundamental programming concepts and methodologies which are essential to building good C++ programs. To practice the fundamental programming methodologies in the C++ programming language via laboratory experiences.

UNIT I PRINCIPLES OF OBJECT ORIENTED PROGRAMMING (OOP) 12

Software Evolution-OOP Paradigm-Basic Concepts of OOP-Benefits of OOP- Object Oriented Languages-Applications of OOP.

UNIT II INTRODUCTION TO C++ 12

Tokens, Keywords, Identifiers, Variables, Operators, Manipulators, Expressions and Control Structures in C++; Pointers - Functions in C++ - Main Function - Function Prototyping - Parameters Passing in Functions - Values Return by Functions - Inline Functions - Friend and Virtual Functions

UNIT III CLASSES AND OBJECTS 12

Constructors and Destructors; and Operator Overloading and Type Conversions - Type of Constructors - Function overloading.

UNIT IV INHERITANCE 12

Single Inheritance - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance. Pointers, Virtual Functions and Polymorphism; Managing Console I/O operations.

UNIT V WORKING WITH FILES 12

Classes for File Stream Operations - Opening and Closing a File - End-of-File Deduction - File Pointers - Updating a File - Error Handling during File Operations - Command line Arguments.

TOTAL: 60 Hours

Course Outcomes:

At the end of this course, the students will be able to:

- CO-1:** Analyze File concepts in C++.
- CO-2:** Apply control statements in various applications.
- CO- 3:** Apply the concepts of object-oriented programming language.
- CO-4:** Apply the concepts of inheritance, polymorphism using C++.
- CO-5:** Understand object oriented programming concepts.

Text Books:

1. Object Oriented Programming with C++, E.Balagurusamy, TMH, 2nd Edition, 1995.
2. Fundamentals of Data Structures in C++,E.Horowitzand S.Shani,,Galgotia Publication,3rd Edition,1999.

Reference Books:

1. Object Oriented Programming in Microsoft C++, Robert Lafore,Galgotia publication, 2nd Edition ,2001.
2. Object Oriented Programming in C++, Pandiyaraja.P, 2008.

Web Sources:

1. www.cplusplus.com
2. www.programiz.com/cpp-programming

Course Objective:

- This course introduces the basic concepts of Database Management System, the Structured Query Language (SQL) and PLSQL. The students gain knowledge about Database, Data models, Relational Algebra, Normalization, SQL, PL/SQL and Stored Procedure.

Unit – I Introduction**12**

DBMS Definition, Characteristics of DBMS ,Application and advantages of DBMS, Instances , Schemas and Database States, Three Levels of Architecture , Data Independence, DBMS languages, Data Dictionary, Database Users, Data Administrators.

Unit – II Data Models**12**

Data Models, types and their comparison, Entity Relationship Model, Entity Types, Entity Sets, Attributes and its types, Keys, E-R Diagram, Data Integrity, RDBMS –Concept, Components and Codd’s rules.

Unit – III Relational Algebra and Normalization**12**

Relational Algebra (selection, projection, union, intersection, Cartesian product, Different types of join like theta join, equi-join, natural join, outer join) Functional Dependencies, Good & Bad Decomposition, Anomalies as a database: A consequences of bad design, Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF.

Unit – IV Introduction to SQL**12**

Introduction to SQL: DDL, DML, and DCL statements, Creating Tables, Adding Constraints, Altering Tables, Update, Insert, Delete & various Form of SELECT- Simple, Using Special Operators for Data Access. Aggregate functions, Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins) Functions.

Unit – V PL/SQL**12**

Introduction to PL/SQL (blocks of PL/SQL, Variables, constants), Control Structure Introduction to Stored Procedures, Functions, Cursor and Triggers-Case Study.

Total: 60 Hours

Course Outcomes:

At the end of this course, the students will be able to:

- CO - 1:** Analyze different types of SQL statements.
- CO - 2:** Apply the query knowledge to write PL/SQL code.
- CO - 3:** Apply ideas to combine tables using join.
- CO - 4:** Apply knowledge to write simple query.
- CO - 5:** Understand the fundamental concepts of DBMS.

Text Books:

1. A. Silberschatz, H. F. Korth, S.Sudharsan, Database System Concepts, Sixth Edition, Tata McGraw Hill, 2011.
2. Ivan Bayross, SQL, PL/SQL, The programming language of Oracle, Second Revised Edition, BPB Publication, 2015

Reference Books:

1. R.Elmasri, S.B.Navathe, Fundamentals of Database systems, Fifth Edition, Pearson Education, 2008.
2. C. J. Date, Introduction to Database Systems, Fifth Edition, Pearson Education, 2005.

Web Sources:

1. www.guru99.com/dbms-tutorial.html
2. www.oracletutorial.com

Course Objective : To impart the knowledge of Integral calculus, Differential Equations, Fourier Series and Laplace transform. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT-I INTEGRAL CALCULUS**12**

Integral calculus: Integration – Definite integrals – Bernoulli's formula -Reduction formula for $\int \sin^n x dx, \int \cos^n x dx, \int \tan^n x dx, \int x^n e^{ax} dx$.

UNIT-II DIFFERENTIAL EQUATIONS**12**

Ordinary Differential Equations: First order of higher degree equations – Second order and non-homogenous linear differential equations with constant coefficient.

Partial Differential Equations: Formation of partial differential equations by eliminating arbitrary constants and arbitrary function- Solutions of four standard types of first order equation-Lagrange method of solving linear partial differential equation $Pp + Qq = R$

UNIT-III FOURIER SERIES**12**

Fourier series of periodic functions on the interval $[c, c+2\pi]$ –Even and Odd functions- Half range sine and cosine series.

UNIT-IV LAPLACE TRANSFORM**12**

Laplace transformation: Definition, Laplace transform of basic trigonometric, exponential and algebraic functions - Inverse Laplace transform- Solving differential equation of second order with constant coefficients using Laplace transform

UNIT – V VECTOR DIFFERENTIATION**12**

Introduction-Scalar point functions-Vector point functions-Vector differential operator ∇ , Gradient-Divergence-Curl-Solenoidal-irrotational-identities- Simple problems

TOTAL : 60 HOURS**Course Outcomes:**

At the End of this course, the students will be able to:

- CO1. Discuss the key terminology, concept tools and techniques used in Integral calculus
- CO2. Understand and discuss the applications of differential equations.
- CO3. Discuss the uses, limitations and applications of Fourier series
- CO4. Evaluate and understand of Laplace transform and its applications
- CO5. Discuss the key terminology, concept tools and techniques used in Vector Differentiation.

TEXT BOOKS:

1. P. Kandaswamy and K.Thilagavathy, Allied Mathematics paper II, 2nd Semester, S.Chand Publishing Pvt. Ltd. 1st Edition, 2004
2. S. Narayanan and T.K. ManickavasagamPillai – Ancillary Mathematics, S. Viswanathan Printers, 1986, Chennai.

REFERENCE BOOKS:

1. P.R. Vittal, Allied Mathematics, Margham Publications, 4th Edition 2009.
A. Singaravelu, Allied Mathematics, Meenakshi Agency, 2007.
2. P. Duraipandian and S.UdayaBaskaran, Allied Mathematics, Vol. I & II Muhil Publications, Chennai.

WEB SOURCES:

1. www.cfm.brown.edu/people/dobrush/am33/Mathematica/ch6/laplace.html
2. www.mathsisfun.com/calculus/differential-equations.html

Course Objective:

- To give a good formal foundation on the relational model of data.
 - To present SQL and procedural interfaces to SQL comprehensively.
 - To present the concepts and techniques relating to query processing by SQL engines.
 - To present the concepts and techniques relating to ODBC and its implementations.
1. Write a Program to create table and insert values using DDL Commands.
 2. Write a Program to implement DML commands.
 3. Write a Program on Types of Data Constraints.
 4. Write a Program on Joins.
 5. Write a Program on group-by clause and order-by clause.
 6. Write a Program on different functions (aggregate, math and string).
 7. Write a Program on different types of sub queries.
 8. Write a Program on different SET Operations.
 9. Write a Program on implementing Factorial, Fibonacci Series using PL/SQL.
 10. Write a Program to implement triggers and cursors.
 11. Write a program that creates the function and calculating area of circle.
 12. Write a program that uses the concept of user defined exception

Total: 30 Hours

Course Outcomes:

At the end of this course, the student will be able to:

- CO-1:** Create an application to check user defined exception using PL/SQL.
- CO-2:** Evaluate the functionalities of trigger and cursor.
- CO-3:** Analyze different types of built-in function in PL/SQL.
- CO-4:** Apply DDL, DML and DCL statement using SQL.
- CO-5:** Apply various types of joins in tables.

Text Books:

1. A. Silberschatz, H. F. Korth, S.Sudharsan, Database System Concepts, Sixth Edition, Tata McGraw Hill, 2011.
2. Ivan Bayross, SQL,PL/SQL, The programming language of Oracle, Second Revised Edition, BPB Publication, 2015

Reference Books:

1. R.Elmasri, S.B.Navathe, Fundamentals of Database systems, Fifth Edition, Pearson Education, 2008.
2. C. J. Date, Introduction to Database Systems, Fifth Edition, Pearson Education, 2005.

Web Sources:

1. www.guru99.com/dbms-tutorial.html
2. www.oracletutorial.com

21PBCS22 OBJECT ORIENTED PROGRAMMING USING C++ LAB 0042

Course Objective: This lab provides detailed knowledge of Arrays, Pointers, Operators in C++. Also provide knowledge in functions, Structures, Unions and Files in C++

1. Write a C++ program to swap two numbers without using third variable
2. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
3. Write a C++ program to declare Struct. Initialize and display contents of member variables.
4. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.
5. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members.
6. Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary).
7. Write a C++ to illustrate the concepts of console I/O operations.
7. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
9. Write a C++ program to allocate memory using new operator.
10. Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)
11. Write a C++ program to create an array of pointers. Invoke functions using array objects.
12. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword. .

Total: 30 Hours

Course Outcomes:

At the end of this course, the students will be able to:

- CO-1:** Create a C++ application using class and objects.
- CO-2:** Create program using Inheritance.
- CO- 3:** Evaluate the concept of Constructor.
- CO-4:** Apply the concepts of pointers in C++.
- CO-5:** Apply the concepts I/O Operation in C++

Text Books:

1. Object Oriented Programming with C++, E.Balagurusamy, TMH, 2nd Edition, 1995.
2. Fundamentals of Data Structures in C++,E.Horowitzand S.Shani,,Galgotia Publication,3rd Edition,1999.

Reference Books:

1. Object Oriented Programming in Microsoft C++, Robert Lafore,Galgotia publication, 2nd Edition ,2001.
2. Object Oriented Programming in C++, Pandiyaraja.P, 2008.

Web Sources:

1. www.cplusplus.com
2. www.programiz.com/cpp-programming

SEMESTER-III

TAMIL - III				L	T	P	Credits
				3	0	0	3

பக்தி இலக்கியம் - காப்பியம் - புதினம் - மாழிமபயணம்

அலகு 1: பக்தி இலக்கியம்
நேரம்

10 மணி

1. **மாணிக்கவாசகம் - திருஞ்சாசகம் - மூன்று பாடல்கள்**
 - ✓ புண்ணாகி பூடாகி (சிப்புராணம்)
 - ✓ எண்ணாப் பிண்பும் (சிப்புராணம்)
 - ✓ உண்ணாலர யான் நைண் நடண் (திருப்புகழ்)
2. **ஆணைகள் - திருப்பாவை - மூன்று பாடல்கள் (1, 3, 4)**
 - ✓ மாரகழித் திங்கள் ... (பாசரம் 1)
 - ✓ ஒங்கி உகளேத... (பாசரம் 3)
 - ✓ ஆழிமலகக் கண்ணா... (பாசரம் 4)
3. **வீணாமுனிவை - நதம்பாணி - மூன்று பாடல்கள்**
 - ✓ ஓர் ஒரு தாய் ; ஒரு தாலதயும் ஓர் (698 - சூலச இலைணின் தாலயப்நபாணற்றுதை)
 - ✓ அணிக் கைத்து அழகு அமுன்திய (1089 - னானைர் இநயசு னாமத்லதப் நபாணற்றி னைணங்கிய தசய்தி)
 - ✓ னான் புத்து இகும் தசஞ் சுடர் காண (3510 - இலைண் சூலச முனிண்கு ஏழு மணிகள் புத்திணை ஒளிவிடும் முடியச ரக் சூட்டு தை)
4. **குணங்குடிகள் - னானை னாகிபு - பராபரக் கண்ணி 1-10 கண்ணிகள்**
5. **திருமுலை - திருமேதிரம் - மூன்று பாடல்கள்**
 - ✓ உடம்பார் அழியின் உயிரார் அழிணர் (திருமேதிரம்: 724)
 - ✓ படமாடக் நகாயிணை பகைண்கு னன்று ஈயிணை (திருமேதிரம்: 1857)
 - ✓ மரத்லத மலைத்தது மாமத யாலன (திருமேதிரம்: 2290)
6. **இளவலிங்க அடிகள் - திருஞ்சாபா - மூன்று பாடல்கள்**
 - ✓ எத்துலணயும் நபதமுணா... (5297)
 - ✓ ஒருமயுடன் னினது திருமைரடி னிலனக்கின் னை (2938)
 - ✓ நகாலயிணை... (4091)

அலகு 2: காப்பியம் -1

9 மணி நேரம்

1. சிண்ப்பதிகாரம் - அலடக்கைக் காலத (ததரிவுதசய்யப்பட்ட பாடை அடிகள் 120-199)
2. சீகை சிண்தாமணி - விமலையார் இண்பகம் (ததரிவுதசய்யப்பட்ட பாடைகள்)

அலகு 3: காப்பியம் -2

9 மணி நேரம்

1. கம்பராமாயணம் - மண்தலர சூழ்ச்சிப் படமை (ததரிவு தசய்யப்பட்ட பாடைகள்)

2. தபரியபுராணம் – பூசைர் ோயனார் புராணம்
(ததரிவு தசய்யப்பட்ட பாடைகள்)

**அலகு 4: புதின ஂ
நேரம்**

8 மணி

1. கைமரம் - நகா. திண்கைதி

**அலகு 5: ம ாழிமபயண்ப்பு, இலக்கண ஂ, இலக்கிய வலாறு 9
மணி நேரம்**

1. அலுண்சார ஂ
தமாழிதபயரப
2. இக்கணக் குறிப்பு
3. பாடம் தழுவிய இக்கிய னைராறு (பக்தி இக்கியம், காப்பியம், புதினம்)

தமாத்தம்: 45 மணி நேரம்

TOTAL HOURS: 45

COURSE OUTCOME (Employability)

At the end of this course the students will be able to,

CO 1: Utilizing fundamental Tamil Grammar in their practical life.

CO 2: Improve their oratorical skill after studying of concept of oratory.

CO 3: Develop their own style of Translation Studies

CO 4: Translate English passage to Tamil.

CO 5: Apply their knowledge into journals, articles writings.

பாைதவநுல்கள்

1. மிழ் இலக்கியவலாறு, ரைதராசன், மு., சாகித்தியஅக்காததமி, புதுதிண்லி
2. மிழ் நதகைத்தகபயடு, தமாழிணைக்கட்டலள
3. பயண் பாைடுண்மிழ், முலனைரஅரங்கிராமலிங்கம் முலனைரஓப்பிணாமதிணாணன், தசன் லனைப்கலைக்கழகம், 2007
4. ம ாழிமபயண்ப்பியல் அடிப்பதைகள், கா.பட்டாபிராமன், யமுலனப்பதிப்பகம், திருணைணாமலை
5. பாைநுல்கைபைலுக்கானஇதணய ஂ
 - <http://www.tamilvu.org/library>
 - <https://www.tamildigitallibrary.in/book>

	HINDI – III	L	T	P	Credits
		3	0	0	3

Course Objective: (Skill Development)

- To enrich the knowledge of students through Tamil literature
- Enable them to learn ancient poems
- To develop interest in learning history of hindi literature

Unit I	- ‘Thirukkural’, Hindi Sahitya ka ithihas (aadikal)	9
Unit II	- ‘Kabir ke pad’, Hindi Sahitya ka ithihas (aadikal)	9
Unit III	- ‘Sur ke pad’, Hindi Sahitya ka ithihas (bhakthi kal)	9
Unit IV	- Thulsi ke pad, Hindi Sahitya ka ithihas (bhakthi kal)	9
Unit V	- Rahim ke dohe , Hindi Sahitya ka ithihas (Rithikal)	9

TOTAL HOURS: 45

COURSE OUTCOME

At the end of this course students will be able to,

CO 1: Students will know the valuable messages in Thirukkural

CO 2: will create interest in knowing ancient poems.

