



# VELS



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 30 Years Successfully*

**B.Sc., Computer Science**

**(Artificial Intelligence & Machine Learning)**

**Curriculum and Syllabus  
Regulations 2023**

**(Based on Choice Based Credit System (CBCS)  
and  
Learning Outcomes based Curriculum Framework  
(LOCF))**

**Effective from the Academic year  
2023-2024**

**Department of Computer Science  
School of Computing Sciences**

## **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: Critical Thinking:** Apply knowledge of Computer Science to identify, analyse problems and to provide effective solutions in the area of Computing.

**PO2: Computing Skills and Ethics:** Analyse a problem, and identify and define the computing requirements appropriate to its solution.

**PO3: Analytical skill:** Ability to design, develop algorithms and provide software solutions to cater the industrial needs.

**PO4: Modern Tool Usage:** Use current techniques, skills, and tools necessary for computing practices

**PO5: Employability Skills:** Inculcate skills to excel in the fields of Information Technology and its Enabled services, Government and Private sectors, Teaching and Research.

**PO6: Ethics:** Insists ethical responsibilities, human and professional values and make their contribution to society.

**PO7:Self Directed and Life-long Learning:** Engaged in life long learning to equip Them to the changing environment and be prepared to take-up mastering Programmes.

**PO8: Individual and team work:** Function effectively as an individual, and as a member or a leader in diverse team and multidisciplinary settings.

**PO9: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO10: Project management and finance:** Demonstrate knowledge and understanding of the problem and management principles and apply these to one's own work, as a member and engineering and management principles and apply these to one's own work, as a member.

**PO11: Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO12: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

### **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. MAGESH KUMAR	Director, School of Computing Sciences	Internal Member
2	Dr. S. PRASANNA	Professor and Head, Department of Computer Applications	Internal Member
3	Dr. S.PERUMAL	Professor and Head, Department of Computer Science	Internal Member
4	Dr. P. SUJATHA	Professor and Head, Department of BCA & IT	Internal Member
5	Dr. T. VELMURUGAN	Associate Professor & HEAD, Department of Computer Science, DG Vaishnav College, Chennai.	Academic Expert ( External Member)
6	Dr. SHAMBUNATH SHARMA	Engineering Manager Quality, Caratlane Trading Pvt. Ltd. Chennai	Industrial Expert ( External Member)
7	Mr. R. BALAMURUGAN	SCOPUS Ltd., Chennai	Alumni Member ( External 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 ((Artificial Intelligence & Machine  
Learning)REGULATIONS 2023**

**(Applicable to all the candidates admitted from the academic year 2023-24 onwards)**

**1. DURATION OF THE PROGRAMME**

1.1. Three years (six semesters)

1.2. 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

7.1. **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.

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

7.3. **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.

7.4. **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.

7.5. **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.

7.5.1. 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.

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

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

7.5.4. Students who want to go to foreign Universities up to two semesters or Project Work with the prior approval of the Departmental / University Committee are allowed to transfer their credits. Marks obtained 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**

### **8.1. 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.

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

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

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

8.3.3 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 3 = 30 Marks
SECTION – B	5 questions either or pattern	5X 8 = 40 Marks
SECTION – C	2 questions either or pattern	2X 15 = 30 Marks
		<b>Total 100 Marks</b>

**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:

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

10.2. 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:**

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

11.2. 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.

11.3. 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

13.1. 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, letter grades and classification to indicate the performance of the Student:

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

GPA for a Semester: =  $\frac{\sum C_i G_i}{\sum C_i}$  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: =  $\frac{\sum_n \sum C_{ni} G_{ni}}{\sum_n \sum C_{ni}}$  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

<b>Grade Conversion Table – UG</b>			
<b>Range of Marks</b>	<b>Grade Points</b>	<b>Letter Grade</b>	<b>Description</b>
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

#### 14.2. Letter Grade and Class CGPA

<b>Overall Performance – UG</b>		
<b>CGPA</b>	<b>GRADE</b>	<b>CLASS</b>
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**

16.1. 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 beyond the normal period to clear the backlog to be qualified for the degree. (Time Span = N + 2 years for the completion of programme)

16.2. In exceptional cases like major accidents and childbirth 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(Artificial Intelligence & Machine Learning)**

**Courses of Study and Scheme of Assessment**

**B.Sc., Computer Science(Artificial Intelligence & Machine Learning)**

**Course Components**

<b>Component</b>	<b>I Sem</b>	<b>II Sem</b>	<b>III Sem</b>	<b>IV Sem</b>	<b>V Sem</b>	<b>VI Sem</b>	<b>Total Credits</b>
Core Courses & Languages	15 +6	15+6	20	19	14	10	105
Ability Enhancement Courses (AEC)	2	-	2	-	-	-	4
Discipline Specific Elective (DSE) & Generic Elective (GEC)	-	-	-	-	6	12	18
Skill enhancement Course(SEC)	-	2	2	4	2	3	13
<b>Total Credits</b>	<b>23</b>	<b>23</b>	<b>24</b>	<b>23</b>	<b>22</b>	<b>25</b>	<b>140</b>

## **2. Learning Outcomes based Curriculum Framework**

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## 1. Introduction

Artificial Intelligence and Machine Learning 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, Machine Learning, 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 CS (Artificial Intelligence and machine Learning) as this discipline evolved itself to a multidisciplinary discipline. Information Technology is growing rapidly. Increasing applications of computers in almost all areas of human endeavor 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 CS (Artificial Intelligence and machine Learning) in 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 specialization in Computer Science were introduced to train manpower in this highly demanding area. B.Sc in CS (Artificial Intelligence and machine Learning) are being planned and introduced in different colleges and institutions.

Artificial Intelligence and machine Learning 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 CS (Artificial Intelligence and machine Learning) 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 as 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 CS (Artificial Intelligence and machine Learning) 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 CS (Artificial Intelligence and machine Learning) 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 CS (Artificial Intelligence and machine Learning) 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 CS (Artificial Intelligence and machine Learning) and Information Technology with a 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 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**

### **2.1 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 the process of computation by introducing some programming languages. This prepares a young mind to launch a rigorous investigation of the 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 through 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.

#### **B. Sc., Computer Science (Artificial Intelligence & Machine Learning)**

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, and 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/fieldwork.

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.

## **2.2 Aims of Bachelor of Science Programmes in Artificial Intelligence and machine learning**

The Bachelor of Science degree in **Artificial Intelligence & Machine Learning** 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.

### 3.1 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 utilize information and apply their disciplinary knowledge and their professional skills in the workplace.

#### 3.1.a. 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.

#### 3.1.b. Intellectual Rigour

Intellectual Rigour is the commitment to excellence in all scholarly and intellectual activities, including critical judgment. 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.

#### 3.1.c. 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.

### 3.1.d. 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 behavior 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.

### 3.1.e. 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.

### 3.1.f. 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.

### 3.1.g. Self-Management

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

## **3.2 LIST OF GRADUATE ATTRIBUTES for B.Sc., CS (Artificial Intelligence & Machine Learning)**

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

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

GA 2. Ability to think carefully, deeply and with rigor 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 communicate 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 demonstrate competence in the practical art of computing 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 behavior.
- 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.

### **4.1 Qualification Descriptor for B.Sc.,CS (Artificial Intelligence and machine Learning)**

On completion of B.Sc., CS (Artificial Intelligence and machine Learning) the expected learning outcomes that a student should be able to demonstrate are the following.

- QD-1.** Fundamental understanding of the principles of Artificial Intelligence and its connections with other disciplines
- QD-2.** Procedural knowledge that creates different types of professionals related to Machine Learning, 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 behaviors that students acquire in their graduation through the program



## 5.1 Programme Learning Outcomes for B.Sc.,CS (Artificial Intelligence and machine Learning)

The Bachelor of Science with Computer Science (BSc with AI & ML) 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, and 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 a 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 CS (Artificial Intelligence and machine Learning), 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**  
**(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)**

**CURRICULUM**

**TOTAL NUMBER OF CREDITS: 140**

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
<b>SEMESTER I</b>						
LANG	23LTAM11/ 23LHIN11/ 23LFRE11	Tamil- I/ Hindi-I / French-I	3	0	0	3
ENG	23LENG21	English- I	3	0	0	3
CORE	23CBAL11	Object Oriented Programming using Python	4	1	0	5
CORE	23CBAL12	Artificial Intelligence	3	1	0	4
CORE	23PBAL11	Python Programming Lab	0	0	4	2
CORE	23BMA001	Mathematics – I	4	0	0	4
AECC	23AECS11	Communication Skills	1	0	2	2
SEC		Orientation/Induction programme / Life skills	-	-	-	-
<b>TOTAL</b>			18	2	6	23

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
<b>SEMESTER II</b>						
LANG	23LTAM21/ 23HIN21/ 23LFRE21	Tamil- II / Hindi-II / French- II	3	0	0	3
ENG	23 LENG21	English- II	3	0	0	3
CORE	23CBAL21	Statistical Structure in data using R	4	1	0	5
CORE	23CBAL22	Data Structures and Algorithm	3	1	0	4
CORE	23PBAL21	R Programming Lab	0	0	4	2
CORE	23CBAL23	Statistics - I	4	0	0	4
SEC	23SSKU11	Soft Skills - I / Sector Skill Council Course	2	0	0	2
SEC		NSS / NCC / Swachh Bharat / Inplant Training	-	-	-	-
<b>TOTAL</b>			19	2	4	23

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
<b>SEMESTER III</b>						
CORE	23CBAL31	Object Oriented Programming Languages	4	0	0	4
CORE	23CBAL32	Advanced Data Base System	4	0	0	4
CORE	23CBAL33	Neural Networks	4	0	0	4
CORE	23CBAL34	Pattern Recognition	3	1	0	4
CORE	23PBAL31	Object Oriented Programming Languages Lab	0	0	4	2
CORE	23PBAL32	Advanced Data Base System Lab	0	0	4	2
AECC	23EVS031	Environmental Studies	2	0	0	2
SEC	23SSKU21	Soft Skills - II / Sector Skill Council Course	2	0	0	2
SEC		Swayam/ NPTEL / Value Added Course	-	-	-	-
<b>TOTAL</b>			19	1	8	24

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
<b>SEMESTER IV</b>						
CORE	23CBAL41	Machine Learning and its Applications	4	1	0	5
CORE	23CBAL42	Deep Learning	4	0	0	4
CORE	23CBAL43	Natural Language Processing	4	0	0	4
CORE	23CBAL44	Internet of Things	3	1	0	4
CORE	23PBAL41	Machine Learning using WEKA 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	2
<b>TOTAL</b>			17	2	6	23

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
<b>SEMESTER V</b>						
CORE	23CBAL51	Programming in MATLAB	4	0	0	4
CORE	23CBAL52	Big Data Analytics	4	0	0	4
CORE	23CBAL53	Machine Vision Systems	4	0	0	4
CORE	23PBAL51	Programming in MATLAB LAB	0	0	4	2
DSE		Discipline Specific Elective-I	3	0	0	3
DSE		Discipline Specific Elective-II	3	0	0	3
SEC		Internship / Mini Project / Sector Skill Council Course	0	0	4	2
SEC		Skill Enhancement Training / Student Club Activities	-	-	-	-
<b>TOTAL</b>			18	0	8	22



Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
<b>SEMESTER VI</b>						
CORE	23CBAL61	Data Science using Python	4	0	0	4
CORE	23CBAL62	Web Mining & Recommender Systems	4	0	0	4
CORE	23PBAL61	Data Science Lab	0	0	4	2
DSE		Discipline Specific Elective-III	3	0	0	3
DSE		Discipline Specific Elective-IV	3	0	0	3
DSE / GE		Generic Elective	2	0	0	2
SEC		Entrepreneurship Development	2	0	0	2
DSE		Project work	0	0	8	4
SEC		Technical Seminar / Innovation Council / Startup Initiative	0	0	2	1
<b>TOTAL</b>			18	0	14	25

CA - Continuous Assessment

SEE - Semester End Examination

### **LIST OF DISCIPLINE SPECIFIC ELECTIVE COURSES**

	Mobile Computing
	Cryptography and its Applications
	Data Mining and Warehousing
	Cloud Computing
	Block Chain Technology
	NoSQL Database
	Security Issues in Machine Learning
	Machine Learning on Cloud
	Knowledge Engineering
	Robotics and its Applications

### **LIST OF GENERIC ELECTIVE COURSES**

	Web Designing
	Client side Scripting Language
	Photoshop
	Flash
	Advanced Excel
	Statistical Package for Social Science
	Office Automation Tools
	Desktop Publishing
	MYSQL
	Cyber Law

## LIST OF ABILITY ENHANCEMENT COMPULSORY COURSES

23AECS11	Communication Skill
23EVS031	Environmental Science

## List of Skill Enhancement Courses

23SSK11	Soft Skills-I
23SSK21	Soft Skills-II
23SSK31	Soft Skills-III
	Responsive Web designing
	Entrepreneurship Development
	Technical Seminar

# **I SEMESTER**

தாள்-1

**இக்காலக் கவிதைகள் - உரைநடை - பண்பாடு - மொழித்திறன் பாடத்திட்ட நோக்கம்:**

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், தற்கால தமிழ் இலக்கிய வகைமைகளான மரபுக்கவிதை, புதுக்கவிதை, உரைநடை ஆகியவற்றை அறிமுகப்படுத்துதல், தமிழர்தம் வாழ்வியல் நெறிகளையும் பண்பாட்டுச் செழுமைகளையும் இன்றைய தலைமுறையினர் அறியச் செய்தல், மாணவர்களுக்குத் தமிழைத் தவறின்றி எழுதுவதற்குத் தேவையான பயிற்சி அளித்து அவர்களின் மொழித்திறனை மேம்படுத்துதல், செய்யுளின் நலத்தைப் பாராட்டும் முறைமையை அறியச் செய்து அதன்வழி சிந்தனை வளத்தைப் பெருகச் செய்தல் என்பனவும் மேற்கண்டவழி மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்து அவர்களுக்கு வேலைவாய்ப்பை உருவாக்குவதும் இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

**அலகு 1: மரபுக்கவிதை**

**9 மணி நேரம்**

1. பாரதியார் - பாரத தேசம் என்னும் தலைப்பில் ஆறு பாடல்கள்.  
(பாடல் எண்கள் 1, 6, 7, 9, 12, 13)
2. பாரதிதாசன் - தமிழுக்கும் அமுதென்று பேர் என்னும் தலைப்பிலான கவிதை.
3. தேசிக விநாயகம் பிள்ளை - உடல் நலம் பேணல் என்னும் தலைப்பிலான கவிதை
4. முடியரசன் - காவியப் பாவை - "புண்படுமா" என்னும் கவிதை.

**அலகு 2: புதுக்கவிதை**

**9 மணி நேரம்**

1. நா. காமராசன் - கறுப்பு மலர்கள்தொகுப்பில் காகிதப்பூக்கள்என்னும் தலைப்பிலான கவிதை.
2. அப்துல் ரகுமான் - ஆலாபனைதொகுப்பில் போட்டிஎன்னும் தலைப்பிலான கவிதை
3. ஈரோடு தமிழன்பன் - ஒரு வண்டி சென்றியுதொகுப்பில் தேர்ந்தெடுக்கப்பட்ட சென்றியு கவிதைகள்
4. ஆண்டாள் பிரியதர்ஷினி - முத்தங்கள் தீர்ந்துவிட்டனதொகுப்பில் 'இங்கே வரும் போது' என்னும் தலைப்பிலான கவிதை

**அலகு 3: உரைநடை**

**9 மணி நேரம்**

1. மாணாக்கரும் தாய்மொழியும் - திரு.வி.க.,

2. மன வலிமை வேண்டும்- மு.வரதராசனார்
3. செம்மொழித் தமிழின் சிறப்புகள்
4. பண்டைத் தமிழரின் சாதனைச் சுவடுகள்

**அலகு 4: தமிழர் வாழ்வும் பண்பாடும்**

**9 மணி நேரம்**

பண்பாடு – வாழ்வியல் முறை – அகம், புறம் - உணவு முறை - விருந்தோம்பல் - நம்பிக்கைகள் – விழாவும் வழிபாடும் - கலைகள் - கட்டடம் - சிற்பம் - ஓவியம் - இசை – கூத்து – தொழிலும் வணிகமும் – அறிவியல் நோக்கு.

**அலகு 5: மொழித்திறன், இலக்கிய வரலாறு, இலக்கணம் 9 மணி நேரம்**

1. எழுத்துப் பிழை, தொடர்பு பிழைகள்
2. வேற்றுமை இலக்கணம்
3. செய்யுள் நலம் பாராட்டல்
4. பாடம் தழுவிய இலக்கிய வரலாறு (மரபுக் கவிதை, புதுக்கவிதை, உரைநடை)

**மொத்தம்: 45 மணி நேரம்**

**பார்வை நூல்கள்**

1. தமிழர் நாகரிகமும் பண்பாடும், டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், 2001.
2. தவறின்றித் தமிழ் எழுதுவோம், மா. நன்னன், ஏகம் பதிப்பகம், 1999.
3. தவறின்றித் தமிழ் எழுத - மருதூர் அரங்கராசன், ஐந்திணைப் பதிப்பகம், 2003.
4. தமிழ் இலக்கிய வரலாறு, வரதராசன், மு., புது தில்லி : சாகித்திய அக்காடெமி, 2002.
5. புதிய தமிழ் இலக்கிய வரலாறு, நீல. பத்மநாபன், சிற்பி பாலசுப்ரமணியம், சாகித்திய அகாடெமி, 2007.
6. செம்மொழி தமிழின் சிறப்பியல்புகள் - முனைவர் மறைமலை இலக்குவனார்; <https://www.youtube.com/watch?v=HHZnmJb4jSY>
7. பாடநூல் தேடலுக்கான இணையம் - <https://archive.org/>

23LHIN11	<b>HINDI - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**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

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

**TOTAL HOURS: 45**

**Text /Reference Books:**

1. Agyeya ki sampurna kahaniyaa - Rajpal &sons, year 2017, Yatrave our bhi ,Kumar  
Ravindra Rashmi prakashan ,Lucknow Bharathiya vigyan ki kahani, Hindi book centre,  
NewDelhi Gadya Khosh

**Weblinks:**

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

## **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



23LFRE11	<b>FRENCH - I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

*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 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-LECON1-3** 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 etpluriels.

**UNITIII-LECON4-6** 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 enfrançais

**UNITIV-LECON7-9** 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**

*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/>

## **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.

23LENG21	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 competence.

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

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

**TOTAL HOURS: 45**

#### Books Prescribed:

1. English for Communication Enrichment: by Jeya Santhi June 2015.
2. Dr. M. Narayana Rao and Dr. B. G. Barki – Anu's Current English for Communication (AnuChitra). June 2012.
3. Dr. Ananthan , R. Effective Communication. Ed. Chennai : Anu ChithraPub.2010.

#### Web Sources:

1. <https://www.gradesaver.com/>
2. <https://www.enotes.com/>
3. <https://www.jstor.org/>
4. <https://www.sparknotes.com/>
5. <https://www.cliffsnotes.com/>

## **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.

**Course Objective:**

Describe the core syntax and semantics of Python programming language, Discover the need for working with the strings and functions and to Infer the Object-oriented Programming concepts in Python.

**UNIT I PARTS OF PYTHON PROGRAMMING LANGUAGE 15**

Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, Control Flow Statements, The if Decision Control Flow Statement, The if...else Decision Control Flow Statement, The if...elif...else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement, Functions, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, \*args and \*\*kwargs, Command Line Arguments.

**UNIT II STRINGS & DICTIONARIES 15**

Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, Lists, Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement. Dictionaries: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary

Methods, The del Statement, Tuples and Sets, Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozen set.

**UNIT III FILES 15**

Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python's

and os. path Modules, Regular Expression Operations, Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.

#### **UNIT IV OBJECT-ORIENTED PROGRAMMING, CLASSES AND OBJECTS 15**

Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism

#### **UNIT V CASE STUDY 15**

Working with the sample Python programs – Using Functions, Strings, Dictionaries, Files and OOP Concepts.

**Total: 75 Hours**

#### **Text Books:**

1. Gowrishankar S, Veena A, “Introduction to Python Programming”, 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

#### **References:**

1. Jake VanderPlas, “Python Data Science Handbook: Essential Tools for Working with Data”, 1st Edition, O'Reilly Media, 2016. ISBN-13:978-1491912058
2. Aurelien Geron, Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems”, 1st Edition, O'Reilly Media, 2017. ISBN – 13: 978-1491962299.
3. Wesley J Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365 Miguel Grinberg, “Flask Web Development: Developing Web Applications with Python”, 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.

## **COURSE OUTCOME**

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

CO-1: Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.

CO-2: Determine the methods to create and manipulate Python programs by utilizing the data Structures like lists, dictionaries, tuples and sets.

CO-3: Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance And polymorphism as used in Python.

CO-4: An understanding of the concepts of user defined functions.

CO-5: To gain the knowledge of Python Attributes and Constructors.

**COURSE OBJECTIVES:**

To introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals, not on providing a mastery of specific software tools or programming environments. Assigned projects promote a 'hands-on' approach for understanding, as well as a challenging avenue for exploration and creativity.

**UNIT I PROBLEM, PROBLEM SPACES AND SEARCH 12**

What is AI? – AI Problems – What is an AI technique – Defining the problem as a state space search – Production system - Production system – Characteristics – Problem Characteristics?

**UNIT II HEURISTIC SEARCH TECHNIQUES 12**

Generate and test – Hill Climbing – Best first Search – Problem Reduction – Constraints Satisfaction – Means end analysis.

**UNIT III KNOWLEDGE REPRESENTATION 12**

Representations and Mappings – Approaches to Knowledge Representation. Using predicate Logic: Representing simple facts in logic – Computable functions and prediction – Resolution – The basic of resolution – Resolution in Propositional Logic – The Unification algorithm – Resolution in Predicate Logic.

**UNIT IV REPRESENTING KNOWLEDGE USING RULES 12**

Procedural versus – Declarative Knowledge – logic Programming – Forward versus Backward Reasoning – Matching

**UNIT V GAME PLAYING 12**

The Minimax search procedure – Adding Alpha Beta cut offs – Addition Refinements – Waiting for Quiescence – Secondary Searches – Using Book moves.

**Total : 60 Hours**

**TEXT BOOKS:**

1. Elain Rich Kevin knight "Artificial Intelligence" - Tata McGraw Hill.
2. Artificial Intelligence and Intelligent Systems – N.P.PADHY.



**REFERENCE BOOKS:**

1. Introduction to Artificial Intelligence Rajenda Akeskar PHI.
2. Artificial Intelligence by PH, Winston – Addison Wesley.
3. Introduction to Artificial Intelligence and Expert System by Patter

**COURSE OUTCOME**

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

1. Knowledge of what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.
2. Explain how Artificial Intelligence enables capabilities that are beyond conventional technology, for example, chess-playing computers, self-driving cars, robotic vacuum cleaners.
3. Ability to apply Artificial Intelligence techniques for problem solving.

**Course Objective:**

To implement Python programs with conditionals and loops. Also represent compound data using Python lists, tuples, dictionaries and Read and write data from/to files in Python.

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. First n prime numbers
8. Multiply matrices
9. Programs that take command line arguments (word count)
10. Find the most frequent words in a text read from a file
11. Simulate elliptical orbits in Pygame
12. Simulate bouncing ball using Pygame

**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  $E, \Delta, \nabla$ , 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 " $\theta$ " - Expansions of  $\sin\theta$ ,  $\cos\theta$  and  $\tan\theta$  in a series of powers of " $\theta$ " – Hyperbolic and inverse hyperbolic functions - Logarithms of complex numbers.

**UNIT V DIFFERENTIAL CALCULUS 12**

Differentiation-Successive differentiation,  $n^{\text{th}}$  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**

**TEXT BOOKS**

1. P. Kandaswamy and K.Thilagavathy, Allied Mathematics paper I, 1<sup>st</sup> Semester, S.Chand Publishing Pvt. Ltd. 1<sup>st</sup>Edition,2003.
2. S. Narayanan and T.K. Manickavasagam Pillai – Ancillary Mathematics, S. Viswanathan Printers, 1986,Chennai.