CO 3: Gain knowledge in Hindi literature

CO 4: will know the difference between Hindi & the languages used by ancient poets

CO 5: will be familiar with different styles of poetry writing

Text / Reference books:

Thirukkural translation by Venkata Krishnan

Ramcharitha manas, Githa press ,Gorakhpur by Sri Hanuman Prasad

Sur Sanchayitha by Rajkamal prakashan ,New Delhi

Padya khosh hindi Sahitya ka Ithihas by Dr.Nagendra,Dr.Hardayal ,

Noida

Weblinks:

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF

FRENCH - III				L	T	P	Credits
				3	0	0	3

Course Objective: (Skill Development)

To strengthen the Grammar and Composition in French language. To train the students to enhance his skills in French language for communication.

UNIT I LECON 11 9

Leçon 16-La famille Vincent. Page 44-Grammaire :Passe compose. Leçon 29- Vers l'hôtel. Page 80- Grammaire :Impératif, a mettre phrases Singulier, Pluriel.

UNIT II- LECON 12-13 **9**

Leçon 40-L'Epicerie les Légumes et les Fruits. Page 112-Grammaire;Présent del'indicatif. Leçon 44 La poste. Page-124 l'Grammaire :A mettre les phrases a l'impératif

UNIT III-LECON 14-15 9

Leçon 51-Le café et tabac page 142- Grammaire :A changer les phrases en interrogatif. Leçon 58-La chasse et la pêche. Page 160-Grammaire :Le plus queparfait

UNIT :IV-LECON 16-18 9

Leçons 61-Un mariage a la campagne. Page-170 -grammaire :a changer auparticipe présent.

UNIT :V- COMPOSITION : 9

A écrire une lettre a un ami l'invitation d'une célébration différente
ex :Mariage-a faire un essaie sur un sujet générale-a lire le passage et répondre aux questions.

TOTAL HOURS: 45

COURSE OUTCOME

At the end of this course students will be able to,

CO 1: The content of the unit 1 aids the students to explore the basics of the new French culture and civilisation.

CO 2: The content of the unit 3 aids the students to adapt to the French society.

CO 3: The content of the unit 3 aids the students to adapt to the French society.

CO 4: The content of the unit 4 aids the students to know about francophonie.

CO 5: The content of the unit 5 aids the students to acquire the language proficiency.

Text Book:

Les leçons ont été choisies et tirées de I & II degré de gauger <<Cours de Langue et de Civilisation Française>> The Millennium, Publication Hachette, édition 2002

Reference Books:

DONDO Mathurin, "Modern French Course", Oxford University Press, New Delhi Edition 2014.

Web Sources:

1. <https://www.thoughtco.com/french-reading-tips-1369373>
2. <https://www.bnf.fr/fr>
3. <https://www.laits.utexas.edu/tex/>

	ENGLISH - III	L	T	P	Credits
		3	0	0	3

ENGLISH III - DRAMA AND COMPOSITION

Course Objective: (Skill Development)

- To train students in the use of English language in varied literary and non-literary contexts.
- To teach them soft skills and strengthen their foundation in grammar and composition.
- To evaluate their comprehension skills.

UNIT I		09
	<ul style="list-style-type: none"> • Introduction to Drama. 	
UNIT II		09
	<ul style="list-style-type: none"> • Shakespeare: Funeral Oration (Act III Scene II Julius Caesar) & • Monkey’s Paw - W.W.Jacobs 	
UNIT III		09
	<ul style="list-style-type: none"> • Comprehension 	
UNIT IV		09
	<ul style="list-style-type: none"> • Precis -Writing and Note Taking 	
UNIT V		09
	<ul style="list-style-type: none"> • General Essay on Current Topics 	

TOTAL HOURS: 45

COURSE OUTCOME

At the end of this course the students will be able to,

- CO 1: Estimate the dramatic scenes in the light of appeal of values.
- CO 2: Prioritize pragmatic day- to - day communication through comprehension.
- CO 3: Develop dramatic skill after reading the scenes of plays.
- CO 4: Improve their own style of writing after an expose to the prescribed dramatic pieces.
- CO 5: Adapt themselves to life - context wherein soft skill demonstration is a must.

Books Prescribed:

- An Introduction to Drama. IInd Edition by George Whitfield
- Reading Comprehension for College Students Paperback – Import, 1984 by Reinhart G. Kussat (Author)
- The Monkey’s Paw By W. W. Jacobs Publisher: Perfection Learning

Web Sources:

- <https://www.gradesaver.com/>
- <https://www.enotes.com/>
- <https://www.jstor.org/>
- <https://www.sparknotes.com/>

Matches – Grouping - Matching at Beginning or End - Match Objects – Substituting - Splitting a String - Compiling Regular Expressions.

Total: 60 Hours

COURSE OUTCOME:

At the End of this course, the students will be able to:

CO 1: Evaluate a program incorporating all the python language constructs.

CO 2: Analyse the concepts of Lists, tuples and error handling mechanisms.

CO 3: Apply the concept of Decision making statements, looping constructs, functions for solving basic programs.

CO 4: Apply the various basic programming constructs like operators, expressions.

CO 5: Understand the basic concepts like editor, execution.

Text Books:

1. Mark Summerfield, Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009.

2. Martin C. Brown, PYTHON: The Complete Reference, McGraw-Hill, 2001

Reference Books:

1. Allen B. Downey, ``Think Python: How to Think like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O,,Reilly Publishers, 2016

2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Web Sources:

1. www.learnpython.org
2. www.programiz.com/python-programming
3. www.udemy.com/topic/python/

Course Objective:

To familiarize the students with linear and nonlinear data structures, to understand sorting and searching, to manipulate the complexity of data structures using asymptotic notations and to apply the data structures in solving problems.

UNIT I INTRODUCTION TO DATA STRUCTURES 12

Introduction to Data Structures- Why Data Structures – Operations of Data Structures – Data Types – Arrays and Lists – Representation Of Arrays – Operations On Arrays - Abstract Data Types (ADTs) – List ADT.

UNIT II LINEAR DATA STRUCTURE 12

Stack: Operations of Stack – Representation – Implementation – Infix to Postfix Conversion – Postfix Evaluation – Recursion – Maze Problem – Queue: Operations of Queue – Representation – Implementation – Job Processing using Queue – Circular Queue – Double Ended Queue – Linked List: Representation – Implementation – Polynomial Addition – Doubly Linked List – Circular List – Circular Doubly Linked List.

UNIT III NON LINEAR DATA STRUCTURES 12

Non Linear Data Structures – Trees: Terminologies in Trees – Representation – Types of Trees – Forest – Transforming Forest into Binary Trees - Traversal Techniques – Applications of Trees – Graphs: Terminologies in Graphs – Representation – Depth First Search – Breadth First Search – Applications of Graphs – Shortest Path- Travelling Salesman Problem – Dijkstra's Algorithm – Types of Graphs.

UNIT IV SORTING AND SEARCHING 12

Sorting: Bubble Sort – Selection Sort – Merge Sort – Insertion Sort – Quick Sort – Heap Sort – Searching: Linear Search – Binary Search – Divide and Conquer – Hashing - Hash Table – Direct Address Method – Mapping Function – Handling Collision.

UNIT V COMPLEXITY AND CASE STUDIES 12

Asymptotic Notation – Big Oh Notation – Omega Notation – Theta Notation – Complexity: Space Complexity – Time Complexity – Space and Time Complexities of Data Structures – Case Studies: Searching for Patterns- Inventing a new sorting Algorithm - Synthesizing Concurrent Graph Data Structures.

Total: 60 Hours

Course Outcomes:

At the End of this course, the students will be able to:

CO 1: Analyze unstructured problems and design computer solutions.

CO 2: Apply or create suitable algorithm to solve a particular problem.

CO 3: Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

CO 4: Apply use recursion to solve a problem with a binary search tree or graph.

CO 5: Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.

Text Books:

1. E.Horowitz and S.Shani Fundamentals of Data Structures in C++, Galgotia Pub.2009.
2. Horowitz, S. Sahni, and S. Rajasekaran, Computer Algorithms, Galgotia Pub. Pvt. Ltd., 2012.

Reference Books:

1. R. Kruse C.L. Tondo and B. Leung, Data Structures and Program design in C, PFU, 1997.
2. Gav Pai “Data structures and algorithms, concepts, techniques and Applications”, McGraw Hill, 2017.

Web Sources:

1. www.nptel.com
2. www.hackerearth.com/practice/data-structures/arrays/1-d/tutorial/

Course Objective : To develop the skills of the students in the concepts of Statistics and Design of Experiments . The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I DIAGRAMMATIC AND GRAPHICAL REPRESENTATION OF DATA 12

Introduction – Scope and Limitations of Statistical methods- Collection of data-Classification of data-Tabulation- Diagrammatic representation of data- Simple bar diagram, Multiple bar diagram, Percentage bar diagram and Pie diagram- Graphical representation of data- Histogram, Frequency polygon and Frequency curves- Ogives.

UNIT II MEASURES OF CENTRAL TENDENCY 12

Introduction- Types of Averages-Mean, Median, Mode, Geometric mean and Harmonic Mean- Merits and Demerits.

UNIT III MEASURES OF DISPERSION 12

Measures of Dispersion-Introduction- Range, Quartile Deviation, Mean Deviation, Standard Deviation and Coefficient of variation.

UNIT IV TESTING OF HYPOTHESIS 12

Introduction-Concept of Sampling and Sampling Distribution –Parameter and Statistics- Standard error – Tests of Significance for small samples : t-test for Single mean - difference of means , F-test(variance –Ratio test) , Chi-Square tests for Goodness of Fit and test for independence of attributes in contingency table.

UNIT V ANALYSIS OF VARIANCE 12

Analysis of Variance- One way and Two Way Classifications – Basic Principles of Experimentation – Completed Randomized Design – Randomized Block Design- Latin Square Design.

TOTAL: 60 HOURS

Course Outcomes:

At the End of this course, the students will be able to:

CO1. Describe and discuss the key terminology, concepts tools and techniques used in Statistical analysis

CO2. Critically evaluate the underlying assumptions of analysis tools of measures of central tendency.

CO3. Critically evaluate the underlying assumptions of analysis tools of measures of dispersion

CO4. Discuss critically the uses and limitations of Testing of hypothesis

CO5. Discuss about the classifications of ANOVA

TEXT BOOKS:

1. S.P. Gupta, Statistical Methods, 44th Edition, Sultan Chand & Sons, 2014.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Applied Statistics, Sultan Chand & Sons, 3rd Edition, 2001.

REFERENCE BOOKS:

1. P.R. Vittal and V. Malini, Statistical and Numerical Methods, Margham Publications, 1st Edition, 2007.
2. Beri G, Business Statistics, Tata McGraw Hill Publishing Company Limited, 2009.
3. S.P. Rajagopalan and R. Sattanathan, Business Statistics and Operations Research, Vijay Nicole Pvt. Ltd.

Web Sources:

1. www.tutorialspoint.com/statistics/
2. www.khanacademy.org/math/statistics-probability

COURSE OBJECTIVES:**The course should enable the students to**

- Understand various data representation techniques in the real world.
- Implement linear and non-linear data structures.
- Analyze various algorithms based on their time and space complexity.
- Develop real-time applications using suitable data structure.
- Identify suitable data structure to solve various computing problems.

1. Write Python programs for implementing the Linear Search.
2. Write Python programs for implementing the Binary Search
3. Write Python programs for implementing the Bubble sort.
4. Write Python programs for implementing the Insertion sort.
5. Write Python programs for implementing the Quick sort.
6. Write Python programs to Design and implement Stack and its operations using List.
7. Write Python programs to Design and implement Queue and its operations using List.
8. Write Python programs to convert infix expression into postfix expression.
9. Write Python programs for implementing the Single Linked List.
10. Write Python programs to implement the Depth first search.
11. Write Python programs to implement the Breadth first search.
12. Write a Python program to implement binary search tree

Total: 30 Hours

COURSE OUTCOME:

At the End of this course, the students will be able to:

- CO 1:** Create linear data structure application using Python.
- CO 2:** Create non linear data structure application using Python.
- CO 3:** Evaluate the implementation of sorting algorithm.
- CO 4:** Evaluate the implementation of binary search tree.
- CO 5:** Analyse the performance of Search algorithm.

Text Books:

1. Mark Summerfield, Programming in Python 3: A Complete introduction to the Python Language, Addison-Wesley Professional, 2009.
2. Martin C. Brown, PYTHON: The Complete Reference, McGraw-Hill, 2001

Reference Books:

1. Allen B. Downey, ``Think Python: How to Think like a Computer Scientist'', 2nd edition, Updated for Python 3, Shroff/O,,Reilly Publishers, 2016
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Web Sources:

1. www.learnpython.org
2. www.programiz.com/python-programming
3. www.udemy.com/topic/python/

SEMESTER-IV

எழுத்துருக்கள்

(Fonts) - தமிழிலழத் தட்டசசு

தசய்ய உதவும் தமண்தபாருள்கள், தமிழிலழத் தட்டசசு தசய்ய
யும் முலகைகள் -

தமிழ்த் தட்டசசுப் பயிண்சி - இலணயமும்தமிழ்ப் பயண்
பாடும் - நதடுதபாறி (Search) - ஸலைப்பூ (Blog), மின் னூகைம் (Online
e-Library), - மின் னகராதி (e-Dictionary), - மின் தசய் தித்தாள் - e-Paper, -
இலணயழித் தமிழ்க் கைலும்-கைபித்தலும் - மின் னழிக் கைண்
- e Learning.

அலகு 5: மபாதுக்கடட்டுதலை, இலக்கிய வலைாறு, இலக்கண ஂ
9 மணி

நேரம்

1. தபாதுக்கட்டுலர லைரதண்
2. பாடம் தழுவிய இக்கிய ன்ரைாறு (சங்க இக்கியம், ோடகம், ன்ளரதமிழ்)
3. இக்கணம் (தபாருளிைக்கணம்) திலண, துலை விளக்கம்.

தமாத்தம்: 45 மணி நேரம்

COURSE OUTCOME (Employability)

At the end of this course the students will be able to,

CO 1: Interpret the cultural life style of Ancient Tamils.

CO 2: Formulated their new methods of fine arts through the sprite of ancient art of Tamils.

CO 3: Find out the solutions for the problems of life through the philosophical ideology of Tamil religions.

CO 4: Acquire the Knowledge and understanding theories of Media Tamil - Introduction of Tamil Computing

CO 5: Formulate the art of life through Tamil traditional scientific approach.

பாதைவநுல்கள்

1. கணினிண்மைமிழ், முலனைரதை.சுண்்தரம், விகடன் பிரசுரம்
2. கணிப்பாறியில் மைமிழ், த.பிரகாஷ், தபரிகாம
3. மைமிழ் க்கணினிஇதணயப்பயன் பாடுகள், முலனைரதூலர.மணிகண் டண், மணிண்ானதிபதிபபக் ம
4. இழியல் கதல, டாக்டரமா. பா. குருசாமி, குரு - நததமாழிபதிப்பகம், திண் டுக்கண்
5. அன்சுக்கதலவழிகாண்டி, பாைசுபபிரமண் ியண், ஆ., தசன் லன : தனசுபதிப்பகம், 1966
6. மைாதலக்காண்்சிக்கதல, முலனைரதை. ைண்ைதம்பி,மங்லகப்பதிப்பகம், தசன் லன42
7. பாைநுல்க் பைலுக்கானஇதணய ஂ
 - <http://www.tamilvu.org/courses/nielit/Chapters/Chapter1/11.pdf>
 - <https://www.tamildigitallibrary.in/>

HINDI – IV				L	T	P	Credits
				3	0	0	3

Course Objective: (Skill Development)

- To develop interest in modern poetry
- To teach them the importance & development of hindi journalism.
- To train them in advertisement writings

Unit I	- Sansar by Mahadevi varma, Hindi Sahitya_ka ithihas (adhunik kal)	9
Unit II	- ‘Mouun nimanthran’ by Sumithranandan panth, Hindi Sahitya_ka ithihas (adhunik kal)	9
Unit III	- ‘rah rahkar Tuutthaa rab kaa kahar’ by Dharmendra kumar nivathiya Hindi Sahitya_ka ithihas (adhunik kal)	9 9
Unit IV	‘samarpan’ by Subhadra kumara chouhan , Advertisement writing	9
Unit V	- ‘panthrah agasth kii pukaar ‘by atal bihari vajpayee, Advertisement writing	

TOTAL HOURS: 45

COURSE OUTCOME

At the end of this course students will be able to,
 CO 1: Students will be familiar with modern poetry
 CO 2: Students will understand the importance of protecting atmosphere
 CO 3: will know the real meaning of patriotism & the value of freedom.
 CO 4: will get the ability to write various types of advertisement
 CO 5: will understand the different methods adopted in writing them

Text / Reference books:

Hindi swachandata kavya by Prem Shankar,Vani prakashan
 Meri ikyavan kavithaye ,Kithab gharprakashan ,20106
 Sanchayan :Mahadevi Verma by Nirmala jain ,Vani prakashan ,2016
 Padya khosh
 Hindi Advertisement writing - ek parichaya .Bokcrot.com

Weblinks:

http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9/_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF
http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9/_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF
http://gadyakosh.org/gk/%E0%A4%A6%E0%A5%87%E0%A4%B5%E0%A5%80%E0%A4%B8%E0%A4%BF%E0%A4%82%E0%A4%B9/_/_%E0%A4%85%E0%A4%9C%E0%A5%8D%E0%A4%9E%E0%A5%87%E0%A4%AF

FRENCH - IV				L	T	P	Credits
				3	0	0	3

Course Objective: (Skill Development)

To strengthen the Grammar and Composition in French language. To train the students to enhance his skills in French language for communication.