**REFERENCE BOOKS**

1. P.R. Vittal, Allied Mathematics, Margham Publications, 4<sup>th</sup> Edition2009.
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. [machine learning mastery.com/gentle-introduction-linear-algebra/](https://machinelearningmastery.com/gentle-introduction-linear-algebra/)  
[www.geeksforgeeks.org/trigonometry/](https://www.geeksforgeeks.org/trigonometry/)

**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 .

# **II SEMESTER**

பாடக் குறியீட்டு எண்: 23LTAM21

பருவம்-2, தமிழ்மொழிப்பாடம்-2, பகுதி-1, தகுதிப்புள்ளி: 3, வாரப் பாட நேரம்: 3.

தாள்-2

அற இலக்கியம் - சிற்றிலக்கியம் - சிறுகதை - பயன்பாட்டுத் தமிழ் பாடத்திட்ட நோக்கம்:

மாணவர்களின் இலக்கிய நாட்டத்தை மேம்படுத்துதல், அற இலக்கியங்கள், சிற்றிலக்கியம், சிறுகதை ஆகியவற்றை அறிமுகப்படுத்துதல், தற்காலப் பேச்சுத் தமிழ் எழுத்துத்தமிழ் ஆகியவற்றின் வளர்நிலைகளை மாணவர்களை அறியச் செய்தல், அதன்வழி சிந்தனை வளத்தைப் பெருகச் செய்தல் என்பனவும் மேற்கண்டவழி மாணவர்களை ஆளுமை மிக்கவர்களாக உருவாக்கி, போட்டித்தேர்வுகளுக்குத் தயார் செய்து அவர்களின் மொழித் திறனை மேம்படுத்த அவர்களுக்குக் கடிதம் எழுதும் கலையைக் கற்றுக்கொடுத்தல், அணி இலக்கணத்தை அறியச் செய்தல் என்பன இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1: அற இலக்கியங்கள்

9 மணி நேரம்

1. திருக்குறள் - வான் சிறப்பு(அறம்), ஊக்கமுடைமை(பொருள்), குறிப்பறிதல்(இன்பம்) - மூன்று அதிகாரங்கள் முழுமையும்.
2. நாலடியார் - மூன்று பாடல்கள். (2, 3, 5)
3. பழமொழி நானூறு - மூன்று பாடல்கள் (74, 75, 78)
4. திரிகடுகம் - மூன்று பாடல்கள் (10, 12, 22)
5. இனியவை நாற்பது - மூன்று பாடல்கள் (1, 12, 16)
- 6.

அலகு 2: சிற்றிலக்கியம்

9 மணி நேரம்

1. முத்தொள்ளாயிரம்  
சேரன் - வீரம் 14, 15 பாடல்கள்  
சோழன் - காதல் 23, 24 பாடல்கள்  
பாண்டியன் - நாடு 87, 88 பாடல்கள்
2. தமிழ்விடு தூது - முதல் 20 கண்ணிகள்
3. திருக்குறறாலக் குறவஞ்சி - மலைவளம் கூறுதல் - முதல் 5 பாடல்கள்
4. முக்கூடற்பள்ளு - மூத்த பள்ளி நாட்டு வளம் கூறுதல் 3 பாடல்கள், இளைய பள்ளி நாட்டு வளம் கூறுதல் 3 பாடல்கள்.

5. கலிங்கத்துப் பரணி - பாலை பாடியது - முதல் 5 பாடல்கள்
- 6.

### அலகு 3: சிறுகதை

9 மணிநேரம்

1. அறிஞர் அண்ணா - செவ்வாழை
2. புதுமைப்பித்தன் - கடவுளும் கந்தசாமிப் பிள்ளையும்
3. ஜெயகாந்தன் - யுகசந்தி
4. கு.அழகிரிசாமி - காற்று
5. அம்பை - காட்டில் ஒரு மான்

### அலகு 4: பேச்சுத் தமிழ்

9 மணி நேரம்

பேச்சுத் திறன் - விளக்கம் - பேச்சுத்திறனின் அடிப்படைகள் - வகைகள் - மேடைப்பேச்சு - உடையாடல் - பயிற்சிகள்

### அலகு 5: எழுத்துத் தமிழ், இலக்கிய வரலாறு, இலக்கணம்

9 மணி நேரம்

1. கலைச் சொல்லாக்கம் - தேவைகள் - கலைச்சொற்களின் பண்புகள் - அறிவியல்  
கலைச்சொற்கள்- கடிதம் - வகைகள் - அலுவலகக் கடிதங்கள் - உறவுமுறைக் கடிதங்கள்.
2. பாடம் தழுவிய இலக்கிய வரலாறு (அற இலக்கியம், சிற்றிலக்கியம், சிறுகதை)
3. அணி இலக்கணம்
4. விண்ணப்பக் கடிதம் எழுதுதல்

மொத்தம்: 45 மணி நேரம்

### பார்வை நூல்கள்

1. பேசும் கலை, முனைவர் கு.ஞானசம்பந்தன் விஜயா பதிப்பகம், 2000.
2. தமிழ் இலக்கிய வரலாறு, வரதராசன், மு., சாகித்திய அக்காதெமி, புது தில்லி, 2002.
3. தமிழ் நடைக் கையேடு, மொழி அறக்கட்டளை, 2008.
4. பயன்பாட்டுத் தமிழ், முனைவர் அரங்க இராமலிங்கம், முனைவர் ஒப்பிலா மதிவாணன், சென்னை பல்கலைக்கழகம், 2007

5. **மொழிபெயர்ப்பியல் அடிப்படைகள்**, கா.பட்டாபிராமன், யமுனைப் பதிப்பகம், திருவண்ணாமலை, 1999.

6 **பாடநூல் தேடலுக்கான இணையம்**

- <http://www.tamilvu.org/library>
- <https://archive.org/>



23HIN21	<b>HINDI – II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objective: ( Skill Development)**

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

<b>Unit I</b>	- ‘ idgah’ by Premchand’ (kahani), Translation-Definition,Types	<b>09</b>
<b>Unit II</b>	‘pitha ‘ by gyanranjan (kahani), Translation - Anuvadak ke gun	<b>09</b>
<b>Unit III</b>	- jamun ka ped by Krishna chander ‘ (kahani) , TranslationPractice	<b>09</b>
<b>Unit IV</b>	- adhi rath ke baad by Shankar shesh (naatak), TranslationPractice	<b>09</b>
<b>Unit V</b>	- adhi rath ke baad by Shankar shesh (naatak), TranslationPractice	<b>09</b>

**TOTAL HOURS: 45**

**Text/Reference book :**

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

**Weblinks:**

1. <https://premchandstories.in/eidgaah-story-munshi-premchand-pdf/>
2. <https://www.google.com/search?q=pitha+by+gyan+ranjan&aq=chrome.1.69i57j0i113j0i22i30.10387j0j4&sourceid=chrome&ie=UTF-8>
3. <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>
4. [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)

## **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

23LFRE21	<b>FRENCH - II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**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 réponses aux 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:**

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, 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/>

23 LENG21	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 competence.

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

**TOTAL HOURS: 45**

#### Books Prescribed:

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

#### Web Sources:

1. <https://www.gradesaver.com/>
2. <https://www.enotes.com/>
3. <https://www.jstor.org/>
4. <https://www.sparknotes.com/>
5. <https://www.cliffsnotes.com/>

#### 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.



**Text Books:**

1. Cornillon Pierre Andre Et Al,“R for statistics”,TandF India, ISBN 9781439881453,2015.
2. Venables, W. N., and Ripley, B. D. “Modern Applied Statistics with S” , 4th ed., Springer- Verlag, New York,2012

**COURSE OUTCOME**

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

**CO-1:** Understand the basics of R programming including matrix and vectors etc.

**CO-2:** Identify and implement appropriate control structures to solve a particular Programming problem.

**CO-3:** Understand the foundations of and be able to design and describe simulation studies

**CO-4:** Expertise in the probability distribution tools such as ANOVA.

**CO-5:** To expand their knowledge of R and build the Linear Models in R.

**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 STRUCTURES****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.

**UNITV COMPLEXITY AND CASE STUDIES****12**

Asymptotic Notation – Big Oh Notation – Omega Notation – Tita 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**

**Text Books:**

1. Gav Pai “ Data structures and algorithms, concepts, techniques and Applications”, McGraw Hill, ISBN –9780070667266,2017.
2. E.Horowitz and S.Shani Fundamentals of Data Structures in C++, GalgotiaPub.2009.
3. Horowitz, S.Sahni,and S.Rajasekaran, Computer Algorithms, GalgotiaPub.Pvt.Ltd.,2012.
4. R.Kruse C.L.Tondoand B.Leung, Data Structures and ProgramdesigninC,PFU,1997.

**COURSE OUTCOME**

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

- CO-1:** Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
- CO-2:** Describe the hash function and concepts of collision and its resolution methods.
- CO-3:** Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.
- CO-4:** Correctly use recursion to solve a problem with a binary search tree or graph.
- CO-5:** Apply or create suitable algorithm to solve a particular problem.

**Course Objective:**

The course is designed to provide Basic knowledge of R Programming. This Lab course will yield a complete knowledge on how to write basic programs and high level applications using concepts R programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn how to program in R and how to use R for effective data analysis. It refers to a statistical programming environment and describes generic programming language concepts as they are implemented in a high-level statistical language. The course covers practical issues in statistical computing. Students interested in using computation to enhance their problem solving abilities.

1. Write a R Program to Make a Simple Calculator.
2. Write a program to find Sum of Natural Numbers Using Recursion.
3. Write a program to find Fibonacci Sequence Using Recursion in R.
4. Write a program to implement R Program for the Factors of a Number.
5. Write a program to to Find the Sum of Natural Numbers.
6. Write a program to Check if a Number is Positive, Negative or Zero.
7. Write a program to Find the “Hello World” Program.
8. Write a program to Program to Add Two Vectors.
9. Write a function to Find Minimum and Maximum.
10. Write a program to Sort a Vector.
11. Write a R Program to Check for Leap Year.
12. Write a program to multiply two Matrices.

<b>23CBAL23</b>	<b>STATISTICS-I (SEMESTER-II)</b>	<b>4L:0T:0P</b>	<b>4 credits</b>
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**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 1 Measures of Central tendency and Dispersion 12**

Introduction – Scope and Limitations of Statistical methods Measures of Central tendency: Mean, Median, Mode .Measures of Dispersion- Range, Quartile Deviation, Mean Deviation, Standard Deviation and Coefficient of variation.

**UNIT II Correlation and Regression Analysis 12**

Introduction – Correlation: Types of Correlation, Scatter diagram method, Karl Pearson’s Coefficient of correlation, Spearman’s Rank Correlation Coefficient. Regression: Regression Lines and Regression equations and simple problems.

**UNIT III Testing of Hypothesis 12**

Introduction – Concept of Sampling and Sampling Distribution- Standard error – Tests of Significance for small samples: Student’s Distribution : Single- two sample and paired t-test, The F-test(variance –Ratio test) , Chi-Square tests for Goodness of Fit and test for independence of attributes in contingency table.

**UNIT IV Probability 12**

Introduction to Probability- Different approaches of Probability-Addition theorem, Multiplication theorem-Conditional probability- Baye’s theorem.

**UNIT V Probability Distribution 12**

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

**Total hours : 60**

**TEXT BOOKS:**

1. S.P. Gupta, Statistical Methods, 44<sup>th</sup> Edition, Sultan Chand & Sons,2014.

**REFERENCE BOOKS:**

1. P.R. Vittal and V. Malini, Statistical and Numerical Methods, Margham Publications,1<sup>st</sup> Edition,2007.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Applied Statistics, Sultan Chand & Sons, 3<sup>rd</sup> Edition, 2001.
3. Beri G, Business Statistics, Tata McGraw Hill Publishing Company Limited, 2009.

# **III SEMESTER**

## **23CBAL31 OBJECT ORIENTED PROGRAMMING LANGUAGES 4 0 0 4**

**Course Objective:** The course provides insight knowledge about object oriented programming concepts and programming language in C++ and JAVA.

### **UNIT I OBJECT ORIENTED PROGRAMMING AND BASICS OF C++ 12**

Principles Of Object Oriented Programming – Beginning With C++ - Applications Of C++ - Tokens –Keywords- Expressions – Data Types – Storage Classes – Operators –Manipulators- Type Cast Operator – Arrays –Strings-Control Structures – Operator Overloading -Functions In C++ - Function Prototyping – Call by Reference – Inline Functions –Recursion – Function Overloading – Friend And Virtual Function.

### **UNIT II CLASSES AND OBJECTS AND OPERATOR OVERLOADING 12**

Introduction – Classes And Objects – Constructors –Parameterized Constructors – Copy Constructor – Dynamic Constructors – Destructors – Introduction To Operator Overloading – Overloading Unary Operator – Overloading Binary Operator – Type Conversions.

### **UNIT III INHERITANCE AND POLYMORPHISM 12**

Introduction- Defining Derived Classes - Inheritance – Types Of Inheritance – Abstract Classes - Introduction to Virtual Functions - Pure Virtual Function-Polymorphism – Exception Handling.

### **UNIT IV JAVA INTRODUCTION, ARRAYS AND STRINGS 12**

Java Evolution - Overview Of Java Language – Constants – Variables – Data Types – Operators And Expressions – Class, Objects And Methods – Arrays, Strings And Vectors.

### **UNIT V PACKAGES AND MULTITHREADING 12**

Introduction – Java API Packages – Creating Packages – Accessing a Package – Adding a Class To a package – Multithreading – Creating Threads - Life Cycle of a Thread – Thread Exceptions –Inter –Thread Communication.

**Total: 60 Hours**

## **Reference Books**

1. Paul Deitel and Harvey Deitel, “C++ How to Program”, Ninth Edition, Prentice Hall, 2015.
2. Herbert Schildt, “Java The complete reference”, Eighth Edition, McGraw Hill Professional, 2011.
3. Balagurusamy E., “Object oriented programming using C++ and JAVA”, First Edition, Tata McGraw–Hill Education 2012.

## **Course Outcome:**

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

**CO-1:** Develop an in-depth understanding of functional, logic, and object-oriented programming paradigms

**CO-2:** An understanding of the concepts of inheritance and polymorphism and ability to overload operators in C++.

**CO-3:** An understanding of the difference between function overloading and function overriding

**CO-4:** An ability to incorporate exception handling in object-oriented programs

**CO-5:** An ability to use template classes and the STL library in C++

**Course Objective:**

This course aims to give students in depth information about system implementation techniques, data storage, representing data elements, database system architecture, the system catalog, query processing and optimization, transaction processing concepts, concurrency control techniques, distributed databases and client server architecture, advanced database concepts, and emerging technologies and applications.

**UNIT I DATABASE SYSTEM****12**

Introduction to Database System Database and Users: Introduction (Basic Concepts: Data, Database, Database systems, Database Management Systems), Characteristics of Database Approach, Actors on Scene, Workers behind the Scene, Advantages of using the DBMS approach Database System Concepts and Architecture: Data Models, Schemas, Instances, the three schema architectures and data independence, Database Languages and interfaces, Database System environment, Centralized and client / Server Architecture for DBMS, Classifications of Database Management Systems.

**UNIT II ER DIAGRAMS****12**

Entity Relationship Diagram Using high level conceptual data models for database design (Design Phases of database design), Entity types, Entity Sets, Attributes and keys, Relationship Types, Relationship sets, Roles and structural constraints, Weak entity Types, Refining the ER diagram for company Database, Entity Relationship Diagram Naming conventions Design issues, Example of other Notation: UML class diagram, Relationship types of degree higher than 2 Subclasses, Super Classes, Inheritance Specialization and Generalization Relational Database design by ER and EER

**UNIT III RELATIONAL DATABASES****12**

Informal Design Guidelines for Relational Schema, Functional Dependencies, Normal Forms based on Primary keys, General definitions of 1NF, 2NF and 3NF, Boyce-Codd Normal Forms (BCNF), Multi-valued Dependency and Fourth Normal Form. Relational Model concepts: Relational Model concepts, Relational Model constraints and Relational Database Schemas



#### **UNIT IV SQL & PL/SQL COMMANDS**

**12**

SQL Concepts :Basics of SQL, DDL,DML,DCL, structure – creation, alteration, defining constraints – Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions –numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. transaction control commands – Commit, Rollback, Savepoint. PL/SQL Concepts PL/SQL Block, Stored Procedures, Functions and Packages (Except Cursor Management)

#### **UNIT V MySQL OPERATIONS**

**12**

MySQL -connecting to and disconnecting from the server-Creating and selecting a Database-Creating a Table-Loading data into a table-Retrieving information from a table-Using MySQL in Batch Mode Grouping-Joins-Arithmetic and string functions-Advanced Functions-SET Operators-Creating Complex Queries-DML Operations-Insert, Update & Delete-TSQL

**Total : 60 Hours**

#### **Books for References:**

1. DateC.J,“AnIntroductiontoDatabaseSystems”,AddisonWesleyLongman,8thEdition,2003.
2. Catell, R.G.G., Barry, D.K., Berler, M., et al, “The Object Data Standard: ODMG 3.0”,Morgan Kaufmann,2000.
3. Silberschatz A., Korth H., and Sudarshan S, “Database System Concepts”, McGraw- Hill,6th Edition,2010.
4. CharlesF.Goldfarb,PaulPrescod,“TheXMLHandbook,PrenticeHall”,5thEdition, 2004.
5. Thomas M. Connolly, Carolyn Begg, “Database Systems: Practical approach toDesign, Implementation and Management”, Pearson Education Limited, 6th edition,2012.

#### **Web References:**

1. <https://vpmpce.wordpress.com/dbms-3330703/-sTUDY material>
2. <https://downloads.mysql.com/docs/mysql-tutorial-excerpt-5.7-en.pdf>

## **COURSE OUTCOME**

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

**CO-1:** Ability to define a problem at the view level & ability to understand the physical structure of the database to handle data.

**CO-2:** Ability to normalize the database & understand the internal data structure.

**CO-3:** Students would clearly understand the transaction system & could extract data efficiently.

**CO-4:** Make backup copies and recover the state of the DB after a system failure.

**CO-5:** Define links between databases on different nodes and work with the multiple databases

**Course Objectives:**

Provide an understanding of the basic mathematical elements of the theory of fuzzy sets. Provide an emphasis on the differences and similarities between fuzzy sets and classical sets theories. Explain the concepts of **neural networks**, fuzzy logic, and genetic algorithms.

**UNIT I BASIC LEARNING ALGORITHMS 12**

Biological Neuron – Artificial Neural Model - Types of activation functions – Architecture: Feed forward and Feedback – Learning Process: Error Correction Learning – Memory Based Learning – Hebbian Learning – Competitive Learning - Boltzman Learning – Supervised and Unsupervised Learning – Learning Tasks: Pattern Space – Weight Space – Pattern Association – Pattern Recognition – Function Approximation – Control – Filtering – Beam forming – Memory – Adaptation - Statistical Learning Theory – Single Layer Perceptron – Perceptron Learning Algorithm – Perceptron Convergence Theorem – Least Mean Square Learning Algorithm – Multilayer Perceptron – Back Propagation Algorithm – XOR problem – Limitations of Back Propagation Algorithm.

**UNIT II RADIAL-BASIS FUNCTION NETWORKS AND SUPPORT VECTOR MACHINES RADIAL BASIS FUNCTION NETWORKS 12**

Cover's Theorem on the Separability of Patterns - Exact Interpolator – Regularization Theory – Generalized Radial Basis Function Networks - Learning in Radial Basis Function Networks Applications: XOR Problem – Image Classification. **SUPPORT VECTOR MACHINES:** Optimal Hyper plane for Linearly Separable Patterns and Non separable Patterns – Support Vector - insensitive Loss Function – Support Vector Machine for Pattern Recognition – XOR Problem - Machines for Nonlinear Regression

**UNIT III COMMITTEE MACHINES AND NEURODYNAMICS SYSTEMS 12**

Ensemble Averaging - Boosting – Associative Gaussian Mixture Model – Hierarchical Mixture of Experts Model(HME) – Model Selection using a Standard Decision Tree – A

Priori and Post priori Probabilities – Maximum Likelihood Estimation – Learning Strategies for the HME Model – EM Algorithm – Applications of EM Algorithm to HME Model - Dynamical Systems – Attractors and Stability – Non-linear Dynamical Systems- Lyapunov Stability – Neuro dynamical Systems – The Cohen-Grossberg Theorem.

#### **UNIT IV ATTRACT OR NEURAL NETWORKS**

**12**

Associative Learning – Attractor Neural Network Associative Memory – Linear Associative Memory – Hopfield Network – Content Addressable Memory – Strange Attractors and Chaos- Error Performance of Hopfield Networks - Applications of Hopfield Networks – Simulated Annealing – Boltzmann Machine – Bidirectional Associative Memory – BAM Stability Analysis – Error Correction in BAMs - Memory Annihilation of Structured Maps in BAMS – Continuous BAMs – Adaptive BAMs – Applications

#### **UNIT V SELF ORGANISING MAPS AND PULSED NEURON MODELS**

**12**

Self-organizing Map – Maximal Eigenvector Filtering – Sanger’s Rule – Generalized Learning Law – Competitive Learning - Vector Quantization – Mexican Hat Networks - Self-organizing Feature Maps – Applications - Spiking Neuron Model – Integrate-and-Fire Neurons – Conductance Based Models – Computing with Spiking Neurons.

**TOTAL: 60 hours**

#### **Text Books :**

1. Nunes Da Silva, "Artificial Neural Networks A Practical Course", SPRINGER, ISBN-9783319431611 , January 2017
2. Satish Kumar, "Neural Networks: A Classroom Approach", Tata McGraw-Hill Publishing Company Limited, New Delhi, 2004.
3. Simon Haykin, "Neural Networks: A Comprehensive Foundation", 2ed., Addison Wesley Longman (Singapore) Private Limited, Delhi, 2001.

## **COURSE OUTCOME**

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

**CO-1:** Able to understand the Architecture of different neural networks.

**CO-2:** Understand about supervised learning and unsupervised learning.

**CO-3:** Understanding limitations of various learning algorithms.

**CO-4:** Provides knowledge about associative memory networks.

**CO-5:** Able to implement learning models for real life applications.

**Course Objective**

To enable students to critically analyze, design and create innovative products and solutions for the real life problems. To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and research oriented methodologies to tackle gaps.

**UNIT I PATTERN CLASSIFIER 12**

Overview of pattern recognition – Discriminant functions – Supervised learning – Parametric estimation – Maximum likelihood estimation – Bayesian parameter estimation – Perceptron algorithm – LMSE algorithm – Problems with Bayes approach – Pattern classification by distance functions – Minimum distance pattern classifier.

**UNIT II UNSUPERVISED CLASSIFICATION 12**

Clustering for unsupervised learning and classification – Clustering concept – C- means algorithm – Hierarchical clustering procedures – Graph theoretic approach to pattern clustering – Validity of clustering solutions.

**UNIT III STRUCTURAL PATTERN RECOGNITION 12**

Elements of formal grammars – String generation as pattern description – Recognition of syntactic description – Parsing – Stochastic grammars and applications – Graph based structural representation.

**UNIT IV FEATURE EXTRACTION AND SELECTION 12**

Entropy minimization – Karhunen – Loeve transformation – Feature selection through functions approximation – Binary feature selection.

**UNIT V RECENT ADVANCES AND CASE STUDY 12**

Neural network structures for Pattern Recognition – Neural network based Pattern associators – Unsupervised learning in neural Pattern Recognition – Self-organizing networks – Fuzzy logic – **CASE STUDY** : Fuzzy pattern classifiers – Pattern classification using Genetic Algorithms.

**Total: 60 Hours**

**Text Books:**

1. Earl Gose and Richard Johnsonbaugh and Steve Jost Pattern Recognition And Image Analysis (With Cd), 1st Edition, Pearson India ISBN-,9789332549791,2015.
2. Robert J.Schalkoff, “ Pattern Recognition Statistical, Structural and Neural Approaches”, John Wiley & Sons Inc., New York,1992.
3. Tou and Gonzales, “ Pattern Recognition Principles” , Wesley Publication Company, London,1974.