UNIT:I 9

Leçon 20 : Une grande Nouvelle-Grammaire Le future.

Leçon 46 :Le mètre ;l'autobus-Grammaire-A former ou a changer L'adjectif masculin ou féminin a l'adverbe-Trouvez les noms quicorrespondent aux verbes suivants.

UNIT :II 9

Leçon 48 : A la préfecture de police-Grammaire Les pronoms relatifs.Leçon 63 :les sports-Grammaire le conditionnel présent.

UNIT :III 9

Leçon :56 A Biarritz la page-Grammaire le future antérieure. Leçon :57 Dans les Pyrénées-Grammaire le future antérieure suite.

UNIT :IV 9

Leçons 65-a fin des vacances Grammaire-a changer les phrases du pluriel ausingulier, le présent du subjonctif.

UNIT :V 9

Grammaire et composition :Transduction - réponses aux questions sur lespassage-essaie sur un sujet générale, :lettre :Ecrire une lettre a une amie.

TOTAL HOURS: 45

COURSE OUTCOME

At the end of this course students will be able to,

CO 1: This unit enables the student to know about the French poet and poetry.

CO 2: To teach about the advanced grammar and the civic responsibility.

CO 3: To teach about the advanced grammar and the French monuments

CO 4: This unit enables the student to know about the French topographies

CO 5: This unit enables the student to know about the formal letter drafting.

Text Book:

Les leçons ont été choisi et tire de i & ii degré de gauger<<Cours de Langue et de Civilisation Française>> The Millenium, Publication Hachette, édition 2002

Reference Books:

DONDO Mathurin, "Modern French Course", Oxford University Press, NewDelhi Edition 2014.

Web Sources:

1. <https://www.thoughtco.com/french-reading-tips-1369373>
2. <https://www.bnf.fr/fr>
3. <https://www.laits.utexas.edu/tex/>

	ENGLISH - IV	L	T	P	Credits
		3	0	0	3

ENGLISH IV - PRACTICAL ENGLISH (CONVERSATION PRACTICE)

Course Objective: (Skill Development)

- To train students in the use of English language in varied literary and non-literary contexts.
- To teach them soft skills and strengthen their foundation in grammar.
- To evaluate students to sensitivity in conversational competency.

UNIT I		09
i.	At the Airport	
ii.	In a Bank	
iii.	On a Bus	
UNIT II		09
iv.	In Flight	
v.	In a Hotel	
vi.	In a Library	
UNIT III		09
vii.	Tea Time	
viii.	On a Train	
ix.	In a Restaurant	
UNIT IV		09
x.	On a Picnic	
xi.	In a Police station	
xii.	In a Post office	
UNIT V		09
xiii.	In a travel agency	
xiv.	Asking the way	
xv.	At the theatre	

TOTAL HOURS: 45

COURSE OUTCOME

- At the end of this course students will be able to,
- CO1: Feel confident to speak in different situations.
- CO2: Learn befitting vocabulary words.
- CO3: Have the ability to visualize speaking situations.
- CO4: Be conversant with other conversational situations.
- CO5: Categorize the nature of questions asked usually in interviews.

Books Recommended:

- English Conversation Practice, D.H.Spencer, Oxford.
- Communicative English by Department of English, National College (Autonomous), Trichy.

Web Sources:

- <https://self-publishingschool.com/how-to-write-dialogue/>
- <https://www.masterclass.com/articles/how-to-write-dialogue>

Course Objective: Student will understand Modern Operating System and their principles. The course will cover theory as well as practice aspects of a subject through scheduled lectures and labs, course will cover details of processes, CPU scheduling, memory management, file system, storage subsystem, input/output management and security protection.

UNIT I: OPERATING SYSTEMS OVERVIEW**9**

Operating Systems Overview- Overview and Functions of Operating Systems - History and Generation of Operating System - Protection and Security - Distributed Systems - Operating Systems Structures - Services - System Calls.

UNIT II: PROCESS MANAGEMENT**9**

Processes-Process Concept - Process Scheduling - Operations on Processes - Interprocess Communication; Threads – Overview - Multicore Programming - Multithreading Models; Windows 7 – Thread and SMP Management. Process Synchronization – Critical Section Problem - Mutex Locks – Semaphores – Monitors - CPU Scheduling and Deadlocks.

UNIT III: MEMORY MANAGEMENT**9**

Memory: Swapping, contiguous memory allocation, paging, page table, segmentation, virtual memory, demand paging, page- replacement, Allocation of frames. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging (Concepts only) – Page Replacement policies : Least Recently used (LRU) Optimal (OPT) , Second Chance (SC), First in First Out (FIFO), Not recently used (NRU).

UNIT IV: FILE SYSTEM INTERFACE AND MASS STORAGE STRUCTURE **9**

File system Interface - Concept of a File – File Access – File Directories - File System Implementation- Mass-Storage Structure: RAID Structure - Disk Structure, Disk Attachment - Disk Scheduling - Swap-Space Management - Stable-Storage Implementation - Overview of Mass-Storage Structure - Tertiary Storage Structure.

UNIT V: I/O SYSTEMS AND SECURITY PROTECTION**9**

I/O systems - Hardware - Application I/O Interface - Kernel I/O Subsystem - Transforming I/O Requests to Hardware Operations – STREAMS - Protection & Security Protection – Protection -

Goals of Protection - Principles of Protection - Domain of Protection Access Matrix-
Implementation of Access Matrix - Access control - Security – Problems - Program Threats –
Intruders – Accidental Data Loss - User Authentication - Implementing Security Defenses-
Firewalls – Antivirus and Antivirus Techniques.

Total: 45 Hours

Course Outcomes:

At the End of this course, the students will be able to:

CO1: Analyze the concepts of memory management techniques including virtual memory.

CO2: Understand about structures and history of operating systems and design issues associated with operating systems.

CO3: Understand various process management concepts including scheduling, synchronization.

CO4: Understand about deadlock, deadlock avoidance and prevention.

CO5: Understand about virus and anti virus techniques in OS.

Text Book:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, “Operating System Concepts” 8th edition, 2015.

Reference Books:

2. Stallings “Operating Systems - Internals and Design Principles”, Pearson Education, 6th Edition, 2009.
3. Andrew S. Tanenbaum, Herbert Bos “Modern Operating Systems”, Pearson Education, 4th Edition, March 2014.
4. B.L. Stuart “Principles of Operating Systems” Cengage learning, India Edition, 2012.
5. A.S. Godboie “Operating Systems” 2nd Edition, TMH, 2009

Web Sources:

1. www.tutorialandexample.com/operating-system-tutorial/
2. www.phptpoint.com/operating-system-tutorial/

COURSE OBJECTIVES:

To learn the fundamental concepts of programming style. Understand the concepts of OOP's principles. To make the students to know about exception and how to handle it. Understand the concepts of string functions. Learn the applet programming and design GUI based applications.

UNIT I- INTRODUCTION TO OBJECT ORIENTED PROGRAMMING 12

An overview of Java: Object-Oriented Programming – Using Block of code – Lexical Issues – Java Class Libraries - Data Types Variables and Arrays: Primitive Types – Literals – Declaring a variable – Dynamic Initialization – One-dimensional array – Multi-dimensional arrays – Operators: Arithmetic, Bitwise, Relational, Boolean - Control Statements: Selection statement, Iteration statement, Jump statement.

UNIT II - JAVA - FEATURES 12

Java - Features – Application of Java – Mobile Application - Desktop GUI Applications - Web-based Applications - Gaming Applications - Big Data Technologies - Distributed Applications - Cloud-based Applications - IoT Applications – AWT: Introduction - Working with Windows, Graphics and Text: AWT classes - Window Fundamentals -Working with Frame Windows - Creating a Frame window in an AWT - Based Applet -Creating a Windowed Program-Displaying Information Within a Window

UNIT III – JAVA GRAPHICS 12

Graphics-Working with Color - Setting the paint Mode - Working with Fonts -Using Awt controls, Layout Managers and Menus. Swing: overview – Controls – Event handling – Event classes – Event Listeners – Event Adapters – Layouts – Menu – Containers - Graphics in swing

UNIT IV - JAVAFX 12

JavaFX - Architecture – Application – 2D & 3D shapes, Effect, Transforms, Animations, Layout, User Interface, Event handling - JSP: Introduction – Lifecycle – Directive – Syntax – Request and response. Struts: Introduction – Features – Architecture – Interceptors

The Applet Class: Two Types of Applets-Applet Basic - Applet Architecture - An Applet Skeleton - Simple Applet Display Methods - Requesting Repainting - Using the Status Window - The HTML Applet Tag - Passing Parameters to Applets - getDocumentBase() and getCodeBase() - Event Handling - Utility Classes-Calendar.

TOTAL: 60 Hours

COURSE OUTCOMES:

At the End of this course, the students will be able to:

CO-1: Apply basic concepts of Object Oriented Programming using Java

CO-2: Apply AWT controls in real time Application

CO-3: Apply Threading concept using Java

CO-4: Apply applet concepts in Java in various application

CO-5: Understand the basic concepts in Java

Text Book:

1. P.Naughton and H.Schildt, Java (The Complete Reference), Ninth Edition,2015

Reference Book:

1. K.Arnold and J.Gosling, The Java Programming Language, Second Edition,2012
2. Cay S.Horstmann, Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 2009
3. Deitel and Deitel, “Java – How to program”, Addison Wesley Press,2009
4. E. Balaguruswamy Programming with JAVA - A Primer McGraw Hill Professional, 2015
5. Robert Sedgewick& Kevin Wayne Introduction to Programming in Java Addison Wesley. 2017

Web Sources:

1. <https://beginnersbook.com/2013/12/java>
2. <https://www.javatpoint.com/what-is-java-used-for>
3. https://www.tutorialspoint.com/struts_2/struts_interceptors.html

21CBCS43

STATISTICS-II

4 1 0 4

Course Objective: To develop the skills of the students in Probability and the concepts of Time series, Index numbers as well as Non-Parametric test. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT-I

PROBABILITY

12

Probability- Different approaches of Probability-Addition theorem, Multiplication theorem- Conditional probability- Baye's theorem- Mathematical Expectation and Variance.

UNIT-II

THEORETICAL DISTRIBUTION

12

Introduction- Discrete distribution : Binomial distribution , Poisson distribution
Continuous distribution: Exponential distribution , Uniform distribution , Normal distribution.

UNIT III

CORRELATION AND REGRESSION ANALYSIS

12

Correlation: Introduction-Types of Correlation-Methods of studying correlation- Scatter diagram method, Karl Pearson's Coefficient of correlation, Spearman's Rank Correlation Coefficient. Regression: Introduction-Regression Lines and Regression equations - simple problems.

UNIT-IV

TIME SERIES

12

Time Series Analysis : Component of Time Series-Measurement of trend-Method of Semi-averages, Moving averages method, Method of least squares-Measurement of Seasonal variations: Method of simple averages, Moving averages method.

UNIT –V

INDEX NUMBERS

12

Index numbers: Types of index number, Laspeyre's method , Paasche's method , Fisher's method- Test of adequacy of index number formulae: Time reversal test and Factor reversal test-Chain index numbers –Simple problems.

TOTAL: 60 Hours

Course Outcomes

At the End of this course, the students will be able to:

CO1. Describe and discuss the key terminology, concepts tools and techniques used in Probability

CO2. Critically evaluate the underlying assumptions of distributions

CO3. Understand and critically discuss the issues of time series

CO4. Discuss critically the uses and limitations of Index numbers

CO5. Understand and critically discuss the issues surrounding of correlation and Regression

TEXT BOOKS:

1. S.P. Gupta, Statistical Methods, 44th Edition, Sultan Chand & Sons,2014.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Applied Statistics, Sultan Chand & Sons, 3rd Edition, 2001.

REFERENCE BOOKS:

1. P.R. Vittal and V. Malini, Statistical and Numerical Methods, Margham Publications,1st Edition,2007.
2. Beri G, Business Statistics, Tata McGraw Hill Publishing Company Limited, 2009.
3. S.P. Rajagopalan and R. Sattanathan, Business Statistics and Operations Research, Vijay Nicole Pvt. Ltd.

Web Sources:

1. www.edureka.co/blog/statistics-and-probability/
2. www.khanacademy.org/math/statistics-probability

Course Objective

This course gives practical training in Modern Operating System to perform the various UNIX commands. It gives hands on training in File operations in C Programming.

1. To study of Basic UNIX Commands and various UNIX editors such as vi, ed, ex and EMACS.
2. To write C Programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
3. To write a C program for implementation of Priority Scheduling Algorithms.
4. To write a C program for implementation of Round Robin Scheduling Algorithms.
5. To write a c program to implement IPC using Shared Memory.
6. To write a C program to implement Banker's Algorithm for Deadlock Avoidance.
7. To write a C program to implement algorithm for Deadlock Detection.
8. To write a c program to implement Threading and Synchronization Applications.
9. To write a c program to implement Paging Technique for Memory Management.
10. To write a C program for implementation of FIFO Page Replacement Algorithm.
11. To write C program to organize the file using Single Level Directory
12. To write a C program for random access file for processing the employee details.

Total: 30 Hours

Course Outcomes:

At the End of this course, the students will be able to:

- CO1:** Create an application to check scheduling algorithm.
- CO2:** Create an application to implement dead lock concept.
- CO3:** Evaluate implementation of FIFO page replacement algorithm.
- CO4:** Analyze file concept in Operating system.
- CO5:** Apply file concepts in Random access file.

Text Book:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts" 8th edition, 2015.

Reference Books:

1. Stallings “Operating Systems - Internals and Design Principles”, Pearson Education, 6th Edition,2009.
2. Andrew S. Tanenbaum, Herbert Bos “Modern Operating Systems”, Pearson Education, 4th Edition, March 2014.
3. B.L.Stuart “Principles of Operating Systems” Cengage learning, India Edition, 2012.
4. A.S. Godboie “Operating Systems” 2nd Edition, TMH,2009

Web Sources:

1. www.tutorialandexample.com/operating-system-tutorial/
2. www.phptpoint.com/operating-system-tutorial/

COURSE OBJECTIVES:

Write simple programs and introduce all the concepts in it. Learn the concept of Java Applications.
Write programs using AWT controls to implement GUI based applications

PRACTICAL LIST:

1. Write a java program to develop an Applet that receives an integer in one text field and compute its factorial value and returns it in another text filed when the button “Compute” is clicked
2. Write a java program to draw different shape using applet
3. Write a java program to draw an image using applet
4. Write a java program to develop a java program using Mouse Action Listener
5. Write a java program to implementation of button using java swing
6. Write a java program to implementation of table using java swing
7. Write a java program to implementation of graphical object using java swing
8. Write a java program to develop a java program for addition of two number using event handling
9. Write an applet program to create a bio data using frame controls. Display the details at the end of the applet screen at the click of the button.
10. Write a java program to develop a servlet application to print the current date and time.
11. Write a java program to implement a scrollable panel using Java Swing
12. Write a java program to implement Menus and submenus

Total: 30 Hours

COURSE OUTCOMES:

At the End of this course, the Student will be able to:

- CO-1:** Create a bio data using frame controls and use applet.
- CO-2:** Create a servlet application to print the current date and time.
- CO-3:** Create a Java Program using button in java swing.
- CO-4:** Analyze an application using Mouse Action Listener.
- CO-5:** Apply java programming to draw an image.