**Reference Books:**

1. DudaR.O.andHarP.E.,“PatternClassificationandSceneAnalysis”,Wiley,NewYork,1973.
2. Morton Nadier and Eric Smith P, “Pattern Recognition Engineering”, John Wiley & Sons, New York,1993.

**COURSE OUTCOME**

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

- CO-1:** Apply mathematical foundations, algorithmic principles and computer science theory in the modeling and design of computer based systems of varying complexity.
- CO-2:**Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health, safety, and sustainability in the field of computer engineering
- CO-3:** Critically analyze existing literature in an area of specialization and develop innovative and research oriented methodologies to tackle gaps identified.
- CO-4:** Apply performance evaluation methods for pattern recognition and critique comparisons of techniques made in the research literature.
- CO-5:** Implement simple pattern classifiers, classifier combinations and structural pattern recognizers.

**Course Objective:**

The purpose of this course is to introduce students to the field of programming using C++ and Java. Be able to use the Java SDK environment to create, debug and run simple Java programs.

1. Design C++ classes with static members, methods with default arguments.
2. Implement complex number class with necessary operator overloading and type conversions such as integer to complex, double to complex, complex to double etc using C++.
3. Manage bank account using inheritance concept using C++
4. Design stack and queue classes with necessary exception handling using C++.
5. Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc
6. Programs illustrating various data types in java.
7. Programs to implement method overloading in java.
8. Programs illustrating the implementation of various forms of inheritance (single, hierarchical, multilevel).
9. Programs to implement polymorphism and method overriding in java.
10. Programs implementing exception handling.
11. Programs to illustrate interfaces in java.
12. Programs to create package in java



**Course Objective**

The student learns to work in PL/SQL Cursors, Stored Procedures, Collections, Transactions and Error Handling. The students will also be able to implement Timestamp ordering Protocol and Deadlock Avoidance concepts.

1. Learning basic DDL, DML, DCL and TCL commands
2. Working with dual table.
3. PL/SQL-Data types, control structures.
4. Creating Stored Procedures with PL/SQL.
5. Error handling in PL/SQL.
6. Cursor Management in PL/SQL.
7. Writing Programs on Packages & Triggers.
8. PL/SQL – Collections
9. PL/SQL - Transactions
10. Embedding PL/SQL in high level language.
11. Implement Timestamp Ordering Protocol in PL/SQL.
12. Implement Deadlock Avoidance in PL/SQL.

# **IV SEMESTER**

**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 15**

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 15**

Neural Network Representation – Problems – Perceptron's – 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 15**

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 INSTANCE BASED LEARNING 15**

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

**UNIT V ADVANCED LEARNING 15**

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: 75 hours**

**Text Books:**

1. Mitchell , “Machine learning” , Tata Mcgraw Hill Education Private Limited ,ISBN 9781259096952,2013
2. Stephen Marsland, Taylor & Francis, “ Machine Learning: An Algorithmic Perspective”, 2nd Edition. Mit Press,2012.

**References:**

1. Understanding Machine Learning. Shai Shalev-Shwartz and Shai Ben-David. Cambridge University Press. 2017.[SS-2017]
2. The Elements of Statistical Learning. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Second Edition. 2009.[TH-2009]
3. Foundations of Data Science. Avrim Blum, John Hopcroft and Ravindran Kannan. January 2017.[AB-2017]
4. Pattern Recognition and Machine Learning. Christopher Bishop.Springer.2006.[CB-2006].

**COURSE OUTCOME**

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

**CO-1:** Develop an appreciation for what is involved in learning models from data.

**CO-2:** Understand how to evaluate models generated from data.

**CO-3:** Understanding limitations of various machine learning algorithms.

**CO-4:** Generate Report on the expected accuracy that can be achieved by applying the models.

**CO-5:** Able to implement deep learning models for language, vision, speech, decision making

**Course Objective**

Deep Learning has received a lot of attention over the past few years and has been employed successfully by companies like Google, Microsoft, IBM, Facebook, Twitter etc. To solve a wide range of problems in Computer Vision and Natural Language Processing. In this course we will learn about the building blocks used in these Deep Learning based solutions. Specifically, we will learn about feed forward neural networks, convolutional neural networks, recurrent neural networks and attention mechanisms. At the end of this course students would have knowledge of deep architectures used for solving various Vision and NLP tasks.

**UNIT I HISTORY OF DEEP LEARNING****12**

Deep Learning Success Stories- McCulloch Pitts Neuron- Thresholding Logic- Perceptrons - Perceptron Learning Algorithm - Multilayer Perceptrons (MLPs)- Representation Power of MLPs- Sigmoid Neurons - Gradient Descent – Feed forward Neural Networks - Representation Power of Feedforward Neural Networks – Feed Forward Neural Networks – Back propagation.

**UNIT II ALGORITHMS****12**

Gradient Descent (GD)- Momentum Based GD- Nesterov Accelerated GD- Stochastic GD – AdaGrad – RMSProp – Adam- Eigenvalues and eigenvectors - Eigenvalue Decomposition Basics - Principal Component Analysis and its interpretations – Singular Value Decomposition.

**UNIT III AUTO ENCODERS AND REGULARIZATION****12**

Autoencoders and relation to PCA - Regularization in autoencoders – Denoising autoencoders Sparse autoencoders - Contractive autoencoders - Regularization: Bias Variance Tradeoff - L2 regularization - Early stopping - Dataset augmentation - Parameter sharing and tying - Injecting noise at input - Ensemble methods – Dropout.

## **UNIT IV GREEDY LAYERS AND CONVOLUTIONAL NEURAL NETWORKS**

**12**

Greedy Layer Wise Pre-training - Better activation functions - Better weight initialization methods - Batch Normalization - Learning Vectorial Representations of Words - Convolutional Neural Networks - LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet - Visualizing Convolutional Neural Networks - Guided Backpropagation - Deep Dream, Deep Art - Fooling Convolutional Neural Networks

## **UNITV RECURRENT NEURAL NETWORKS AND APPLICATIONS**

**12**

Recurrent Neural Networks – Back Propagation Through Time (BPTT) - Vanishing and Exploding Gradients - Truncated BPTT, GRU, LSTMs - Encoder Decoder Models - Attention Mechanism - Attention over images - Applications: Vision, NLP, Speech.

**Total: 60 Hours**

### **Text Books:**

1. Ian Good fellow and Yoshua Bengio and Aaron Courville, “Deep Learning, An MIT Press book”, 2012.

### **Reference Books:**

1. Raúl Rojas, “Neural Networks: A Systematic Introduction” ,1996.
2. Christopher Bishop, “Pattern Recognition and Machine Learning”,2007.

## **Course Outcomes**

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

**CO-1:** Thoroughly Understanding the fundamentals of Deep Learning.

**CO-2:** To know the main variants of deep learning (such convolutional and recurrent architectures), and their typical applications.

**CO-3:** Able to visualize the Convolutional Neural Networks, and study vectorial representations of Words.

**CO-4:** Be able to design and implement deep neural network systems.

**CO-5:** Be able to structure and prepare scientific and technical documentation describing project Activities.

**Course Objective**

The Course provides the models, methods, and algorithms of statistical Natural Language Processing (NLP) for common NLP tasks, such as speech recognition, machine translation, spam filtering, text classification and spell checking.

**UNIT I OVERVIEW AND LANGUAGE MODELING****12**

Overview - Origins and challenges of NLP-Language and Grammar-Processing Indian Languages - NLP Applications-Information Retrieval - Language Modeling: Various Grammar - based Language Models - Statistical Language Model.

**UNIT II WORD LEVEL AND SYNTACTIC ANALYSIS****12**

WordLevelAnalysis-RegularExpressions-Finite-StateAutomata-MorphologicalParsing  
- Spelling Error Detection and correction - Words and Word classes - Part-of Speech Tagging.  
Syntactic Analysis-Context-free Grammar-Constituency-Parsing- Probabilistic Parsing.

**UNIT III SEMANTIC ANALYSIS AND DISCOURSE PROCESSING****12**

Semantic Analysis - Meaning Representation - Lexical Semantics – Ambiguity - Word Sense Disambiguation - Discourse Processing – cohesion - Reference Resolution - Discourse Coherence and Structure.

**UNIT IV NATURAL LANGUAGE GENERATION AND MACHINETRANSLATION**

Natural Language Generation - Architecture of NLG Systems - Generation Tasks and Representations - Application of NLG. Machine Translation - Problems in Machine Translation - Characteristics of Indian Languages - Machine Translation Approaches - Translation involving Indian Languages.

**UNIT V CASE STUDY AND INFORMATION RETRIEVAL****12**

Information Retrieval - Design features of Information Retrieval Systems – Classical - Non-classical - Alternative Models of Information Retrieval – case study on valuation Lexical Resources, World Net – Frame Net - Stemmers - POS Tagger – Research Corpora.

**Total: 60 Hours**



**Text Books:**

1. Tanveer Siddiqui, U.S. Tiwary, “Natural Language Processing and Information Retrieval”, Oxford University Press,2012.

**Reference Books:**

1. Daniel Jurafsky and James H Martin, “Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition”, 2nd Edition, Prentice Hall,2008.

2. James Allen, “Natural Language Understanding”, 2nd edition, Benjamin Cummings publishing company, 1995.

**Course Outcomes**

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

**CO-1:** An ability to apply core computer science concepts and algorithms, such as dynamic programming.

**CO-2:** Can apply the methods to new NLP problems and will be able to apply the methods to problems outside NLP.

**CO-3:** The student will be familiar with some of the NLP literature and will read and suggest improvements to published work.

**CO-4:** To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, and pragmatics, as well as the resources of natural language data.

**CO-5:** To demonstrate understanding of human languages and be familiar with the most main stream descriptive and theoretical frameworks for handling their properties

**Course Objective**

To understand the fundamentals of Internet of Things and to apply the concepts in Real World Scenario.

**UNIT I OVERVIEW 12**

IoT-An Architectural Overview- Building an architecture - Main design principles and needed capabilities - An IoT architecture outline - Standards considerations.

**UNIT II M2M AND IOT TECHNOLOGY FUNDAMENTALS 12**

Devices and gateways- Local and wide area networking- Data management- Business processes in IoT- Everything as a Service(XaaS) -M2M and IoT Analytics – Knowledge Management.

**UNIT III REFERENCE ARCHITECTURE 12**

Introduction - IoT reference Model - IoT Reference Architecture-Functional View- Information View- Deployment and Operational View- Other Relevant architectural views.

**UNIT IV REAL-WORLD DESIGN CONSTRAINT 12**

Introduction- Technical Design constraints - Data representation and visualization, Interaction and remote control. IoT systems management - IoT Design Methodology - specifications - Integration and Application Development.

**UNIT V CASE STUDY 12**

Case Study - Various Real time applications of IoT- Connecting IoT to cloud - Cloud Storage for Iot-Data Analytics for IoT-Software & Management Tools for IoT.

**Total Hours: 60 hours**

**Text Boks:**

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Aves and, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to New Age of Intelligence”, 1stEdition, Academic Press, 2014.

**Reference Books:**

1. Peter Waher, “Learning Internet of Things”, PACKT publishing, Birmingham, Mumbai,2005.
2. Arshdeep Bahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press,2012.

**Course Outcome**

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

**CO-1:** To assess the vision and introduction of IoT and to understand IoT Market perspective

**CO-2:** To Implement Data and Knowledge Management and use of Devices in IoT technology.

**CO-3:** To understand where the IoT concept fits within the broader ICT industry and possible future Trends

**CO-4:** To Understand and be able to explain the role of big data, cloud computing and data analytics in a typical IoT system.

**CO-5:** Apply effective techniques to create IoT based projects.

**Course Objective:** Learn how to build a data warehouse and query it. Also obtain Practical Experience Working with all real data sets using WEKA.

1. Build Data Warehouse and Explore WEKA
2. Perform data preprocessing tasks.
3. Demonstration of preprocessing on dataset labor.arff
4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
5. Demonstration of Association Rule process on dataset contact lenses.arff using apriori algorithm
6. Demonstrate performing Regression on datasets
7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
8. Demonstration of classification rule process on dataset student.arff using j48 Algorithm
9. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
10. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
11. Demonstration of clustering rule process on dataset iris.arff using simplek-means
12. Demonstration of clustering rule process on dataset student.arff using simple kmeans

# **V SEMESTER**



## **UNIT V: TOOL BOXES**

**12**

Simulink – Simulink model for a dead zone system, nonlinear system – Applications in DSP – Computation of DFT & FFT – Filter structure – IIR & FIR filter design – Applications in Communication PCM, DPCM, DM, DTMF- Interfacing of Matlab with event driven simulators.