Text Book:

1. P.Naughton and H.Schildt, Java (The Complete Reference), Ninth Edition,2015

Reference Book:

1. K.Arnold and J.Gosling, The Java Programming Language, Second Edition,2012
2. Cay S.Horstmann, Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 2009
3. Deitel and Deitel, “Java – How to program”, Addison Wesley Press,2009
4. E. Balaguruswamy Programming with JAVA - A Primer McGraw Hill Professional, 2015
5. Robert Sedgewick& Kevin Wayne Introduction to Programming in Java Addison Wesley. 2017

Web Sources:

1. [https://beginnersbook.com › 2013/12 › java](https://beginnersbook.com/2013/12/java)
2. <https://www.javatpoint.com/what-is-java-used-for>
3. https://www.tutorialspoint.com/struts_2/struts_interceptors.html

SEMESTER-V

Course Objective:

This course gives an insight into advanced features of Java which concentrates in Servlet Java Beans, EJB, RMI, JSP, ORB Protocol; Java beans API, writing RMI clients –Pushing data from RMI Servlet, HTML and XML.

Unit I SERVLET

9

Overview – The Java Web Server – Your First Servlet – Servlet Life Cycle-Servlet Chaining – Server Side Includes- Session Tracking – Security – Introduction to HTML - Tags-Creating Forms – Using JDBC In Servlet – Applet To Servlet Communication- HTML to Servlet Communication.

Unit II JSP

9

Introduction JSP- JSP Architecture - Life cycle of JSP -Examining MVC and JSP -JSP Scripting Elements & Directives-Working with Variables Scopes-Exception Handling- Session Management - Creating and Processing Forms - Using JSP Working with Java Mail- Understanding Java Messaging Services-Transactions.

Unit III RMI

9

Overview – Developing Applications With RMI: Declaring & Implementing Remote Interfaces-Stubs & Skeletons, Registering Remote Objects, Writing RMI Clients and Servers – Pushing Data From RMI Servlet – RMI Over Inter-ORB Protocol.

Unit IV JAVA BEAN AND EJB

9

The Software Component Assembly Model- The Java Beans Development Kit- Developing Session Beans- Notable Beans – Using the Java Beans API. Creating, Updating and Reading from JAR Files- Adding Controls to Beans. EJB Architecture- The EJB Model -EJB Requirements – Design and Implementation – EJB Session Beans- EJB Entity Beans.

Unit V NETWORKING AND CONNECTIVITY

9

Networking Basics: Transmission control Protocol (TCP) - Ports, Sockets -Working with URLs: Connecting to URLs - IDE - Servers - Interacting with database: Database Connectivity-Design of

JDBC- Introduction to XML - Tags-Creating Forms-Creating tables-Spring. .

Total : 45 hours

COURSE OUTCOME:

At the End of this course, the student will be able to:

CO-1: Create Java Mail application using JSP.

CO-2: Create data base application using JDBC.

CO-3: Apply RMI concept to develop client server application.

CO-4: Understand the concept build basic web application.

CO-5: Understand the concept of Java Bean and EJB.

Text Book:

1. J2EE 1.4 Bible, J. McGovern, R. Adatia, Y. Fain, Wiley-dreamtech India Pvt.Ltd, NewDelhi, 2003.

Reference Books:

1. Java 2 Complete Reference, H. Schildt, 5th Edition, Tata McGraw-Hill, NewDelhi, 2002.
2. Java Servlets, K. Moss, Second edition, Tata McGraw Hill, New Delhi, 1999.
3. Inside Servlets, D. R. Callaway, Addison Wesley, Boston, 1999.
4. Java Beans from the Ground Up, Joseph O'Neil, Tata McGraw Hill, New Delhi.
5. Enterprise JavaBeans, Tom Valesky, Addison Wesley, 1998.
6. Core Java Vol II Advanced Features, Cay S Horstmann & Gary Cornell, Addison Wesley.

Web Sources:

1. www.journaldev.com/1877/servlet-tutorial-java
2. www.studentstutorial.com/jsp/jsp-tutorial

Course Objective: This course gives practical training in HTML to Servlet Communication, JSP Beans used to create JSP program, RMI to create Web Services, Email creation and manipulation, Web applications and Session management is done by students.

1. HTML to Servlet Communications
2. Servlet to HTML Communication
3. Applet to Servlet Communication
4. Servlet to Applet Communication
5. Designing online applications with JSP
6. Creating JSP program using JavaBeans
7. Working with Enterprise JavaBeans
8. Performing Java Database Connectivity.
9. Creating Web services with RMI.
10. Creating and Sending Email with Java
11. Building web applications
12. Finding Simple Interest using Session Management.

Total: 30 Hours

COURSE OUTCOMES:

At the End of this course, the Student will be able to:

CO-1: Create HTML to Applet Communication application using Servlet.

CO-2: Create HTML to servlet application .

CO-3: Create data base application using JDBC.

CO-4: Apply use bean concepts in JSP.

CO-5: Apply Session Management application in JSP.

Text Book:

1. J2EE 1.4 Bible, J. McGovern, R. Adatia, Y. Fain, Wiley-dreamtech India Pvt.Ltd, NewDelhi, 2003.

Reference Books:

1. Java 2 Complete Reference, H. Schildt, 5th Edition, Tata McGraw-Hill, NewDelhi, 2002.
2. Java Servlets, K. Moss, Second edition, Tata McGraw Hill, New Delhi, 1999.
3. Inside Servlets, D. R.Callaway,Addison Wesley, Boston,1999.
4. Java Beans from the Ground Up,JosephO'Neil, Tata McGraw Hill, New Delhi.
5. Enterprise JavaBeans, TomValesky,Addison Wesley,1998.
6. Core Java Vol II Advanced Features, Cay S Horstmann& Gary Cornell, Addison Wesley.

Web Sources:

1. www.journaldev.com/1877/servlet-tutorial-java
2. www.studentstutorial.com/jsp/jsp-tutorial

Course Objective: This course gives practical training in Network programming using Visual Basic Dot Net, ActiveX Data Object Dot Net, Active Server Pages Dot Net with various applications.

1. Program to demonstrate various conditional statements in VB.NET
2. Programs to demonstrate various looping statements in VB.NET
3. Create a simple Application that demonstrates various windows controls available in VB.NET
4. Program that makes use of functions in VB.NET
5. Deploying OOP Concepts using VB.NET
6. Demonstration of Login Processing using ASP.NET
7. Demonstration of Validation controls in ASP.NET
8. Deployment of Calendar Control in ASP.NET
9. Traversing and selecting a Product Name displayed in dropdown list, through coding in The Form Load Event in ASP.NET
10. Creation of Web Application in ASP.NET for Conditions-based book issue in a Library
11. Construction of Banking Application with Implementation of Web-user controls in ASP.NET.
12. Deployment of Data Grid in ADO.NET for viewing product details.

Total: 30 Hours

COURSE OUTCOMES:

At the End of this course, the Student will be able to:

- CO-1:** Create login processing application using ASP .NET.
- CO-2:** Create Banking application and library application using ASP .NET.
- CO-3:** Analyze validation controls in ASP .NET
- CO-4:** Analyze Calendar Control in ASP. NET
- CO-5:** Apply Data Grid control in ADO .NET.

Text Books:

1. Professional .NET Framework 2.0, Joe Duffy, Wrox Publications, 2006 Edition.
2. Visual Basic.NET Programming – Black Book, Steven Holzner, Paraglyph Press and DreamTech Press, 2005 Edition.

Reference Books:

1. Professional ASP.NET 1.1, Alex, Wrox Publications, 2nd Edition, 2004.
2. ADO.NET Complete Reference, Michael Otey and Denielle Otey, Tata McGraw Hill Publication, 4th Edition, 2007.

Web Sources:

1. <http://www.projects.students3k.com/projects/mini-projects-in-asp-net>.
2. www.vbtutor.net/index.php/visual-basic-net-tutorials/

SEMESTER-VI

Objectives:

The main objectives of the Project is, to understand the software engineering process including budgeting through project, plan for various activities of the project and distribute the work amongst team members.

Content:

The students will undertake a project as part of their final semester. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be five and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the respective project guide assigned to the student. The Guide will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes with the objectives and the process of the project. From there, the student takes over and works on the project.

Total: 60 Hours

Course Outcome:

At the End of this Course, the Student will be able to:

- CO-1:** Create new project with Report:
- CO-2:** Evaluate project scope and Objectives.
- CO-3:** Analyze Software, Hardware and tools needed for the project.
- CO-4:** Apply technical knowledge to solve project problem.
- CO-5:** Understand the implementation of Project

Syllabus

**Discipline Specific
Electives Courses**

Course Objective: This course introduces the basic concepts of Data Communication & Networking , OSI Model, Layers of OSI Model, Parallel and serial transmission, Analog and digital network.

UNIT I PROTOCOLS & MEDIA**12**

Introduction to data communication – Network protocols & standards – Line configuration – Topology – Transmission mode – Categories of networks – OSI model – Layers of OSI model – Transmission media – Guided media – Unguided media.

UNIT II SIGNALS & ERRORS**12**

Analog and digital signals – Encoding and modulation – Parallel and serial transmission – DTE/DCE – Types of errors – Error detection and correction – Data link control – Line discipline – Flow control – Error control.

UNIT III MULTIPLEXING & SWITCHING**12**

Multiplexing – Types of multiplexing – LAN – Project 802 – Ethernet – Token bus – Token ring – FDDI – MAN – IEEE 802.6 – Circuit switching – Packet switching.

UNIT IV ISDN & ATM**12**

History of analog and digital network – Access to ISDN – ISDN layers – Broadband ISDN – Packet layer protocol – ATM – ATM architecture – ATM layers – Congestion control – Leaky bucket algorithm.

UNIT V NETWORK & APPLICATION LAYER**12**

Repeaters – Bridges – Routers – Gateway – Routing algorithms – TCP/IP – Overview – Network layer – Transport and application layers of TCP/IP – DNS – SMTP – HTTP – WWW.

TOTAL: 60 Hours**Course Outcomes:**

CO-1: Analyze the features and operations of various application layer protocols such as Http, DNS, and SMTP.

CO-2: Analyze the various types of transmission media and services.

CO-3: Understand the fundamental concepts of data communications and networking and able to intelligently compare and contrast local area networks and wide area networks in terms of characteristics and functionalities.

CO-4: Understand the purpose of network layered models, network communication using the layered concept, and able to compare and contrast Open System Interconnect (OSI) and the Internet Model.

CO-5: Understand the basic difference between data logical link control and media access control and realize the features of SMDS, switching techniques, ISDN, and ATM.

Text Book:

1. Behrouz and Forouzan, "Data Communications and Networking", 2nd Edition, Tata McGraw Hill, 2007.

Reference Books:

1. Andrew.S.Tanenbaum,"Computer Networks", 4th Edition, Prentice Hall of India, 2008.
2. WilliamStallings,"Data and Computer Communication ", 6th Edition, Pearson Education, 2000.

Web Sources:

1. ecomputernotes.com/computernetworkingnotes/communication-networks/
2. www.tutorialride.com/computer-network/

Course Objective:

This course introduces the basic concepts of Software Engineering, the phases of Software Development Life Cycle, the metrics of Software projects, Software Cost Estimation Techniques and quality assurance.

Unit-I – FUNDAMENTAL CONCEPTS OF SOFTWARE ENGINEERING 12

Introduction - Generic view of Software Process- Software Engineering: A Layered Technology - A Process Framework- The Capability Maturity Model Integration (CMMI)-Process Patterns- Process Assessment- Personal and Team Process Model- Process Technology- Software Process Models- Evolutionary Process Models- Specialized Process Models- The Formal Methods Model- The Unified Process- View of Agile Process Models- Software Cost Estimation- Cost Estimation Factors, Techniques- Planning a software Project- Project Scheduling.

Unit II - REQUIREMENT ANALYSIS 12

System Engineering Hierarchy-System Modelling -Requirements Engineering - Initiating the Requirement Engineering Process- Eliciting Requirements- Developing use cases- Building an Analysis Model- Negotiation Requirements- Validating Requirements.

Unit III- SOFTWARE DESIGN CONCEPTS 12

Design Concepts- Quality Elements, Quality Attributes- Fundamentals of Software Design Concepts- Design Models- Design Elements -Pattern Based Software Design-Describing a design Pattern- Using Pattern in Design- Frameworks-Architectural Design-Importance of Software Architecture- The Architectural Style-The Design Categories of Architectural Style Includes-Architecture Design- Defining Archetype-Architecture Trade-Off Analysis Method (ATAM)- Architectural Style for SW Design-Modelling Component Level Design-. User Interface –Analysis and Design

Unit IV- SOFTWARE TESTING 12

Introduction to Testing-Test Strategies for Conventional Software-Unit Testing- Integration Testing -Test Strategies for Object Oriented Software-Validation Testing-Validation Test Criteria- Configuration Review-Alpha and Beta Testing-System Testing- Testing Tactics -White box Testing- Basis Path Testing -Control Structure Testing- Black Box Testing.

Unit V - SOFTWARE MANAGEMENT

12

Change Management- Software Configuration Management- The SCM Repository- The SCM Process-Quality Management- Quality Concepts- Software Quality Assurance- Software Review- Formal Technical Reviews- Formal Approaches to SQA- Software Reliability- The ISO 2000 Quality Standards- The SQA Plan

Total : 60 Hours

Course Outcomes:

CO-1: Evaluate software-based systems, or programs of varying complexity that meet desired needs, satisfy realistic constraints, and demonstrate accepted design and development principles.

CO-2: Analyze and solve problems, as well as identify the computing requirements appropriate to their solutions.

CO-3: Apply rapid software development methods and decide on appropriate software architecture.

CO-4: Understand the nature of Software Requirement Specifications.

CO-5: Understand ability to engage in life-long maintenance and continuing Software development.

Text Book:

1. Roger Pressman, Software Engineering: A Practitioner's Approach, Sixth Edition, 2005, McGraw Hill. New York.

Reference Books:

1. Waman S Jawadekar, Software Engineering: a Primer, First Edition, 2008, Tata McGraw Hill. New Delhi.
2. Deepak Jain, Software Engineering: Principles and Practices, First Edition, 2009, OxfordUniversity Press.
3. James Peters & Witold Pedrycz, Software Engineering: An engineering Approach, First Edition, 2007, Wiley-India.

Web Sources:

1. <http://www.tutorialsspace.com/Software-Engineering/>
2. <http://www.nptel.com>

TOTAL: 60 hours

Course Outcomes:

CO-1: Evaluate different open source technology like Linux, PHP & MySQL with different packages.

CO-2: Apply the concepts of functions, arrays in PHP.

CO-3: Understand the concepts objects in PHP.

CO-4: Understand how to create database and table in MySQL.

CO-5: Understand the concepts of connecting and MySQL.

Text Books:

1. Christopher Negus ,Red Hat Linux Bible, Wiley Publishing ISBN: 0-7645-4333-4, Edition, 2010
2. Julie C Meloni, Teach yourself PHP, MySQL and Apache all in one ,SAMS Publication, Fifth Edition, 2011.

Reference Books:

1. Rasmus Lerdorf, Kevin Tatroe, Bob Kaehms, Ric McGredy (2002), Programming PHP, O'REILLY (SPD), First edition, 2012
2. Lee Babin, Nathan A. Good, Fran4k M. Kromann, Jon Stephens), "PHP 5 Recipes, A problem solution approach", après Special edition, 2005
3. PHP & MYSQL in easy steps by MCGrawHill Indian edition, First Edition, 2008.
4. Steven Holzner, The Complete Reference PHP, MCGrawHill, Indian edition, First Edition, 2009.

Web Sources:

1. https://www.tutorialspoint.com//cakephp/cakephp_form_handling.htm
2. <http://www.php.net/tut.php>

Course Objective: This course introduces the fundamental concepts of VB.NET, ASP.NET, ADO.NET for web development, to produce dynamic Web pages and to build web sites, web applications and web services.

UNIT I INTRODUCTION TO .NET TECHNOLOGIES**12**

Introduction to .NET Framework - .NET Framework Components Overview with Focus on CLR, CTS- Overview History of the Platform of .NET - Client-side Technologies Overview - Server-side Technologies -Client-side Vs Server-side Scripts – Advantages and Disadvantages of Client-side and Server-side Scripts

UNIT II VB.NET BUILDING BLOCKS**12**

Introduction VB.NET – VB Vs VB.NET – VB.NET Integrated Development Environment – Basic Keywords – Data Types – VB.NET statements – Conditionals - If Else – Select Case – Switch and Choose – Loops – Do –For Next – For Each Next – While – Windows Forms – Working with Controls – MDI –VB.NET Functions – OOPs in VB.NET.

UNIT III INTRODUCTION TO ASP.NET AND ASP.NET CONTROLS**12**

Introduction to ASP.NET - Advantages of ASP.NET - ASP. NET Architecture - ASP.NET Page's Structure -Sample Program in ASP.NET - Page Events - HTML Server Controls - Basic Web Server Controls - Data List Web Server Controls - Validation Controls - Web User Controls in ASP.NET

UNIT IV ADVANCED CONCEPTS IN ASP.NET**12**

Request Object - Response Object -Code-Behind Feature of ASP.NET - Caching in ASP.NET - Output Caching -Fragment Caching - Data Caching - Session / State Management – Events and Abandon Method – Authentication in ASP.NET - Error Handling and Debugging - Tracing an Application

UNIT V ADO.NET**12**

Introduction to ADO.NET: Comparison between ADO & ADO.NET— Connected ADO.NET Architecture – Disconnected ADO.NET Architecture. The difference between Connection Model & Disconnected Model – difference between the DataSet and RecordSet- the

Dataset Model. Accessing Data using ADO.NET: dataset-DataAdapterDataRelation

TOTAL: 60 Hours

Course Outcomes:

At the End of this course, Student will be able to:

CO-1: Evaluate functionalities of connected and disconnected architectures and also the reader and adapter classes of ado.net.

CO-2: Apply validation controls in developing online client page design for reservation, banking.

CO-3: Apply the features of all objects, caching and session management for every client.

CO-4: Understand and learn to maintain internet application server and dot net services.

CO-5: Understand basic building blocks of vb.net environment.

Text Books:

1. Joe Duffy, Professional .NET Framework 2.0, Wrox Publications, 2006 Edition.
2. Steven Holzner, Visual Basic.NET Programming – Black Book, Paraglyph Press and DreamTech Press, 2005 Edition.

Reference Books:

1. Alex, Professional ASP.NET 1.1, Wrox Publications, 2nd Edition, 2004.
2. Michael Otey and Denielle Otey, ADO.NET Complete Reference, Tata Macraw Hill Publication, 4th Edition, 2007.

Web Resources:

1. <http://www.projects.students3k.com/projects/mini-projects-in-asp-net>.
2. <https://www.dotnettutorials.net>

COURSE OBJECTIVE:

This course introduces the basic concepts of Data Mining. It gives in depth knowledge of data modelling strategy, Data Mining Algorithms, Knowledge Discovery in databases and web mining.

UNIT-I INTRODUCTION 12

Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction

UNIT-II DATA MINING PRIMITIVES AND SYSTEM ARCHITECTURE 12

Data Mining – Primitives – Data Mining Query Language Architectures of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization, Analytical Characterization, Mining Class Comparison – Statistical Measures.

UNIT-III MINING ASSOCIATION RULES 12

Basic concepts- single Dimensional Boolean Association Rules from Transaction Databases, Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data warehouse.

UNIT-IV CLASSIFICATION & PREDICTION 12

Introduction- issues- Decision Tree Induction – Bayesian Classification – Classification of Back Propagation. Classification based on Concepts from Association Rule Propagation. Classification based on Concepts from Association Rule Mining – Other Methods. Prediction – Introduction – Classifier accuracy.

UNIT-V CLUSTER ANALYSIS 12

Introduction – Types of Data in Cluster Analysis, Partitioning Methods – Hierarchical Methods Density Based Methods – GRID Based Method – Model based Clustering Method.

TOTAL: 60 Hours

COURSE OUTCOME:

At the End of this course, the Student will be able to:

CO-1: Evaluate and implement clustering algorithm using sample, realistic data sets and modern tools.

CO-2: Analyse the types of data to be mined and present a general classification of tasks and primitives to integrate a data mining system.

CO-3: Apply proper association rule mining algorithm to construct best data mining model.

CO-4: Understand the concept of database technology evolutionary path which has led to the need for data mining and its applications.

CO-5: Understand basic data warehouse structure and to learn how to gather and analyze large sets of data to gain useful business understanding.

Text Books:

1. J.Han and M. Kamber, Data Mining Concepts and Techniques, Harcourt India Pvt. Ltd – New Delhi, 2001.

Reference Books:

1. K.P. Soman , ShyamDiwakar, V.Ajay , Insight into Data Mining Theory and Practice, Prentice Hall of India Pvt. Ltd - New Delhi, 2006
2. Shawkat Ali A B M, Saleh A. Wasimi, “Data Mining: Methods and Techniques”, Third Indian Reprint, Cengage Learning, 2010.
3. Michael Steinbach, Pang-Ning Tan, and Vipin Kumar, Introduction to Data Mining, Pearson publication, 2nd Edition, 2016.

WEB SOURCES:

1. [http:// www.academicpress.com](http://www.academicpress.com)
2. <http://www.mkp.com>

21BCS106

NETWORK SECURITY

4 0 0 4

Course Objective: This course introduces the basic concepts of Network security, the various Encryption and Decryption algorithms and Authentication Schemes.

UNIT I INFORMATION SECURITY

12

History- Security As A Process, Not Point Products- Access.Attacks- Modification Attacks-Denial - Of- Service Attacks- Repudiation Attacks- IP Spoofing- Malicious Code.

UNIT II NUMBER THEORY

12

Accountability-Secret Key Encryption- DES-AES (Rijndael)- Number Theory - Prime Number - Modular Arithmetic – Euclid’s Algorithm – Fermat’s And Euler’s theorem - Discrete Logarithm - Public Key Encryption- Diffie- Hellman Key exchange- Elliptic Curve Cryptography.

UNIT III FIREWALLS

12

Types of Firewalls: Define And Types of Firewalls-Develop a Firewall Configuration-Design a Firewall Rule Set - Intrusion Detection: Types-Set up and IDS - Manage and IDS-Understand Intrusion Prevention.

UNIT IV AUTHENTICATION

12

Authentication Applications-Confidentiality and Integrity- IP Security-Web Security-GSM Security-Security UMTS 3G.

UNIT V RFID BASICS

12

Applications- Security Issues- Generation 2 Tags- Addressing RFID Privacy Concerns-Electronic Passports.

TOTAL: 60 Hours

Program Outcome:

At the End of this course, the Student will be able to:

CO1: Evaluate the authentication and hash algorithms.

CO2: Analyze the symmetric encryption techniques.

CO3: Analyze Information Security types and uses.

CO4: Understand the various Authentication Schemes.

CO5: Understand knowledge about firewalls.

Text Book:

1. Behrouz A.Forouzan, Debdeep Mukhopadhyay, Cryptography and Network Security, TataMcGraw Hill Second Edition, 2010.

Reference Books:

1. Eric Maiwald, Fundamentals of Network Security, Tata McGraw HillEdition, 2011.
2. Bernard Menezes, Network Security and Cryptography, Cengage Learning,India, Edition, 2010.

Web Sources:

1. www.nptel.com
2. www.khan-academy/Network-security

21BCS107

ARTIFICIAL INTELLIGENCE

4 0 0 4

Course Objective: To learn the overview of artificial intelligence principles and approaches. To develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents. This course also covers fundamental areas of Local Search Algorithms, Adversarial Searching and Neural Networks.

UNIT I BASICS OF AI 12

Introduction: Overview of Artificial intelligence- Problems of AI, AI technique, Tic - Tac - Toe problem. Intelligent Agents: Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents. Learning: Forms of learning, inductive learning, learning decision trees, explanation based learning, learning using relevance information, neural net learning & genetic learning.

UNIT II DIFFERENT TYPES OF SEARCHING ALGORITHMS 12

Problem Solving: Problems, Problem Space & search: Defining the problem as state space search, production system, constraint satisfaction problems, and issues in the design of search programs. Search techniques: Solving problems by searching: Problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing uniform search strategies. Heuristic search strategies: Greedy best-first search, A* search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated annealing search, local beam search, genetic algorithms; constraint satisfaction problems, local search for constraint satisfaction problems.

UNIT III KNOWLEDGE & REASONING 12

Knowledge & Reasoning: Knowledge representation issues, representation & mapping, approaches to knowledge representation, issues in knowledge representation. Using predicate logic: Representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction.

UNIT IV KNOWLEDGE REPRESENTATION 12

Representing knowledge using rules: Procedural verses declarative knowledge, logic programming, forward verses backward reasoning, matching, control knowledge. Probabilistic reasoning: Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Fuzzy sets, and fuzzy logics.

UNIT V DIFFERENT FIELDS OF AI 12

Natural Language Processing: **Introduction**, Syntactic processing, semantic analysis, discourse, and pragmatic processing. Expert Systems: Representing and using domain knowledge, expert system shells, and knowledge acquisition. Basic knowledge of programming language like Prolog

Total: 60Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Create self-learning and research skills to tackle a topic of interest on his/her own or as part of a team.

CO-2: Interpret the modern view of AI as the study of agents that receive percepts from the environment and perform actions.

CO-3: Analyze the dimensions along which agents and environments vary, along with key functions that must be implemented in a general agent.

CO-4: Understand the concepts of Artificial intelligence

CO-5: Understand major challenges and the complexity of AI problems.

Text Books:

1. Ritch & Knight ,Artificial Intelligence, TMH, 2011
2. Stuart Russel, Peter Norvig ,Artificial Intelligence, A Modern Approach, Pearson, 2009

Reference Books:

1. Patterson, Introduction to Artificial Intelligence & Expert Systems, PHIPoole, Computational Intelligence, OUP,2012
2. Saroj Kaushik, Logic & Prolog Programming, Saroj Kaushik, New Age International Expert Systems, Giarranto, VIKAS, 2014

Web Resources:

1. www.edureka.com
2. www.towardsdatascience.com

Course Objective: This Course Introduces The Concepts Of Computer Graphics And Its Components To Enrich The View Of The Image. It Also Gives An Idea About Two And Three Dimensional Modeling Concepts And Viewing Concepts.

UNIT I INTRODUCTION TO COMPUTER GRAPHICS**12**

Video Display Devices- Raster Scan Systems -Random Scan Systems - Interactive Input Devices - Hard Copy Devices - Graphics Software - Output Primitives - Line Drawing Algorithms - Initializing Lines - Line Function - Circle Generating Algorithms.

UNIT II ATTRIBUTES OF OUTPUT PRIMITIVES**12**

Line Attributes - Color And Grayscale Style - Area Filling Algorithms - Character Attributes Inquiry Functions - Two Dimensional Transformation - Basic Transformation - Composite Transformation - Matrix Representation - Other Transformations.

UNIT III TWO - DIMENSIONAL VIEWING**12**

Window- To View Port Co-Ordinate Transformation - Clipping Algorithms - Interactive Input Methods - Physical Input Devices - Logical Classification of Input Devices - Interactive Picture Construction Methods.

UNIT IV THREE - DIMENSIONAL CONCEPTS**12**

Three Dimensional Display Methods - Parallel Projection - Perspective Projection - Depth Cueing - Visible Line and Surface Identification Three Dimensional Transformations.

UNIT V THREE DIMENSIONAL VIEWING**12**

Projection - Viewing Transformation - Implementation of Viewing Operations - Hidden Surface and Hidden Line Removal – Back face Removals.

TOTAL: 60 Hours**Course Outcomes:**

At the End of this course, the Student will be able to:

CO-1: Evaluate every image by using Clipping Algorithms.

CO-2: Evaluate various algorithms for scan conversion and filling of basic objects.

CO-3: Analyze 3-D display methods and projections techniques for display of 3D images.

CO-4: Apply geometric transformations on graphics objects and its applications.

CO-5: Understand the basics of Computer Graphics

Text Book:

1. D.Hearn and M.P.Baker , Computer Graphics, - Prentice Hall of India ,1997.

Reference Book:

1. W.M. Newman and RF.Sproull , Principles of Interactive Computer Graphics, - McGraw-Hill International Edition , 1999.
2. Pakhira M.K., Computer Graphics, Multimedia and Animation, TMH, 2008.
3. Hill F.S, Computer Graphics using Open GL, Pearson 2nd Edition, 2001.

Web Sources:

1. www.udemy.com/course/computer_graphics_subject/
2. www.coursera.org/computer_graphics/

Web Reference:

1. https://www.tutorialspoint.com/computer_graphics/index.htm
2. <https://www.javatpoint.com/computer-graphics-3d-graphics>
3. <https://www.scribd.com/doc/13702209/3D-Display-Methods>

21BCS109

MULTIMEDIA AND ITS APPLICATION

4 0 0 4

Course Objective: This course introduces the basic concepts of multimedia and its components such as text, image, video, Graphics and Animation. Also provides the emerging trends of multimedia.

Unit I INTRODUCTORY CONCEPTS

12

Multimedia – Definitions, CD-ROM And The Multimedia Highway, Uses Of Multimedia, Introduction To Making Multimedia – The Stages Of Project, The Requirements To Make Good Multimedia, Multimedia Skills And Training, Training Opportunities In Multimedia. Motivation For Multimedia Usage, Frequency Domain Analysis, Application Domain.

Unit II MULTIMEDIA

12

Hardware And Software: Multimedia Hardware – Macintosh And Windows Production Platforms, Hardware Peripherals – Connections, Memory And Storage Devices, Media Software – Basic Tools, Making Instant Multimedia, Multimedia Software And Authoring Tools, Production Standards.

Unit III MULTIMEDIA MAKING IT WORK

12

Multimedia Building Blocks – Text, Sound, Images, Animation And Video, Digitization Of Audio And Video Objects, Data Compression: Different Algorithms Concern To Text, Audio, Video And Images Etc., Working Exposure On Tools Like Dream Weaver, Flash, Photoshop Etc.,

Unit IV MULTIMEDIA AND THE INTERNET

12

History, Internet Working, Connections, Internet Services, The World Wide Web, Tools For The WWW – Web Servers, Web Browsers, Web Page Makers And Editors, Plug-Ins And Delivery Vehicles, HTML, VRML, Designing For The WWW – Working On The Web, Multimedia Applications – Media Communication, Media Consumption, Media Entertainment, Media Games.

Unit V MULTIMEDIA-LOOKING TOWARDS FUTURE

12

Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing, Assembling And Delivering A Project-Planning And Costing, Designing And Producing, Content And Talent, Delivering, CD-ROM Technology.

TOTAL: 60 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Create WWW and Web page makers and editors.

CO-2: Evaluate different multimedia data in digital formats and compare text, audio, image and video data.

CO-3: Apply Tools like Dream Weaver, Flash, Photoshop Etc.,

CO-4: Understand the Multimedia conferencing and CD-ROM technology.

CO-5: Understand the basic components of a multimedia project.

Text Book:

1. T. Vaughan, Multimedia: Making it work, Tata McGraw Hill, New Delhi, , 4th Edition, 2019

Reference Book:

1. K. Andleigh and K. Thakkar, Multimedia System Design, PHI, New Delhi, 2000.
2. S. Heath, Multimedia & Communication Systems, Focal Press, UK, 1999.

Web Sources:

1. www.udemy.com/course/computer_graphics_subject/
2. www.coursera.org/computer_graphics/

Course Objective:

To Study about fundamental concepts of software tests and its application in various scenarios with the help different testing strategies, methods and tools. The student can expose the criteria for test cases and learn the design of test cases. Be familiar with test management and test automation techniques.

UNIT I INTRODUCTION 9

Testing as an engineering activity – Testing as a process – Testing maturity model – Testing axioms – Basic definitions – Software testing principles – The tester’s role in a software development organization – Origins of defects – Cost of defects – Defect classes – The defect repository and test design – Defect examples – Developer / Tester Support of developing a defect repository.

UNIT II TEST CASE DESIGN STRATEGIES 9

Test case Design Strategies – Using Box approach to test case design – Boundary value analysis – Equivalence class partitioning – State based testing – Cause- effect graphing – Compatibility testing – User Documentation testing – Domain testing – Random testing – Requirement based testing – Using White Box approach to test design- Test adequacy criteria – Static testing Vs Structural testing – Code Functional Testing – Coverage and Control Flow Graphs – Covering code Logic – Paths – Code complexity testing – Additional white box testing approaches – Evaluating test adequacy criteria.