**TOTAL: 60 Hours**

### **Text books**

1. MATLAB & Simulink Student Version Release 14, ISBN 0-9755787-2- 3, Prentice Hall (December 17, 2004)
2. MATLAB Student Version Release 13, Published by MathWorks (2002). ISBN 10: 0967219590 ISBN 13: 9780967219592.

### **Web Resources**

1. <http://www.glue.umd.edu/~nsw/ench250/matlab.htm>.
2. <http://www.mathworks.com/>

## **COURSE OUTCOME**

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

CO1: To understand features of MATLAB as a programming tool..

CO2: Able to learn Matlab for script and functions and file management

CO3: Use basic flow controls and logical operators.

CO4: To understand miscellaneous MAT lab functions & Variables.

CO5: Able to generate plots and exports this for use in reports and presentation.

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**BIG DATA ANALYTICS**

**4 0 0 4**

**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 BIGDATA**

**12**

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**

**12**

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**

**12**

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 AND FRAMEWORKS**

**12**

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop - Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming - Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications Case Studies -



Real Time Sentiment Analysis, Stock Market Predictions.

### **UNIT V CASE STUDY**

**12**

Case study : walmart - uber – Netflix – eBay - :Procter and Gamble – Travel and Tourism  
– Telecom Industry.

**TOTAL: 60Hours**

#### **TextBooks for References:**

1. Maheswari, “ Data Analytics”, McGraw Hill, 1 st Edition,2017.
2. StephanKudyba, Big Data, Mining, and Analytics: Components of Strategic Decision Making,Auerbach Publications, March 12,2014.
3. Michael Minelli (Author), Michele Chambers (Author), AmbigaDhiraj (Author), Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley Publications,2013.

#### **COURSE OUTCOME**

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

- CO-1:** Understand the fundamental concepts of big data platform and know about the basic concepts of nature and evolution of big data.
- CO-2:** Understand the data streams concepts and stream computing.
- CO-3:** Learn about the advanced analytics techniques to gain knowledge of latest techniques.
- CO-4:** Become skilled at analyzing, scaling and streaming of Hadoop.
- CO-5:** Understand the framework of Visual data analysis techniques, interaction techniques.

**Course Objective:** To make students understand fundamentals of Machine vision system, Industrial vision system and image fundamentals and how digital images can be processed, fundamentals of computer vision, geometrical features of images, object recognition and application of machine vision applications in manufacturing, electronics etc.

**UNIT I INTRODUCTION TO MACHINE VISION SYSTEM 12**

Machine vision: Introduction, definition, Human visual system, Active vision system, Machine vision components, hardware's and algorithms, image function and characteristics, segmentation, data reduction, feature extraction, edge detection, image recognition and decisions, m/c learning, application of machine vision such as in inspection of parts, identification

**UNIT II INDUSTRIAL MACHINE VISION SYSTEM 12**

Industrial M/C vision: Industrial machine vision in production and services, structure of industrial m/c vision, generic standards, rules of thumb, illumination, optics, image processing, interfacing machine vision system, vision system calibration, industrial robot control, mobile robot application, Competing technologies, CCD line scan and area scan sensor, Videcon and other cameras, Triangulation geometry, resolution passive and active stereo imaging, laser scanner, data processing.

**UNIT III IMAGE PROCESSING 12**

Image processing: Machine Vision Software, Fundamentals of Digital Image, Image Acquisition Modes, Image Processing in Spatial and Frequency Domain, Point Operation, Thresholding, Grayscale Stretching, Neighborhood Operations, Image Smoothing and Sharpening, Edge Detection, Binary Morphology Color image processing. Image analysis: Feature extraction, Region Features, Shape and Size features, Texture Analysis, Template Matching and Classification, 3D Machine Vision Techniques, Decision Making.

**UNIT IV COMPUTER VISION 12**

Computer Vision: Imaging Geometry, Coordinate transformation and geometric warping for image registration, Hough transforms and other simple object recognition methods, Shape correspondence and shape matching, Principal Component Analysis, Shape priors for recognition.

## UNIT V CASE STUDY

12

Machine vision applications: Machine vision applications in manufacturing, electronics, printing, pharmaceutical, textile, applications in non-visible spectrum, metrology and gauging, OCR and OCV, vision guided robotics, Field and Service Applications, Agricultural, and Bio medical field, augmented reality, surveillance, bio-metrics.

**TOTAL: 60 Hours**

### Books for Study

- a. Beyerer j , “Machine Vision Automated Visual Inspection Theory Practice And Applications” , SPRINGER,ISBN - 9783662477939,2015
- b. SonkaM.,“ImageProcessingandMachineVision”,PrenticeHall,,3rded.2013
- c. Rafael C.Gonzales, Richard. E.Woods, “Digital Image Processing Publishers”, Third Edition,2007
- d. Alexander Hornberg, “Handbook of Machine Vision”, FirstEdition,2006.
- e. Gonzalez, R.C., and Woods, R.E., “Digital Image Processing “, Dorling Kingsley 2009, 3rdedition.

### References:

1. JainA.K.,“FundamentalsofDigitalImageProcessing”,PrenticeHall,2007.
2. Emanuele Trucco, Alessandro Verri, “Introductory Techniques For 3D Computer Vision”, First Edition,2009.
3. D.ForsythandJ .Ponce, “Computer Vision-A Modern Approach”, Prentice Hall.

### COURSE OUTCOME

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

**CO-1:** To understand the basic theories of Machine Vision System.

**CO-2:** Study about the interfacing of vision system, expertise in robot control and applications.

**CO-3:** Expertise the Image smoothening and sharpening techniques and learn about image morphology.

**CO-4:** Identify geometrical features of images, object recognition and application of real time image processing.

**CO-5:** Apply the machine vision system application in manufacturing, electronics and Pharmaceutical fields.

**Course Objective:**

This course will give the fundamental knowledge and practical abilities in MATLAB required to effectively utilize this tool in technical numerical computations and visualization. To acquaint yourself with the statistics method and simulation tool boxes

1. MATLAB Software, Basic Features, Tool Box And Different Functions
2. To Learn Arithmetic, Relational And Logic Operator
3. Matrix Formation And Its Manipulation
4. Vector Manipulation
5. To Get Familiar With Plotting Commands Used In MATLAB
6. To Plot A Unit Circle
7. To Plot Signals Using Impulse, Step, Ramp Functions
8. To Plot A Sine And Cosine Wave
9. Verification Of Superposition Theorem
10. Verification Of The venin's Theorem
11. Simulation Of A Half Wave Uncontrolled Rectifier
12. Simulation Of 1-Phase Full Bridge Controlled Rectifier

# **VI SEMESTER**

**Course Objectives:** The objective of this course is to provide comprehensive knowledge of python programming paradigms required for Data Science.

**UNIT I INTRODUCTION TO PYTHON 12**

Structure of Python Program-Underlying mechanism of Module Execution-Branching and Looping- Problem Solving Using Branches and Loops-Functions - Lists and Mutability- Problem Solving Using Lists and Functions.

**UNIT II SEQUENCE DATA TYPES AND OBJECT-ORIENTED PROGRAMMING 12**

Sequences, Mapping and Sets- Dictionaries- -Classes: Classes and Instances-Inheritance- Exceptional Handling-Introduction to Regular Expressions using “re” module.

**UNIT III USING NUMPY 12**

Basics of NumPy-Computation on NumPy-Aggregations-Computation on Arrays- Comparisons, Masks and Boolean Arrays-Fancy Indexing-Sorting Arrays-Structured Data:NumPy’s Structured Array.

**UNIT IV DATA MANIPULATION WITH PANDAS –I 12**

Introduction to Pandas Objects-Data indexing and Selection- Operating on Data in Pandas- Handling Missing Data-Hierarchical Indexing - Combining Data Sets.

**UNIT V DATA MANIPULATION WITH PANDAS –II AND CASE STUDY 12**

Aggregation and Grouping-Pivot Tables-Vectorized String Operations -Working with Time Series- High Performance Pandas-eval() and query()- VISUALIZATION AND MATPLOTLIB: Basic functions of matplotlib-Simple Line Plot, Scatter Plot-Density and Contour Plots-Histograms, Binnings and Density-Customizing Plot Legends, Colour Bars- Three-Dimensional Plotting in Matplotlib. Case Study: Data Science Pharmaceutical Industries, BioTech, and Education.

**Total : 60 Hours**

**Text Books:**

1. Jake Vander Plas ,Python Data Science Handbook - Essential Tools for Working with Data, O'ReilyMedia,Inc,2016.
2. Zhang.Y ,An Introduction to Python and Computer Programming, Springer Publications, 2016. Joel Grus, Data Science from Scratch First Principles with Python, O'Reilly Media,2016.
3. T.R.Padmanabhan, Programming with Python,SpringerPublications,2016.

**COURSE OUTCOME**

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

**CO-1:** To demonstrate significant experience with python program development Environment

**CO-2:** To implement numerical programming, data handling through NumPy Modules.

**CO-3:** To Clean and prepare data for analysis

**CO-4:** To Summarize Data

**CO-5:** To Build Machine Learning models using Scikit-Learn





**Unit V CONTENT-BASED RECOMMENDATION****12**

High level architecture of content-based systems, Advantages and drawbacks of content based filtering, Item profiles, Discovering features of documents, Obtaining item features from tags, Representing item profiles, Methods for learning user profiles, Similarity based retrieval, Classification algorithms.

**Total: 60 Hours****Text Books:**

1. Bing Liu, Web Data Mining: Exploring Hyperlinks, Content, and Usage Data, 2nd Edition, Springer,2011
2. Soumen Chakrabarti, Mining the Web, Morgan-Kaufmann, first edition,2002  
JannachD., ZankerM. and FelFeringA., Recommender Systems: An Introduction, Cambridge University Press(2011),1sted.

**Web Resources:**

1. <https://www.kdnuggets.com/2014/09/most-viewed-web-mining-lectures-videolectures.html>
2. <https://www.cs.uic.edu/~liub/WebContentMining.html>

**COURSE OUTCOME**

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

**CO-1:** To learn various techniques to mine the Web and other information networks,

**CO -2:** To learn to apply the appropriate technique for data analysis

**CO-3:** To learn how to extract knowledge from web scale datasets by various techniques.

**CO -4:** To be familiar with classic and recent developments in Web search and web data Mining.

**CO -5:** To develop state-of-the-art recommender systems that automates a variety of choice- making strategies

**Course Objective:**

The main goal of this course is to help students learn, understand, and practice big data analytics and machine learning approaches for data science. The students implement Algorithms such as Decision trees, SVM, KNN, Naïve Bayes.

1. Functions in Python Libraries using Numpy.
2. Functions in Python Library using Pandas.
3. Functions in Python Library using Scikit
4. Perform Data exploration and preprocessing in Python
5. Implement regularized Linear regression
6. Implement Naive Bayes classifier for dataset stored as CSV file.
7. Implement regularized logistic regression
8. Build models using different Ensembling techniques
9. Build models using Decision Trees
10. Build model using SVM with different kernels
11. Implement K-NN algorithm to classify dataset.
12. Build model to perform Clustering using K-means after applying PCA and determining the value of K using Elbow Method.

**Syllabus**  
**Discipline Specific Electives**  
**(DSE)**

**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 9**

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 9**

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

**UNIT III WIRELESS LAN 9**

IEEE S02.11: System Architecture-Protocol Architecture, Physical Layer, 802.11b and 802.11a– Hiper LAN: WATM, BRAN, HIPERLAN 2 – Bluetooth: User Scenarios, Architecture, Radio Layer, Baseband Layer, Link Manager Protocol, L2CAP, Security, SDP-Security and Link Management.