UNIT III LEVELS OF TESTING 9

The need for levels of testing – Unit test – Unit test planning – Designing the Unit Tests – The Test Harness – Running the Unit tests and recording results – Integration tests – Designing integration tests – Integration test planning – Scenario testing – Defect bash elimination – System testing – Acceptance testing – Performance testing – Regression testing – Internationalization testing – Ad-hoc testing – Alpha , Beta tests – Testing OO systems – Usability and Accessibility testing – Configuration testing – Compatibility testing – Testing the documentation – Website testing

UNIT IV TEST MANAGEMENT 9

People and organizational issues in testing – Organization structures for testing teams – testing services – Test planning –Test plan components – Test plan attachments – Locating test items – test management – test process – Reporting test results – Introducing the test specialist – Skills needed by a test specialist – Building a testing group – The structure of testing group – The technical training program.

UNIT V TEST AUTOMATION 9

Software test automation – Skills needed for automation – Scope of automation – Design and architecture for automation – Requirement for a test tool – Challenges in automation – Test metrics and measurements – Project , Progress and Productivity metrics.

TOTAL 45 HOURS

Course Outcomes:

At the End of this course, the Student will be able to:

CO -1: Create test planning based on the document.

CO-2: Evaluate and validate a test plan and use of automatic testing tools.

CO-3 - Evaluate various types of software risks and its impact on different software application.

CO-4: Analyze test cases suitable for a software development for different domains

CO-5 : Understand importance of testing techniques in software quality management and assurance.

Text Book:

1. Srinivasan Desikan and Gopaldaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, 2006.

Reference Books:

1. Ron Patton, “Software Testing”, Second Edition, Sams Publishing, Pearson Education, 2007
2. Adithya P.Mathur “ Foundations of Software Testing – Fundamental Algorithms and Techniques”, Pearson Education India, 2011
3. Mauro Pezze, Michael Young, Software testing and Analysis- Process, Principles and Techniques, Wiley India, 2012
4. Paul C Jorgensen, “Software Testing A Craftsman's Approach”, Auerbach publications, 3rd edition, 2011.

Web Sources:

1. www.softwaretestingmaterial.com/manual-testing-tutorial/
2. www.softwaretestinghelp.com/manual-testing-tutorial-1/

21BCS111

INTERNET OF THINGS

4 0 0 4

Course Objective: Student will understand the evolution of internet technology and need for IoT. The course will cover the basics of communications concepts, characteristics of sensors, protocols and the need of security in the Internet of Things.

UNIT I: EVOLUTION OF IOT

12

Review of computer communication concepts- OSI layers – components - packet communication – Networks - TCP-IP – subnetting - IPV4 addressing and challenges. IPV6 addressing - IoT architecture reference layer.

UNIT II: INTRODUCTION TO IOT COMPONENTS

12

Characteristics IoT sensor nodes - Edge computer - cloud and peripheral cloud - single board computers- open source hardwares - Examples of IoT infrastructure.

UNIT III: IOT PROTOCOLS AND SOFTWARES

12

MQTT – UDP - MQTT brokers - publish subscribe modes – HTTP - COAP - XMPP and gateway protocols – IoT Communication Pattern – IoT protocol Architecture - Selection of Wireless technologies.

UNIT IV: IOT SECURITY

12

Need for encryption - standard encryption protocol - lightweight cryptography - Quadruple Trust Model for IoT – Threat Analysis and model for IoT-A, Cloud security

UNIT V: ARDUINO PROGRAMMING

12

Arduino UNO-Setup-IDE Overview-Sktech structure- Data types-Operators-Control statement-Loops-Arrays-String- Math Library-Random Number-Interrupts-Example Program.

Total: 60 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Analyze the concepts the network concepts like TCP-IP, subnetting, IPV4.

CO-2: Analyze the characteristics of sensors, edge computer cloud and its peripherals.

CO-3: Understanding the architecture of IoT reference layer.

CO-4: Understand the protocols like MQTT, UDP, etc.,

CO-5: Understand the selection of wireless technologies.

Text Book:

1. Alessandro Bassi, Martin Bauer, Martin Fiedler, Thorsten Kramp, Rob van Kranenburg, Sebastian Lange, Stefan Meissner, “Enabling things to talk – Designing IoT solutions with the IoT Architecture Reference Model”, Springer Open, 2016 .

Reference Books:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle, “From Machine to Machine to Internet of Things”, Elsevier Publications, 2014.
2. LuYan, Yan Zhang, Laurence T. Yang, Huansheng Ning, The Internet of Things: From RFID to the Next-Generation Pervasive Network, Aurbach publications, March,2008.
3. Vijay Madiseti , Arshdeep Bahga, Adrian McEwen (Author), Hakim Cassimally “Internet of Things A Hands-on-Approach” Arshdeep Bahga & Vijay Madiseti, 2014.
4. Pethuru Raj and Anupama C. Raman, The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press, 2018

Web Sources:

1. www.guru99.com
2. www.tutorialspoint.com

21BCS112

E-COMMERCE

4 0 0 4

Course Objective: This course gives an exposure to the Electronic Commerce concepts. It gives in depth knowledge about **electronic** commerce, its opportunities, Electronic Data Interchange, Secure Electronic Transaction.

Unit I ELECTRONICCOMMERCE AND OPPORTUNITIES BACKGROUND 12

The Electronic Commerce Environment – Electronic Marketplace Technologies – Modes of Electronic Commerce: Overview: Electronic Data Interchange.

Unit II APPROACHES TO SAFE ELECTRONIC COMMERCE 12

Overview – Secure Transport Protocols – Secure Transaction – Secure Electronic Payment Protocol (SEPP) – Secure Electronic Transaction (SET)

Unit III CERTIFICATES FOR AUTHENTICATION 12

Security on Web Servers – Payment Schemes: Internet Monetary Payment and Security Requirements- Payment and Purchase Order Process – Online Electronic Cas

Unit IV INTERNET / INTRANET SECURITY ISSUES AND SOLUTIONS 12

The Need for Computer Security – Specific Intruder Approaches – Security Strategies- Security Tools – Encryption – Enterprise Networking and Access to the Internet Antivirus Programs. - Security Teams

Unit V MASTERCARD/VISA SECURE ELECTRONIC TRANSACTION 12

Introduction –Business Requirements – Concepts – Payment Processing. E-Mail And Secure E-Mail Technologies For Electronic Commerce: Introduction _ The Means Of Distribution – A Model For Message Handling- MIME, S/MIME, MOSS, MIME And Related Facilities For EDI Over The Internet.

TOTAL: 60 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Analyze business requirements and payment processing systems.

CO-2: Understand the basics of Electronic Data Interchange.

CO-3: Understand about different types of message handling systems over the internet.

CO-4: Understand how the payments are transferred in a secured manner.

CO-5: Understand the need for the security of web servers.

Text Book:

1. Daniel Minoli & Emma Minoli, Web Commerce Technology Handbook, Tata McGraw Hill,1999.

Reference Books:

1. whitley, Electronic Commerce Strategy, technologies and application, Pearson Education, 2000.
2. K.Bajaj & D Nag, E-Commerce, Tata McGraw Hill, 2nd Edition, 1999.
3. Joseph.P.T, E-Commerce: An Indian Perspective, 3rd edition, 2008.

Web sources:

1. blog.templatetoaster.com/what-is-ecommerce/
2. www.geeksforsseek/ecommerce

21BCS113

MOBILE COMPUTING

4 0 0 4

Course Objective:

This course introduces the basic concepts of mobile computing, communication systems, mobile and wireless devices, GSM – Architecture – Routing Strategies –TCP.

UNIT I INTRODUCTION

12

Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing – Wireless Transmissions –Multiplexing – Spread Spectrum and Cellular Systems- Medium Access Control – Comparisons.

UNIT II TELECOMMUNICATION SYSTEMS

12

GSM – Architecture – Sessions –Protocols – Hand Over and Security – UMTS and IMT – 2000 – Satellite Systems - Types of Satellite System - Routing- Localization.

UNIT III WIRELESS LAN

12

IEEE S02.11: System Architecture-Protocol Architecture, Physical Layer, 802.11b and 802.11a– Hiper LAN: WATM, BRAN, HYPERLAN2 – Bluetooth: User Scenarios, Architecture, Radio Layer, Base band Layer, Link Manager Protocol, L2CAP, Security, SDP – Security and Link Management.

UNIT IV MOBILE NETWORK LAYER

12

Mobile IP – Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies.

UNIT V MOBILE TRANSPORT LAYER

12

Congestion Control – Implication of TCP Improvement – Mobility – Indirect – Snooping – Mobile – Transaction oriented TCP - TCP over wireless – Performance - Case study analysis: Smart Phone Enhanced Shopping, Advances on Sensors for Health Systems.

TOTAL: 60 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Evaluate about various wireless LAN techniques.

CO-2: Analyze radio signal propagation issues and their impact on communication system performance.

CO-3: Understand about various wireless systems and standards and their basic operation cases.

CO-4: Understand the techniques of radio spectrum allocation in multi-user systems and their impact on networks capacity.

CO-3: Understand how the various signal processing and coding techniques of GSM and its Architecture.

Text Book:

1. J. Schiller, Mobile Communications, Pearson Education, Delhi, 2nd edition, 2003.

Reference Books:

1. Hansmann, Merk, Nicklous, Stober, Principles of Mobile Computing, 2 nd Edition, Springer (India), 2004.
2. Pahalavan, Krishnamurthy, Principle of wireless Networks: A unified Approach, Pearson Education, Delhi, 2003.
3. Martyn Mallick, Mobile and Wireless Design Essentials, Wiley Dreamtech India Pvt. Ltd., New Delhi, 2004.
4. W.Stallings, Wireless Communications and Networks, 2 nd Edition, Pearson Education, Delhi, 2004.

Web Sources:

1. www.nptel.ac.in
2. www.nescoacademy.com

21BCS114

SOFTWARE PROJECT MANAGEMENT

3 0 0 3

Course Objective: The course gives an insight of the most commonly used software architecture and design patterns and their applications.

UNIT I - PROJECT CONCEPTS AND ITS MANAGEMENT

9

Project life cycle models-Software Management Process Framework: Phases, Artifacts, Workflows, Checkpoints – Software Management Disciplines: Planning / Project Organization and Responsibilities / Automation / Project Control – Modern Project Profiles

UNIT II - COST ESTIMATION

9

Problems in Software Estimation – Algorithmic Cost Estimation Process, Function Points, SLIM (Software Life cycle Management), COCOMO II (Constructive Cost Model)

UNIT III - SOFTWARE QUALITY MANAGEMENT

9

Software Quality Factors – Software Quality Components – Software Quality Plan– Software Quality Metrics – Software Quality Costs – Software Quality Assurance Standard – Certification – Assessment.

UNIT IV - SOFTWARE MANAGEMENT AND METRICS

9

Software Configuration Management – Risk Management: Risk Assessment: Identification / Analysis / Prioritization Software Metrics – Classification of Software Metrics: Product Metrics: Size Metrics, Complexity Metrics, Halstead’s Product Metrics, Quality Metrics, and Process metrics.

UNIT V - PROJECT EVALUATION AND EMERGING TRENDS

9

Strategic Assessment–Technical Assessment–Cost Benefit Analysis–Cash Flow Forecasting–Cost Benefit Evaluation Technique–Risk Evaluation–Software Effort Estimation. Emerging Trends: Import of the internet on project Management – people Focused Process Models.

Total: 45 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Analyse the problems of software Estimation.

CO-2: Apply various methods of Cost Estimation.

CO-3: Understand Software Project Models and Software Management Concepts

CO-4: Understand Software Quality Management – Quality Factors, components and Plans.

CO-5: To understand Software Quality Metrics and Quality Assurance Standards.

Text Book:

1. Ramesh Gopaldaswamy , “Managing and global Software Projects”, Tata McGraw Hill Tenth Reprint, 2011.

Reference Books:

1. Roger S.Pressman, “Software Engineering a Practitioner’s Approach“, 7th Edition, McGraw Hill, 2010.
2. Daniel Galin, “Software Quality Assurance: from Theory to Implementation”, Addison-Wesley, 2003.
3. Bob hughes and Mike Cotterell, “Software Project Management” second edition, 1999.
4. Royce, W. “Software Project Management: A Unified Framework”, Addison-Wesley, 1998.

Web Sources:

1. www.softwaretestingmaterial.com/manual-testing-tutorial/
2. www.softwaretestinghelp.com/manual-testing-tutorial-1/

21BCS115

MACHINE LEARNING

4 0 0 4

Course Objective: This course provides basics for understanding underlying machine learning theory and to formulate machine learning problems corresponding to different applications.

UNIT I INTRODUCTION

12

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

UNIT II NEURAL NETWORKS AND GENETIC ALGORITHMS

12

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III BAYESIAN AND COMPUTATIONAL LEARNING

12

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

UNIT IV INSTANT BASED LEARNING

12

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

UNIT V ADVANCED LEARNING

12

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Case Study: Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task .

Total: 60 hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Evaluate how to develop models generated from data.

CO-2: Evaluate performance of machine learning algorithms.

CO-3: Analyze expected accuracy that can be achieved by applying the models.

CO-4: Apply the algorithms to a real-world problem, optimize the models learned.

CO-5: Understand a wide variety of learning algorithms

Text Books:

1. Tom M. Mitchell, Machine Learning , MGH, 1st Edition, 2015
2. Stephen Marsland, Machine Learning: An Algorithmic Perspective, Taylor & Francis, 2nd Edition, 2017.

Reference Books:

1. Shai Shalev-Shwartz and Shai Ben-David, Understanding Machine Learning. Cambridge University Press. 2017.
2. Trevor Hastie, The Elements of Statistical Learning. Robert Tibshirani and Jerome Friedman. Second Edition. 2009.
3. Avrim Blum, John Hopcroft and Ravindran Kannan, Foundations of Data Science, TMH, January 2017.

Web Sources:

1. www.mygreatlearning.com
2. www.machinelearningmastery.com

Course Objective: This course introduces the fundamental concepts of cloud computing model for enabling ubiquitous, convenient access to shared pool of configurable computing resources and storage solutions over a network.

Unit I CLOUD COMPUTING 12

History of Cloud Computing – Cloud Architecture – Cloud Storage – Why Cloud Computing Matters – Advantages of Cloud Computing – Disadvantages of Cloud Computing– Companies in the Cloud Today – Cloud Services

Unit II WEB-BASED APPLICATION 12

Pros and Cons of Cloud Service Development – Types of Cloud Service Development– Software as a Service – Platform as a Service – Web Services – On- Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds.

Unit III CENTRALIZING EMAIL COMMUNICATIONS 12

Collaborating on Schedules – Collaborating on To-Do Lists – Collaborating Contact Lists – Cloud Computing for the Community – Collaborating on Group Projects and Events for the Corporation

Unit IV COLLABORATING ON CALENDARS SCHEDULES AND

TASKMANAGEMENT 12

Exploring Online Scheduling Applications –Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing - Collaborating on Databases– Storing and Sharing Files

Unit V COLLABORATING VIA WEB-BASED COMMUNICATION TOOLS

12

Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis

TOTAL: 60 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Create applications by utilizing cloud platforms.

CO-2: Evaluate cloud computing driven commercial systems such as Google Apps and Microsoft Azure.

CO-3: Analyze own organization's needs for capacity building and training in cloud related IT areas.

CO-4: Apply appropriate technologies and approaches for the related issues to cloud computing.

CO-5: Understanding the key dimensions of the challenges of cloud computing.

Text Books:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Queue Publishing, August 2008.
2. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On- demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

Reference Books:

1. velete, Antony. T, Cloud computing a practical approach 2010, TMH, 4th Edition, 2007.
2. Jennings, Roger, Cloud computing with Windows Azure platform, PHI,2009.

Web Sources:

1. www.coursrra.com

Course Objective: To explore, design, and implement basic concepts of big data & analytics methodologies for analyzing structured and unstructured data with emphasis on the relationship between the Data Scientist and its application to the business needs.

UNIT I INTRODUCTION TO BIG DATA**9**

Introduction to Big Data Platform – Challenges of Conventional Systems - Nature of Data- Evolution Of Analytic Scalability - Intelligent data analysis- Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools

UNIT II MINING DATA STREAMS**9**

Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream –Real time Analytics Platform (RTAP) Applications

UNIT III ADVANCED ANALYTICS**9**

Analyzing, Visualization and Exploring the Data, Statistics for Model Building and Evaluation, Advanced Analytics - K-means clustering, Association rules-Speedup, Linear Regression, Logistic Regression, Naïve Bayes, Decision Trees, Time Series Analysis, Text Analysis

UNIT IV HADOOP**9**

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop - Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming

UNIT V FRAMEWORKS**9**

Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

TOTAL: 45 Hours**Course Outcome:**

At the End of this course, the Student will be able to:

CO-1: Evaluate Big Data real time analytics platform applications.

CO-2: Analyze big data platform and learn intelligent data analysis and compare old and modern data analytic tool.

CO-3: Apply advanced analytics techniques to gain knowledge of latest techniques.

CO-4: Understand the data streams concepts and stream computing.

CO-5: Understand the fundamental concepts of big data platform and know about the basic concepts of nature and evolution of big data.

Text Book:

1. Prajapati, Big Data Analytics with R and Hadoop, 2014

Reference Book:

1. Stephan Kudyba, Big Data, Mining, and Analytics: Components of Strategic Decision Making, Auerbach Publications, March 12, 2014.
2. Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author), Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications, 2013

Web Sources:

1. www.intellipaat.com/blog/big-data-tutorial-for-beginners/
2. www.simplilearn.com/tutorials/data-analytics-tutorial

Course Objective:

To use R for statistical programming, computation, graphics, and modeling, write functions and use R in an efficient way and be able to develop programs and use for their research.

UNIT I INTRODUCTION 12

Introduction, How to run R, R Sessions, and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

UNIT II R PROGRAMMING STRUCTURES 12

Control Statements, Loops, – Looping Over Non vector Sets,- If-Else, Arithmetic, and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

UNIT III MATH AND SIMULATION IN R 12

Math Function, Extended Example Calculating Probability- Cumulative Sums and Products- Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files,

UNIT IV GRAPHICS AND PROBABILITY DISTRIBUTIONS 12

Creating Graphs, The Workhorse of R Base Graphics, the plot () Function – Customizing Graphs, Saving Graphs to Files. Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

UNIT-VI LINEAR MODELS AND CASE STUDY 12

Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, – Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests – Case study on simple R programs.

TOTAL: 60 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Evaluate functions in R and implement simple iterative algorithms.

CO-2: Analyze probability distribution tools such as ANOVA.

CO-3: Apply to implement simple algorithms in R independently

CO-4: Apply visualization techniques in R in an efficient way.

CO-5: Understand the basics of R programming including matrix and vectors etc.

Text Book:

1. Cornillon Pierre Andre Et AI, "R for statistics", T and F India, ISBN 9781439881453, 2015.

Reference Book:

1. Venables, W. N., and Ripley, B. D. "Modern Applied Statistics with S", 4th ed., Springer-Verlag, New York, 2012

Web Sources:

1. www.statmethods.net/r-tutorial/
2. <http://www.r-tutor.com/>

21BCS119 MICROPROCESSOR AND ITS APPLICATIONS 4 0 0 4

Course Objective: To provide a fundamental knowledge of Microprocessors and to improve the ability to do assembly language program. To learn about other microprocessor standards such as Pentium.

Unit - I INTRODUCTION 12

Components of IBM PC: System Unit – Monitor – Input devices – Printer. Interfaces: I/O Buses – Parallel and Serial Ports- Universal Serial Bus. Software Support General Organization of a Microcomputer: CPU-Buses-Memory-Input and Output Devices. 8086 Internal Architecture: The EU- The BIU. Addressing Modes: Immediate Addressing Mode – Register Addressing Mode – Memory Addressing Mode – Port Addressing Mode.

Unit - II ASSEMBLY LANGUAGE PROGRAMMING 12

Instructions: Data Transfer Instructions – Arithmetic Instructions –Bit manipulation Instructions – String Instructions- Branch Control Instructions – Iteration Control Instructions – Interrupt Instructions – Processor Control Instructions. Assembly Language Programming: Program Development Tools – Assembler Directives. Programming examples.

Unit – III ADVANCED MICROPROCESSOR 12

Pins and Signals: Pin Configuration – Signals – Bus Cycles. Basic System Components: Clock Generator – Bus Buffering and DE multiplexing – Bus Controller – Address Decoders. Interrupts: Interrupt Vector Table- The 8086 Response to Interrupts – 8086 Interrupt Types – Priority to 8086 Interrupts. Direct Memory Access: Basic DMA Operation

Unit - IV OTHER MICROPROCESSOR AND STANDARDS 12

Protected Mode Operation: Limitations of Real Mode Operation – Features of Protected Mode Operation – Memory Addressing in Protected Mode – Virtual Memory – Multitasking – Virtual Real Mode. The 80486 Microprocessor: Internal Blocks and Signals – Internal Registers – Instructions – Memory and I/O. The Pentium Microprocessor: Internal Blocks and Signals – Registers – Instructions – Memory and I/O. Pentium –MMX Microprocessor-The Pentium – Pro Microprocessor: Internal Structure – The Pentium – II Microprocessor.

Unit - V CASE STUDY

12

Working with the sample assembly language programs – programs using arithmetic instructions, looping control instructions, interrupt instructions, process control instructions.

Total: 60 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Create real time microprocessor applications.

CO-2: Evaluate the function of Pentium processor.

CO-3: Analyze program using 8085 processor.

CO-4: Analyse the instruction set used in 8085

CO-5: Understand pin configuration and signals.

Text Book:

1. N. Mathivanan, Microprocessors, PC Hardware and Interfacing, Prentice Hall of India, 2007.

Reference Book:

1. M. Rafiqzaman, Microprocessors Theory and Applications, Prentice Hall of India, 2008.

Web sources:

www.nptel.com/microprocessor

www.nescoacademy/microprocessor

21BCS120

MODERN COMPUTER ORGANIZATION

4 0 0 4

Course Objective: This course introduces the basic concept of computer architecture, addressing modes, floating-point arithmetic operations, pipelining, hazards, parallelism, hierarchical memory system, direct memory access, I/O processors

UNIT I OVERVIEW & INSTRUCTIONS

12

Eight ideas – Components of a computer system – Technology – Performance – Power wall – Uniprocessors to multiprocessors; Instructions – operations and operands – representing instructions – Logical operations – control operations – Addressing and addressing modes.

UNIT II ARITHMETIC OPERATIONS

12

ALU - Addition and subtraction – Multiplication – Division – Floating Point operations – Subword parallelism.

UNIT III PROCESSOR AND CONTROL UNIT

12

Basic MIPS implementation – Building datapath – Control Implementation scheme – Pipelining – Pipelined datapath and control – Handling Data hazards & Control hazards – Exceptions.

UNIT IV PARALLELISM

12

Instruction-level-parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading – Multicore processors

UNIT V MEMORY AND I/O SYSTEMS

12

Memory hierarchy - Memory technologies – Cache basics – Measuring and improving cache performance - Virtual memory, TLBs - Input/output system, programmed I/O, DMA and interrupts, I/O processors.

TOTAL: 60 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Evaluate the concept of pipelining.

CO-2: Analyze hierarchical memory system including cache memories and virtual memory.

CO-3: Apply knowledge about concept of parallelism.

CO-4: Understand the knowledge about Direct Memory Access and interrupts.

CO-5: Understand the architecture of computers and to analyze the performance using various addressing modes.

Text Books:

1. David A. Patterson and John L. Hennessey, "Computer organization and design", Morgan Kaufman / Elsevier, Fifth edition, 2014.
2. V. Carl Hamacher, Zvonko G. Varanescic and Safat G. Zaky, "Computer Organisation", VI th edition, Mc Graw-Hill Inc, 2012.

Reference Books:

1. William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2006.
2. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
3. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2005.
4. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata Mc Graw Hill, 1998.

Web sources:

1. <http://www.nptel.ac.in/>
2. www.coursera.org

21BCS121

DEEP LEARNING

3 0 0 3

Course Objectives:

To understand the major technology trends driving Deep Learning and apply fully connected deep neural networks. This course is used to analyse the key parameters and hyper parameters in a neural network's architecture.

UNIT I Probability and Information Theory

9

Random Variables- Probability Distributions- Marginal Probability- Conditional Probability- Expectation- Variance and Covariance- Bayes' Rule- Information Theory -Numerical Computation- Overflow and Underflow- Gradient-Based Optimization- Constrained Optimization- Linear Least Squares.

UNIT II Machine Learning Basics

9

Machine Learning Basics and Underfitting, Hyper parameters and Validation Sets, Estimators, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feedforward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

UNIT III Regularization for Deep Learning

9

Regularization for Deep Learning: Parameter Norm Penalties- Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Algorithms with Adaptive Learning Rates, Optimization Strategies and Meta-Algorithms.

UNIT IV Convolutional Networks

9

Convolutional Networks: The Convolution Operation, Pooling- Convolution- Basic Convolution Functions -Structured Outputs, Data Types -Efficient Convolution Algorithms- Random or Unsupervised Features -Basis for Convolutional Networks.

Sequence Modelling: Recurrent and Recursive Nets- Unfolding Computational Graphs- Recurrent Neural Networks- Bidirectional RNNs- Deep Recurrent Networks - Recursive Neural Networks- Echo State Networks- LSTM -Gated RNNs- Optimization for Long-Term Dependencies.

Total : 45 hours

Course Outcomes:

At the End of this course, the Student will be able to:

- CO-1: Analyze mathematical foundation of neural network.
- CO-2: Apply Efficient Convolution Algorithms.
- CO-3: Understand the Concept of Convolutional Networks.
- CO-4: Understand about Information theory.
- CO-5: Understand Supervised and Unsupervised Learning.

Text Books:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press, 2016.
2. Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O'Reilly Media, First Edition, 2017.

Reference Books:

1. Nikhil Buduma, O'Reilly, Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Shroff Publishers, 2019.
2. Douwe Osinga, O'Reilly, Deep learning Cook Book, Practical recipes to get started Quickly, Shroff Publishers, 2019.

Web Sources:

1. <https://keras.io/datasets/>
2. <http://deeplearning.net/tutorial/deeplearning.pdf>
3. <https://arxiv.org/pdf/1404.7828v4.pdf>

Syllabus

Generic Elective Courses

Course Objective:

To build web applications using HTML and client side script technologies use with Microsoft's IIS. To build web applications with style sheets and Data object in order to provide secure web design.

UNIT I INTRODUCTION**9**

Internet Basic - Introduction to HTML - List - Creating Table - Linking Document Frames - Graphics to HTML Doc - Style Sheet - Style Sheet Basic - Add Style to Document - Creating Style Sheet Rules
- Style Sheet Properties - Font - Text - List - Color and Background Color - Box - Display Properties.

UNIT II JAVASCRIPT FUNDAMENTALS**9**

Introduction To Javascript - Advantage of Javascript Javascript Syntax – Data type - Variable - Array
- Operator and Expression - Looping Constructor - Function - Dialog Box.

UNIT III OBJECTS IN JAVASCRIPT**9**

Javascript Document Object Model - Introduction - Object In HTML - Event Handling - Window Object - Document Object - Browser Object - Form Object - Navigator Object Screen Object - Build In Object - User Defined Object - Cookies.

UNIT IV ASP.NET FUNDAMENTALS**9**

Asp. Net Language Structure - Page Structure - Page Event, Properties & Compiler Directives. Html Server Controls - Anchor, Tables, Forms, Files. Basic Web Server Controls- L.Able, Textbox, Button, Image, Links, Check & Radio Button, Hyperlink. Data List Web Server Controls - Check Box List, Radio Button List, Drop down List, List Box, Data Grid, Repeater.

UNIT V NETWORK & SECURITY**9**

Request And Response Objects, Cookies, Working With Data - OLEDB Connection Class, Command Class, Transaction Class, Data Adaptor Class, Data Set Class. Advanced Issues - Email, Application Issues, Working with IIS and Page Directives, Error Handling. Security –

Authentication, IP Address, Secure By SSL & Client Certificates.

TOTAL: 45 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Create a web page using HTML.

CO-2: Evaluate different web server scripting techniques

CO-3: Analyze functions of HTML

CO-4: Understand to work with multiple applications

CO-5: Understand the concepts of web designing

Text Books:

1. P I. Bayross, "Web Enable Commercial Application Development Using HTML, DHTML, Javascript", en CGI, BPB Publications, 2000.
2. Eric A. Smith, "ASP 3 Programming Bible", Wiley-Dreamtech India (P) Ltd, 2003.

Reference Books:

1. Dave Mercer, "ASP3.0 Beginners Guide", TataMcGraw-Hill Edition, Sixthreprint, 2004.
2. J. Jaworski, "Mastering Javascript", BPB Publications, 1999.
3. T. A. Powell, "Complete Reference HTML (Third Edition)", TMH, 2002.

Web Sources:

1. www.w3schools.com
2. www.tutorialspoint.com

Course Objective:

This course introduces the basic computer concepts and various problem solving methods, including word processing, Calculations using Spreadsheet applications and Data storage using Database management.

UNIT I FUNDAMENTALS OF COMPUTER**9**

Evolution Of Computers - Classification Of Computers – Definition Of Hardware- CPU – Inputs/Outputs – Storage Devices - Types Of Software - Overview of Operating System – Multitasking OS –Overview Of Modern Digital Computer.

UNIT II MS WORD**9**

Word Processing Programs And Their Uses – Word Basics – Formatting Features -Editing Text &Paragraphs- Automatic Formatting And Styles –Mail Merge–Working With Tables-Graphics And Frames – Macro - Special Features Of Word – Automating Your Work And Printing Documents- Desktop Publishing Service – Converting Doc Into Www Pages.

UNIT III MS EXCEL**9**

Spreadsheet Programs – Applications – Menus-Commands-Toolbars – Working &Editing In Workbook – Creating Formats &Links – Formatting A Worksheet &Creating Graphic Objects – Calculations – Working With Formula - Organizing Data, Importing Data, Functions – Data Handling – Working With Graphs - Creating Charts - Managing Workbooks.

UNIT IV MS ACCESS**9**

Introduction - Planning A Database - Starting Access - Data Types And Properties - Creating A New Database - Creating Tables - Working With Forms - Creating Queries - Finding Information In Databases - Creating Reports - Types Of Reports - Printing &Print Preview – Importing Data From Other Databases Viz. MS Excel Etc.

Getting Started In Powerpoint – Creating A Presentation - Setting Presentation Style - Adding Text To The Presentation - Formatting A Presentation - Adding Style, Color - Arranging Objects - Adding Header & Footer - Creating And Editing Slides – Slide Layout – Adding Picture And Graph – Adding Sound And Video – Adding Auto Shape - Custom Animation - Previewing A Slide Show.

TOTAL: 45 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

- CO-1:** Create formats and links.
- CO-2:** Create Presentation using MS PowerPoint.
- CO-3:** Analyze the Classification of Computers.
- CO-4:** Apply formatting features, editing text & paragraphs.
- CO-5:** Understand different types of Softwares.

Text Books:

1. E.Balagurusamy, “Computing Fundamentals & C Programming”, Tata McGraw hill, 2017.
2. Sanjay Saxena , “MS office 2000”, Vikas publication house pvt.ltd, 2000.

Reference Books:

1. Jennifer AckermanKettell, Guy Hart-Davis, Curt Simmons, Microsoft Office 2003:
The Complete Reference, McGraw-Hill Osborne, 2nd edition, 2003.
2. Balaguruswamy, “Office Automation & Word Processing”, TMH, 1987.

Web Sources:

1. www.udemy.com
2. www.guru99.co

Course Objective:

This course introduces the basic concepts of desk top publishing with document setup, fonts, composing machines, graphics, tones, book preparation and file maintenance.

UNIT I FUNDAMENTALS OF COMPUTERS**9**

Introduction To Computers, Hardware And Software – Applications Of Computers – Input Devices – Output Devices – Storage Media – Types Of Software- Operating Systems – Introduction To DOS – DOS Commands And Tools – MS-Windows – Using The Desktop – Setup Using Control Panel – Windows Accessories – Files & Folder Management - Introduction To Internet – Browsers – Sending And Receiving E-Mail – File Downloading And Uploading.

UNIT II DOCUMENT SET UP**9**

History Of Printing – Types Of Printing - Desktop Publishing: Introduction – Merits & Demerits – DTP And Traditional Composing – Cost & Estimation Of DTP Unit – Word Processing Using MS-Word: Basics – Text Formatting – Setting Header And Footer – Tables, Borders And Shading – Special Effects And Image Insertion.

UNIT III TYPING AND COMPOSING PAGES**9**

Typography – Managing Fonts – Measurement Types For Fonts, Pages, Lines – Proof Reading – Page Setup – House Styles – Page Maker Case Study - Page Composing - Different Composing Methods And Processes – Composing Machines – Output Devices – Qwark Express Case Study

UNIT IV DOCUMENT DESIGNING**9**

Graphic Reproduction – Setting Tones, Shadowing, Highlight, Contrast For Images - Scanning Principles – Types Of Scanners And Their Use – Setting Resolution – Page Design – Color Types – Color Selection - Preparation Of Graphics – Book Preparation – Seminar Presentation – Imposition Techniques

UNIT V FILE & PRINT MANAGEMENT**9**

Printing – Types of Printers – Different Types of File Formats – Icc Based Color Management –

Preparation Of Project Work – Binding Techniques – Coreldraw Case Study.