**UNIT IV MOBILE NETWORK LAYER 9**

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

**UNIT V MOBILE TRANSPORT LAYER 9**

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: 45 Hours**

**Books for References:**

1. J. Schiller , “Mobile Communications”, Pearson Education, Delhi, 2nd edition,2013.
2. Principles of Mobile Computing, Hansmann, Merk, Nicklous, Stober, 2nd Edition, Springer India),2004.
3. Principle of wireless Networks: A unified Approach, Pahalavan, Krishnamurthy, Pearson Education, Delhi,2003.
4. Mobile and Wireless Design Essentials, Martyn Mallick, Wiley Dreamtech India Pvt. Ltd., New Delhi,2004.
5. Wireless Communications and Networks, W.Stallings, 2nd Edition, Pearson Education, Delhi,2004.

**COURSE OUTCOME**

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

**CO-1:** Learn to model radio signal propagation issues and analyze their impact on communication system performance.

**CO-2:** To understand how the various signal processing and coding techniques of GSM and its Architecture.

**CO- 3:** To have depth knowledge about various wireless LAN techniques.

**CO-4:** To understand the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.

**CO-5:** To provide the student with an understanding of advanced multiple access techniques.

**Course Objective:** To understand the fundamentals of Cryptography, acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity. To understand the various key distribution and management schemes and to explore how to deploy encryption techniques to secure data in transit across data networks.

**UNIT I INTRODUCTION & NUMBER THEORY 9**

Services, Mechanisms and attacks-the OSI security architecture-Network security model-Finite Fields and Number Theory: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm - Finite fields - Polynomial Arithmetic – Prime numbers - Fermat's and Euler's theorem -Testing for primality –The Chinese remainder theorem- Discrete logarithms.

**UNIT II BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY 9**

Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.

**UNIT III HASH FUNCTIONS AND DIGITAL SIGNATURES 9**

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature & authentication Protocols.

**UNITIV SECURITY PRACTICE & SYSTEM SECURITY 9**

Authentication applications – Kerberos – X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles–Trusted systems.

## **UNITV CASE STUDY ON E-MAIL, IP WEB SECURITY**

**9**

E-mail Security: Security Services for E-mail-attacks possible through E-mail - establishing keys privacy - authentication of the source - Message Integrity - Non-repudiation - Pretty Good Privacy - S/MIME. IP Security: Overview of IPsec - IP and IPv6 - Authentication Header - Encapsulation Security Payload (ESP) - Web Security: SSL/TLS Basic Protocol-computing the keys - Encoding- Secure Electronic Transaction (SET).

**Total: 45 Hours**

### **Books for References:**

1. William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education, March 2013.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002.
3. Bernard Menezes, "Network Security and Cryptography", Cengage Learning, India Edition, 2010.
4. Behrouz A. Forouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", Tata McGraw Hill Second Edition, 2010.

### **COURSE OUTCOME**

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

**CO-1:** Identify computer and network security threats, classify the threats and develop a Security model to prevent, detect and recover from the attacks.

**CO-2:** Knowledge and understanding of Basics of number theory, Key management, Public key cryptosystems, Message authentication, Hash functions and algorithms.

**CO-3:** Will develop their skills in the programming of symmetric and/or asymmetric ciphers and their use in the networks.

**CO-4:** Develop SSL or Firewall based solutions against security threats, employ access Control Techniques to the existing computer platforms such as Unix and Windows NT.

**CO-5:** Identify E-mail-attacks and establishing keys privacy E-Mail attacks.

**Course Objective:** This course introduces the basic concepts of Data Mining and Warehousing. It gives in depth knowledge of data modelling strategy, Data Mining Algorithms, Knowledge Discovery in databases and web mining and the utilization of dataware housing.

**UNIT I FUNDAMENTALS****9**

DATA PROCESSING: Data Mining – History – Strategies – Techniques – Applications – Challenges –Future- Types of Data – Data Warehouses – Data Processing - Quality Measure – OLAP – Data Mining Algorithms - Feature Extraction, Selection and construction – Missing Data and Techniques.

**UNIT II WEKA TOOL****9**

Introduction – Installation- Visualization – filtering- selecting attributes- other popular packages. Classification Task: Introduction – Decision trees – Naïve Bayes’ classification- Artificial Neural Networks and Support Vector Machines.

**UNIT III MODEL EVALUATION TECHNIQUES****9**

Accuracy Estimation- ROC-Lift Charts- Cost – Bagging and Boosting- Model Ranking Approach. ASSOCIATION RULE MINING: Concepts, Relevance, Functions of Association rule Mining – Apriori Algorithm- Strengths and Weaknesses of ARM- Applications.

**UNITIV DATA WARE HOUSING****9**

Need for strategic information, Decision support system, knowledge discovery & decision making, need for data warehouse, definitions of Data warehousing and data mining, common characteristics of Data warehouse, Data Marts, Metadata, Operational versus analytical databases, trends and planning of Data warehousing.

**UNIT V DEFINING BUSINESS REQUIREMENTS AND CASE STUDY****9**

Defining business requirements, Data modeling strategy, Fact tables, dimensions, Star schema and other schemas, Multi dimensional data models, Data Cube presentation of fact tables, using the Data warehouse, Designing tools for Data warehouse, OLAP models and operations.

**Total: 45 Hours**



**Books for References:**

1. Shawkat Ali A B M, Saleh A. Wasimi, “Data Mining: Methods and Techniques”, Third Indian Reprint, Cengage Learning,2010.
2. Soman K. P., ShyamDiwakar, Ajay V. “Insight into Data Mining Theory and Practice” , Fifth Printing, PHI Learning,2011.
3. <https://www.cs.waikato.ac.nz/ml/weka/citing.html>
4. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, the Morgan Kaufmann Series in Data Management Systems, 3rd Edition,2012.
5. Introduction to Data Mining, Michael Steinbach, Pang-Ning Tan, and Vipin Kumar, Pearson publication,2nd Edition,2016.
6. Data Warehousing Fundamentals , Paulraj Ponnian, John Wiley,3rd Edition,2004.
7. Introduction to Business Intelligence and Data Warehousing, PHI,2002.

**COURSE OUTCOME**

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

- CO-1:** To understand basic terms of data mining and algorithms to apply for real world business peoples.
- CO-2:** Install weka tool and apply the attributes in the existing algorithms and check the results.
- CO-3:** To understand basic terms of data mining and algorithms to apply for real world business peoples.
- CO-4:** To understand basic data warehouse structure and to learn how to gather and analyze large sets of data to gain useful business understanding.
- CO-5:** To study about various data modeling strategy and create multidimensional models.

**Course Objective:** This course introduces the fundamental concepts of cloud computing, its services and Tools. Analyze the comparative advantages and disadvantages of cloud computing.

**UNIT I CLOUD COMPUTING 9**

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 9**

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– GoogleAppEngine–IBM Clouds.

**UNIT III CENTRALIZING EMAIL COMMUNICATIONS 9**

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

**UNIT IV COLLABORATING ON CALENDARS SCHEDULES AND TASK MANAGEMENT 9**

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 9**

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

**Total: 45 Hours**

**Books for References:**

1. Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August2008.
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, July2008.

**COURSE OUTCOME**

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

**CO-1:** Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.

**CO-2:** Analyze Cloud infrastructure including Google Cloud and Amazon Cloud.

**CO-3:** Analyze authentication, confidentiality and privacy issues in cloud computing environment.

**CO-4:** Access the cloud database, analyze how to store and share data with privacy.

**CO-5:** Determine financial and technological implications for selecting cloud computing platforms.

**Course Objective:**

This course covers the technical aspects of public distributed ledgers, blockchain systems, crypto currencies, and smart contracts. Students will learn how these systems are built, how to interact with them, how to design and build secure distributed applications.

**UNIT-I BLOCK CHAIN BASICS 9**

Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof positions.

**UNIT-II INTRODUCTION TO BLOCKCHAIN 9**

Introduction, Advantage over conventional distributed database, Block chain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Block chain application, Soft & Hard Fork, Private and Public block chain.

**UNIT-III DISTRIBUTED CONSENSUS AND CRYPTO CURRENCY 9**

Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate. History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin.

**UNIT-IV CRYPTO CURRENCY REGULATION 9**

Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Block chain.

## UNIT V CASE STUDY ON BLOCKCHAIN

9

Case study on Naive Blockchain construction, Memory Hard algorithm – Hash cash implementation, Direct Acyclic Graph, Play with Go-ethereum, Smart Contract Construction, Toy application using Blockchain, Mining puzzles

**Total: 45 Hours**

### **Books for References:**

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19,2016).
2. Draft version of “S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, ‘Blockchain Technology: Cryptocurrency and Applications’, Oxford University Press,2019.
3. Josh Thompson, ‘Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming’, Create Space Independent Publishing Platform,2017.

### **WEB RESOURCES:**

1. <https://www.blockchainexpert.uk/book/blockchain-book.pdf>
2. [https://users.cs.fiu.edu/~prabakar/cen5079/Common/textbooks/Mastering\\_Blockchain\\_2nd\\_Edition.pdf](https://users.cs.fiu.edu/~prabakar/cen5079/Common/textbooks/Mastering_Blockchain_2nd_Edition.pdf)
3. [https://www.gsb.stanford.edu/sites/gsb/files/publication-pdf/study-blockchain-impact-moving-beyond-hype\\_0.pdf](https://www.gsb.stanford.edu/sites/gsb/files/publication-pdf/study-blockchain-impact-moving-beyond-hype_0.pdf)
4. [https://www.lopp.net/pdf/princeton\\_bitcoin\\_book.pdf](https://www.lopp.net/pdf/princeton_bitcoin_book.pdf)
5. <https://bitcoinbook.cs.princeton.edu/>
6. <https://www.icaew.com/technical/technology/blockchain/blockchain-articles/blockchain-case-studies#asset>
7. <https://consensys.net/blockchain-use-cases/>
8. [https://medium.com/@dejanjovanovic\\_24152/blockchain-case-studies-2271d37d3ed](https://medium.com/@dejanjovanovic_24152/blockchain-case-studies-2271d37d3ed)

## **COURSE OUTCOME**

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

**CO-1:** Stating block chain technologies basics are made possible through learning Distributed Database and various types of database

**CO-2:** Stating the Mining strategies followed in block chain teach the basic architecture behind the perfect building of block chain for industries.

**CO-3:** Describing the history behind the block chain and learning about Vulnerability, Attacks and Side chain gives an additional support for creating a secured block chain.

**CO-4:** Recognizing some of latest crypto currency aspects leads students to understand some of basic concepts of Black Market and Global Economy.

**CO-5:** Develop the acquired knowledge in solving the problem in existing case studies.

**COURSE OBJECTIVES:**

This course introduces the basic concepts and types of NoSQL Databases and also gives the understanding of the detailed architecture, define objects, load data, query data of the Column- Oriented and Document Oriented NoSQL databases.

**UNIT I INTRODUCTION TO NOSQL****9**

Overview and History of NoSQL Databases, Definition of the Four Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points.

**UNIT II NOSQL AND RELATIONAL DATABASE****9**

Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases.

**UNIT III REPLICATONANDSHARDING****9**

Replication and sharing, Map Reduce on databases. Distribution Models, Single Server, Sharing, Master- Slave Replication, Peer-to-Peer Replication, Combining Sharing and Replication.

**UNIT IV NOSQL KEY/VALUE COLUMN-ORIENTED DATABASES****9**

NoSQL Key/Value databases using MongoDB, Document Databases, Features, Consistency, Transactions ,Availability, Query Features, Scaling, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure. Column-oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, Column-Family DataStore, Features, Consistency, Transactions, Availability, Query Features ,Scaling.

## UNIT V CASE STUDY

9

A study on emergence of NoSQL- A study on uses of Relational database over NoSQL- A study on Replication and sharding – A study on Column-oriented NoSQL databases using Apache casendra– A study on Mongo DB with NoSQL

**Total Hours: 45**

### **Text Books:**

1. NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Sadalage, P. & Fowler, Publication: Pearson Education

### **Reference Book:**

1. Redmond, E. & Wilson, Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement Edition: 1st Edition.

## **COURSE OUTCOME**

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

**CO-1:** To know the History and Overview of NoSQL databases.

**CO-2:** To understand the difference between RDBMS and NoSQL.

**CO-3:** To understand the concepts of Sharding and Replication.

**CO-4:** To know about the concepts of Column Oriented Databases using Apache HBASE.

**CO-5:** To enable to create NoSQL database using different bases.



**Course Objective:**

This course introduces the basic concept of machine learning, types of machine learning, security issues and possible solutions to ensure machine learning security, advanced learning techniques and case study on machine learning.