TOTAL: 45 Hours

Course Outcomes:

At the End of this course, the Student will be able to:

CO-1: Apply formatting for document creation.

CO-2: Apply knowledge for seminar presentation.

CO-3: Apply knowledge for project work preparation.

CO-4: Understand the basics of computers, Hardware and Software.

CO-5: Understand different types of printers and file formats.

Text Books:

1. Shirish Chavan , “Rapidex DTP Course”, UNICORN Books Pvt. Ltd., 2007
2. Sanjay Saxena, “A First Course in Computers”, Vikas Publishing House, 2005.

Reference Books:

1. Pete Yeo, “DTP Manual”, Chapman Hall, 1994.
2. Shirih Chauan, “Rapidex DTP Course: Coreldraw “, Unicorn Books, 2005.

Web Sources:

1. www.geeksforgeek.com
2. www.javatpoint.com

SYLLABUS
ABILITY ENHANCEMENT
COMPULSORY COURSES(AECC)

COMMUNICATION SKILLS**1 0 2 2****Course Objective:**

- This course is to subject the students to practise the components in various units.
- To make students ready for placement interviews within campus.
- To infuse confidence to face job situations.

	Credit Hours
UNIT I	06
• Resume and CV Writing	
• Complaint Letter	
• Social Correspondence	
• Letter of Enquiry	
UNIT II	06
• Short Essay Writing	
UNIT III	06
• Explaining Proverbs	
UNIT IV	06
• Use of Prepositions	
UNIT V	06
• Synonymous Words	
Total	30 Hours

Course Outcome:

- CO1 To enhance learners' confidence level.
CO2 To make learners' feel the assimilation of skills.
CO3 To engage in a conversation with others to exchange ideas.
CO4 To impart leadership qualities among the participants.
CO5 To express opinions to enhance their social skills.

Books Prescribed

- For Unit I – V Effective Communication For You – V. Syamala
Emerald Publishers, Chennai.
- Cameron, David. Mastering Modern English, Hyderabad: Orient Blackswan, 1978 (rpt. 1989, 1993, 1995, 1998).
- Freeman, Sarah. Written Communication in English, Hyderabad: Orient Blackswan, 1977 (21st Impression, 2007).
- Singh, Vandana R. The Written Word. New Delhi: Oxford university Press, 2003 (3rd Impression, 2007)
- Seely, John. Oxford Guide to Effective Writing and Speaking. New Delhi: Oxford University Press, 2000 (4th Impression, 2008)

Web Sources:

- <https://www.myperfectresume.com/career-center/resumes/how-to/write>
- <https://www.englishgrammar.org/>
- <https://www.thesaurus.com/browse/>

21EVS201	ENVIRONMENTAL STUDIES	2 0 0 2
UNIT I	INTRODUCTION	6
The multidisciplinary nature of Environment of studies – Definition - Scope and Importance - Need for Public Awareness.		
UNIT II	NATURAL RESOURCES	6
Natural resources and associated problem - Renewable and Non- Renewable resources:-Forest Resources-Mineral Resources-Food Resources - Energy Resources-Land Resources: Role of an individual in conservation of natural resources- Equitable use of resources of sustainable lifestyles.		
UNIT III	ECO SYSTEM	6
Concepts of an Ecosystem - Structure and Functions of an Ecosystem - Procedures, Consumers and Decomposers - Energy flow in the ecosystem - Food chains, Food webs and ecological pyramids - Introduction, types, Characteristics features - Structures and functions of the following ecosystem :Forest ecosystem, Grass land ecosystem, Desert ecosystem, Aquatic ecosystem.		
UNIT IV	BIODIVERSITY AND ITS CONSERVATION	6
Introduction - Definition, genetic, species and ecosystem diversity - Bio-geographical classification of India - Value of Bio-diversity - Bio-diversity at global, National and Local levels - India s a mega-diversity nation - Hot-Spots of diversity - Threats to diversity: Habitats loss, poaching of Wild life, man wild life conflicts - Endangered and Endemic species of India In-Situ conversation of Bio-diversity.		
UNIT V	ENVIRONMENTAL POLLUTION AND HUMAN RIGHTS	6
Definition - Causes, effects and control measures of : Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution - Soil pollution management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution - Pollution – Case studies -Disaster Management – Flood, earthquakes, cyclone of landslides. Environment and human health - Human rights - Value education - HIV/AIDS - Women and child welfare - Role of information technology in Environment and Human health - Case study		
		TOTAL: 30 Hours

Text Book:

1. Text Book Of Environmental Engineering, R.Venugopala Rao, Eastern Economy Edition.

Reference Books:

1. Environmental studies, Dr. N. Arumugam, Prof.V. Kumaresan.
2. Environmental studies, Thangamani & Shyamala Thangama

SYLLABUS
SKILL ENHANCEMENT
COURSES(SEC)

SOFT SKILLS I**2 0 0 2****Course Objective:**

- To enable participants Business Communication Skills
- To enhance participants E-mail writing skills
- To impart Leadership and Team Bonding skills

Credit Hours**UNIT I: EFFECTIVE COMMUNICATION SKILLS****06**

Talking about your company – Making Polite requests – Introducing yourself and others –
Socialising with others – Talking about work activities – Talking about your job –
Communication practice – Role plays

UNIT II: WRITTEN BUSINESS COMMUNICATION**06**

Essential Email writing skills – Formal and Informal E-mails – Usage of formal language –
Report Writing – Writing project reports – Extended writing practice – Email Etiquette –
Understanding Business E-mails

UNIT III: TELEPHONE ETIQUETTE**06**

The basics of Telephone Etiquette – Customer Service – Being courteous – Making
arrangements – Giving clear and concise information – Tone and Rate of speech –
Pronunciations – Summarisation – Mock Telephonic Conversations

UNIT IV: LEADERSHIP SKILLS**06**

Essential Leadership Skills – Interpersonal Skills – Team Building – Team work – Do's and
Don'ts of Leadership skills – Importance of communication in Leadership – Delegating and
Handling of Projects

UNIT V: LISTENING AND ANSWERING QUESTION**06**

Listening for the main ideas – Listening for details – Listening for specific information –
Predicting and listening for opinions – Recognising context – Listening for sequence –
Understanding Pronunciation – Listening practice

Total**30 Hours****Course Outcome:**

- CO1 To enhance participant's Business Communication Skills
CO2 To enhance the participant's Reading, Speaking, Listening and Writing capabilities
CO3 To engage in a conversation with others to exchange ideas
CO4 To impart leadership qualities among the participants
CO5 To express opinions to enhance their social skills

Books Prescribed

- Raman, M. & Sangeeta Sharma. Technical Communication.OUP.2008
- Taylor, Grant.English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd. 2005
- Tiko, Champa & Jaya Sasikumar. Writing with a Purpose.OUP. New Delhi. 1979

Web Sources:

- <https://www.skillsyouneed.com/ips/communication-skills.html>
- <https://blog.smarp.com/top-5-communication-skills-and-how-to-improve-them>
- <https://blog.hubspot.com/service/phone-etiquette>

SOFT SKILLS II

2002

Course Objective:

- To enable students to develop their communication skills effectively
- To enhance students Reading, Writing, Listening and Speaking skills
- To develop their self-confidence through communication

Credit Hours

UNIT I: READING COMPREHENSION AND VOCABULARY

06

Reading Techniques – Types of Reading – Skimming – Scanning – Reading for detail – Identifying key words – Underlining unfamiliar key words – Vocabulary Building – Reading Comprehension practice

UNIT II: PRESENTATION SKILLS

06

Presentation Methods – Preparation and Practice – Organising content – Do's and Don'ts of a Presentation – Presentation Techniques – Mock Presentation

UNIT III: GROUP DISCUSSION

06

Introduction to Group Discussion – Preparation for GD – Structure of GD's – Do's and Don'ts – Tips and Strategies – Etiquette and Practice – Body Language and Posture – Sharing Ideas with respect – Understanding Opinions – Mock GD Practice

UNIT IV: CONVERSATIONAL SKILLS

06

Introduction to Small talk – How to start and end a conversation – Exchanging ideas – Expressing Interests – Giving Opinions – Social skills and Etiquette – Informal Conversations – Formal Meetings – Group Practice

UNIT V: SELF – INTRODUCTION AND ROLE PLAY

06

Introducing oneself – Exchange of Greetings – Appropriate Greetings – Usage of Vocabulary – Rapport Building – Handshakes and First Impressions – Basic Etiquette

Total

30 Hours

Course Outcome:

- | | |
|-----|--|
| CO1 | To get students to understand the importance of communicating in English |
| CO2 | To understand effective communication techniques |
| CO3 | To increase self-confidence through regular practice |
| CO4 | To encourage active participation in their regular class |
| CO5 | To enable participants to face large group of audience with confidence |

Books Prescribed

- English for Competitive Examinations by R.P.Bhatnagar&Rajul Bhargava Macmillan India ltd. Delhi.
- Carnegie, Dale. The Quick and Easy Way to Effective Speaking. New York: Pocket Books, 1977.
- Kalish, Karen.How to Give a Terrific Presentation. New York: AMACOM, 1996

Web Sources:

- <https://www.skillsyouneed.com/ips/communication-skills.html>
- <https://venngage.com/blog/presentation-skills/>
- <https://gdpi.hitbullseye.com/Group-Discussion.php>

SOFT SKILLS III**2002****Course Objective:**

- To enable students to develop their soft skills and Body Language
- To enhance students Reading, Writing, Listening and Speaking skills
- To develop their self-confidence to excel at Interviews

Credit Hours**UNIT I: SKILL ENHANCEMENT****06**

Time Management – Planning and Organisation – Scheduling – Prioritization – Delegation – Task Management – Stress Management – Overcoming anxiety – Confidence Building – Body Language

UNIT II: RESUME / COVER LETTER WRITING**06**

SWOT Analysis – Details and Resume Writing – Resume Examples – Building Resume using SWOT – Writing Resume – Writing Cover Letter – Resume Correction – Resume Feedback

UNIT III: INTERVIEW SKILLS**06**

Interview Do's and Don'ts – First Impression – Grooming – Body Language – Frequently asked questions – Useful Language – Mock Interview

UNIT IV: QUANTITATIVE ABILITY**06**

Permutation & Combinations – Probability – Profit & Loss – Ratio Proportions & Variations – Cubes – Venn Diagrams – Logical Reasoning – Critical Reasoning

UNIT V: REVISIONARY MODULES**06**

Group Discussions – HR Process – Interview Process – Mock Group Discussions

Total**30 Hours****Course Outcome:**

- | | |
|-----|---|
| CO1 | To develop participants social and professional skills |
| CO2 | To help participants manage time effectively |
| CO3 | To build a strong resume to suit corporate requirements |
| CO4 | To face interviews confidently |
| CO5 | To enhance their aptitude abilities |

Books Prescribed

- Meena. K and V.Ayothi (2013) A Book on Development of Soft Skills (Soft Skills: A Road Map to Success) P.R. Publishers & Distributors.
- Soft Skills – Know Yourself & Know the World, S.Chand & Company LTD, Ram Nagar, New Delhi
- Prasad, H. M. How to Prepare for Group Discussion and Interview. New Delhi: Tata McGraw-Hill Publishing Company Limited, 2001.
- Pease, Allan. Body Language. Delhi: Sudha Publications, 1998.

Web Sources:

- <https://www.skillsyouneed.com/ips/communication-skills.html>
- <https://www.businessnewsdaily.com/5836-top-interviewing-skills.html>
- <https://gdpi.hitbullseye.com/Group-Discussion.php>

SECTOR SKILL COURSE

21SSKU51

Responsive Web Designing

0 0 4 2

Objectives:

To build web applications using HTML and CSS technologies use with Microsoft's IIS. To build web applications with style sheets in order to provide secure web design.

1. Design a Bio-Data using HTML.
2. Create a webpage with four frames (Picture, table, list, and hyperlink).
3. Program to show all character elements in html.
4. Create a webpage to show the block level elements and text level elements.
5. Create a webpage to show various confectionary items using ordered list and unordered list.
6. Create a webpage to show different hobbies using HTML and CSS.
7. Program to show India map using HTML.
8. Create a web page using style sheet.
9. Create a web page to show registration for recruiting agency
10. Program to show books in inventory in different tables by using row span and col span
11. Create a Web Page in HTML to show Admission form in college
12. Program to Create a Nested List using HTML and CSS.

Total: 30 Hours

Course Outcome:

At the End of this course, the Student will be able to:

CO-1: Create webpage using various HTML building blocks.

CO-2: Evaluate the usage of block level and text level elements in HTML.

CO-3: Apply list tag in HTML.

CO-4: Apply picture, table, list and Hyper link in a web page

CO-5: Apply CSS element in web page creation.

Text Books:

1. P I. Bayross, "Web Enable Commercial Application Development Using HTML, DHTML, Javascript", en CGI, BPB Publications, 2000.
2. Eric A. Smith, "ASP 3 Programming Bible", Wiley-Dreamtech India (P) Ltd, 2003.

Reference Books:

1. Dave Mercer, “ASP3.0 Beginners Guide”, TataMcGraw-Hill Edition, Sixthreprint, 2004.
2. J. Jaworski, “Mastering Javascript”, BPB Publications, 1999.
3. T. A. Powell, “Complete Reference HTML (Third Edition)”, TMH, 2002.

Web Sources:

1. www.w3schools.com
2. www.tutorialspoint.com

COURSE OBJECTIVE:

- To develop and strengthen entrepreneurial quality and motivation in students
- To impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.
- To understand the concept and process of entrepreneurship and its contribution in and role in the growth and development of individual and the nation.

UNIT I ENTREPRENEURSHIP**6**

Entrepreneur – Personality characteristics of successful entrepreneur – Types of Entrepreneurs – Knowledge and skills required for an entrepreneur – Difference between Entrepreneur and Intrapreneur

UNIT II BUSINESS**6**

Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – Market Survey and Research – Techno Economic Feasibility Assessment

UNIT III BUSINESS PLAN PREPARATION**6**

Sources of product for business – Pre-feasibility study – Criteria for selection of product – Ownership – Capital – Budgeting project profile preparation – Matching entrepreneur with the project – Feasibility report preparation and evaluation criteria.

UNIT IV SUPPORT TO ENTREPRENEURS**6**

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry.

UNIT V ENTREPRENEURSHIP DEVELOPMENT PROGRAMME**6**

Meaning, Objectives – Phases of EDP – steps in EDP – Strategies for Entrepreneurship development – Institutions in aid of Entrepreneurship Development Programme – Use of IT enabled services in entrepreneurship - E Licensing, E filing.

Total 30 hrs

COURSE OUTCOMES:

At the end of the course, a student will be able to

CO – 1: Understand the concept of Entrepreneurship

CO – 2: Identify, create and analyze entrepreneurial opportunities.

CO – 3: Assess techno economic feasibility of a Business Plan

CO- 4 - Create Business Plans

CO-5: State various statutory institutions involved in the process of Entrepreneurship development

TEXT BOOKS:

1. Hisrich R D, Peters M P, “Entrepreneurship” 8th Edition, Tata McGraw-Hill, 2016
2. Khanka S.S., “Entrepreneurial Development” S Chand & Company; edition, 2016

REFERENCE BOOKS:

1. Sharma, “Entrepreneurship Development”, PHI LEARNING PVT LTD, (2017)
2. Abhinav Ganpule & Aditya Dhobale, “Entrepreneurship Development”, Kindle Edition, Jatayu Publication; 1 edition ,2018.
3. Sangeeta Sharma, “Entrepreneurship Development”, 10th Edition, Kindle Edition PHI Learning, 2018

WEBSITES

1. <http://www.simplynotes.in/e-notes/mbabba/entrepreneurship-development/>
2. <https://openpress.usask.ca/entrepreneurshipandinnovationtoolkit/chapter/chapter-1-introduction-to-entrepreneurship/>

WEBSOURCES

1. <https://articles.bplans.com/10-great-websites-for-entrepreneurs/>
2. <https://www.entrepreneur.com/article/272185>

21SSKU62

Technical Seminar

0 0 2 1

Course Objective:

To develop technical and communication skill, needed for getting employment opportunities, help to identify the pros and cons of their skill set, help to exhibit the inherent and external personality.

Content:

- Students encourage to participate seminar, webinar, workshop.
- Every student assign to select their topic of interest in core subject
- Encourage to participate various activities allotted to their topic.
- At the end of the semester, every student submit technical report on their topic.
- Based on documentation and viva students eligible to get their grade.

Total: 15 Hours