**UNIT I INTRODUCTION TO MACHINE LEARNING 9**

Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised, Unsupervised, Reinforced learning, Introduction to Bayes Theorem, Linear Regression- model assumptions, regularization (lasso, ridge, elastic net)

**UNIT II CLASSIFICATION AND REGRESSION ALGORITHMS 9**

Classification and Regression algorithms- Naïve Bayes, K-Nearest Neighbors, logistic regression, support vector machines (SVM), decision trees, and random forest, Classification Errors, Analysis of Time Series- Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Neural Networks Learning And Generalization, Overview of Deep Learning.

**UNIT III SECURITY IN MACHINE LEARNING 9**

Security Vulnerabilities in Machine Learning Algorithms, Evasion Attacks (Adversarial Inputs), Data Poisoning Attacks, Model Stealing Techniques, Possible Solutions to Ensure Machine Learning Security

**UNIT IV ADVANCED LEARNING 9**

Sampling-Basic Sampling methods, Monte Carlo, Gibbs Sampling – Computational Learning Theory – Mistake Bound Analysis – Reinforcement learning – Markov Decision processes, Deterministic and Non- deterministic Rewards and Actions, Temporal Difference Learning Exploration.

## UNIT V CASE STUDY

9

Possible case studies: Machine learning for intrusion detection, Machine learning for side channel analysis, Privacy preserving machine learning, Adversarial machine learning.

**Total: 45 Hours**

### **Books for References:**

1. Christopher Bishop, "Pattern Recognition and Machine Learning" Springer,2007.
2. Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012.
3. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Third Edition, 2014.
4. Tom Mitchell, "Machine Learning", McGraw-Hill, 1997.
5. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning", Springer, Second Edition, 2011.
6. Stephen Marsland, "Machine Learning - An Algorithmic Perspective", Chapman and Hall/CRC Press, Second Edition, 2014.

### **COURSE OUTCOME**

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

**CO-1:** To appreciate supervised and unsupervised learning and their applications

**CO-2:** To understand the classification and regression algorithm techniques.

**CO-3:** To appreciate the concepts and algorithms of reinforcement learning.

**CO-4:** To understand the possible solutions to ensure machine learning security.

**CO-5:** To appreciate the concepts and algorithms of reinforcement learning.

**Course Objective**

To familiarize the students with Computational learning basics and to implement advanced learning techniques to the cloud environment and provide security to the cloud using machine learning techniques.

**UNIT I COMPUTATIONAL LEARNING THEORY BASICS 9**

Introduction: Types of Learning - Designing a learning system – concept learning - Find-s – Candidate Elimination - PAC Learn ability- Sample complexity for finite and Infinite hypothesis spaces-VC Dimension- Evaluating Hypothesis - Estimating Hypothesis Accuracy - Error Estimation - Bias-Variance - Confidence Interval - Central Limit Theorem.

**UNIT II ADVANCED LEARNING 9**

Sampling – Basic sampling methods – Monte Carlo. Reinforcement Learning- K-Armed Bandit- Elements - Model-Based Learning- Value Iteration- Policy Iteration. Temporal Difference Learning- Exploration Strategies- Deterministic and Non-deterministic Rewards and Actions- Eligibility Traces- Generalization- Partially Observable States- The Setting- Example. Semi - Supervised Learning. Computational Learning Theory - Mistake bound analysis, sample complexity analysis, VC dimension. Occam learning, accuracy and confidence boosting.

**UNIT III CLOUD TECHNOLOGIES 9**

Infrastructure as a service: Amazon EC2 - Platform as Service: Google App Engine, Microsoft Azure Amazon AWS , Aneka – Software as a service : RESTful Web Services – SLA- Cloud Storage: MapReduce, GFS, HDFS, Hadoop Framework-Cloud container: Docker.

**UNIT IV CLOUD SECURITY 9**

Infrastructure Security: Network level, Host level and Application level –Data Security- Identity and access Management: Architecture and Practices - Security Management in the Cloud – Availability management- access Control.

Collaborating on Calendars, Schedules and Task Management – 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. Case Study: Collaborating via Web-Based Communication Tools – Evaluating Web Mail Services – Evaluating Web Conference Tools – Collaborating via Social Networks and Groupware – Collaborating via Blogs and Wikis

**Total: 45 Hours**

**Text Books:**

1. Christopher Bishop, “Pattern Recognition and Machine Learning”, Springer-Verlag New York, 2013.
2. Tom M. Mitchell, “Machine Learning”, McGraw Hill, 1997.
3. Rajkumar Buyya, Christian Vecchiola and Thamarai Selvi S, “Mastering Cloud Computing”, Tata McGraw Hill Education Private Limited, New Delhi, 2013.

**References:**

1. Yaser S. Abu Mostafa, Malik Magdon Ismail, HsuanTien Lin, “Learning From Data A Short Course”, Amlbook.Com, 2012.
2. Tim Mather, Subra Kumaraswamy and Shahid Latif, “Cloud Security and Privacy: An Enterprise Perspective on Risk And Compliance”, O'Reilly, USA, 2011.
3. 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, Jul 2008.
4. Stephen Marsland, “Machine Learning –An Algorithmic Perspective”, CRC Press, 2009.

## **COURSE OUTCOME**

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

**CO-1:** Understand the types of learning and Designing a learning system.

**CO-2:** Understanding about Computational learning theory.

**CO-3:** Apply different types of cloud technologies,

**CO-4:** Exploring Online Scheduling Applications.

**CO-5:** Identify applications suitable for different types of machine learning with suitable justification.

**Course Objective**

To enable the students to understand the Concepts of Artificial Intelligence, Search Space, Knowledge Representation, Learning Techniques, Fuzzy systems and expert systems and solve problems in Artificial Intelligence using Python.

**UNIT I INTRODUCTION TO AI PROBLEMS****9**

Introduction: AI Problems – AI techniques – criteria for success. The AI Problems, Defining the Problem as a State Space Search, Problem Characteristics–Searching strategies – Generate and Test, Heuristic Search Techniques–Hill climbing– issues in hill climbing.

**UNIT II SEARCH METHODS****9**

Search Methods – Best First Search – Implementation in Python – OR Graphs, The A\* Algorithm, Problem Reduction–AND-OR Graphs, The AO\* algorithm, Constraint Satisfaction. MINIMAX search procedure, Alpha–Beta pruning.

**UNIT III KNOWLEDGE REPRESENTATION****9**

Knowledge representation – Using Predicate logic – representing facts in logic, functions and predicates, Conversion to clause form, Resolution in propositional logic, Resolution in predicate logic, Unification.–Representing Knowledge Using Rules: Procedural Versus Declarative knowledge, Logic Programming, Forward versus Backward Reasoning.

**UNIT IV LEARNING CONNECTION IS TMODELS****9**

What is learning, Rote learning, Learning by Taking Advice, Learning in Problem-solving, Learning from example: induction, Explanation-based learning. Connectionist Models: Hopfield Networks, Learning in Neural Networks, Applications of Neural Networks, Recurrent Networks. Connectionist AI and Symbolic AI.

Case Study: Expert System –Representing and using Domain Knowledge – Reasoning with knowledge– Expert System Shells –Support for explanation- examples –Knowledge acquisition- examples. Python–Introduction to Python– Lists Dictionaries & Tuples in Python– Python implementation of Hill Climbing.

**Total : 45 hours**

**Books for References:**

1. Konar, Amit. Artificial intelligence and soft computing: behavioral and cognitive modeling of the human brain. CRC press,2018
2. Elaine Rich and Kevin Knight, “Artificial Intelligence”, Tata McGraw-Hill Publishing Company Ltd., New Delhi, Third Edition, ISBN: 13:978-0-07-008770-5,2010.
4. Stuart Russell, Peter Norvig, “Artificial Intelligence- A modern approach”, Pearson Education Asia, Second Edition,ISBN:81-297-0041-7,2009.
6. Akshar Bharati, Vinee Chaitanya, Rajeev Sangal, “Natural Language Processing: A Paninian Perspective”, Prentice Hall India Ltd., New Delhi, ISBN 10:8120309219,2004.
7. Dan W.Patterson, “Introduction to Artificial Intelligence and Expert Systems”, Prentice Hall India Ltd., New Delhi, ISBN:81-203-0777-1,2009.
8. Rajendra Akerkar, Introduction to Artificial Intelligence, PHI Learning Pvt.Ltd.,ISBN: 81-203- 2864-7,2005.

**COURSE OUTCOME**

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

**CO-1:** Ability to understand the knowledge representation, problem solving, fuzzy set and expert systems

**CO-2:** Ability to develop a basic understanding of AI building blocks presented in intelligent agents.

**CO-3:** Ability to choose an appropriate problem solving method and knowledge representation technique.

**CO-4:** Ability to design models for reasoning with uncertainty as well as the use of unreliable information.

**CO-5:** To familiarize with Fuzzy Logic and knowledge processing in expert systems.

**Course objective:**

This course introduces the basic concepts of robotics, sensors, robot controls, robot cell design, and micro robotics and Nano robotics system.

**UNIT I INTRODUCTION****9**

Robot anatomy – Definition - law of robotics - History and Terminology of Robotics- Accuracy and repeatability of Robotics - Simple problems - Specifications of Robot - Speed of Robot - Robot joints and links - Robot classifications - Architecture of robotic systems- Robot Drive systems - Hydraulic, Pneumatic and Electric system.

**UNIT II END EFFECTORS IN ROBOT CONTROLS****9**

Mechanical grippers-Slider crank mechanism, Screw type, Rotary actuators, cam type- Magnetic grippers - Vacuum grippers - Air operated grippers-Gripper force analysis - Gripper design - Simple problems - Robot controls - Point to point control, Continuous path control, Intelligent robot - Control system for robot joint - Control actions - Feedback devices- Encoder, Resolver, LVDT - Motion Interpolations - Adaptive control.

**UNIT III ROBOT TRANSFORMATIONS AND SENSORS****9**

Robot kinematics-Types- 2D, 3D Transformation-Scaling, Rotation, Translation - Homogeneous coordinates, multiple transformation - Simple problems. Sensors in robot – Touch sensors - Tactile sensor – Proximity and range sensors – Robotic vision sensor - Force sensor - Light sensors, Pressure Sensors.

**UNIT IV ROBOT CELL DESIGN AND APPLICATIONS****9**

Robot work cell design and control - Sequence control, Operator interface, Safety monitoring devices in Robot - Mobile robot working principle, actuation using MATLAB, NXT Software Introductions - Robot applications - Material handling - Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersea robot.



## UNIT V MICRO/NANO ROBOTICS SYSTEM AND CASE STUDY

9

Micro/Nano robotics system overview - Scaling effect - Top down and bottom up approach  
- Actuators of Micro / Nano robotics system - Nano robot communication techniques –  
Case Study : Fabrication of micro / nano grippers - Wall climbing, micro robot working principles - Biomimetic robot - Swarm robot - Nano robot in targeted drug delivery system.

**Total : 45 hours**

### Text Books:

1. S.R. Deb, “Robotics Technology and flexible automation”, Tata McGraw-Hill Education, 2009.
3. Mikell P Groover & Nicholas G Odrey, Mitchel Weiss, Roger N Nagel, Ashish Dutta, “Industrial Robotics, Technology programming and Applications”, McGrawHill,2012.

### Reference Books:

1. Richard D. Klafter, Thomas .A, Chri Elewski, Michael Negin, “Robotics Engineering an Integrated Approach”, PHI Learning,2009.
2. Francis N. Nagy, Andras Siegler, “Engineering foundation of Robotics”, Prentice Hall Inc., 1987.
3. P.A. Janaki Raman, “Robotics and Image Processing an Introduction”, Tata McGraw Hill Publishing companyLtd.,1995.

### Course Outcome

- CO-1:** To understand the basics of robot like accuracy, speed of robot, joint and links in robots.
- CO-2:** To understand the purpose of end effectors like magnetic grippers, vacuum grippers and gripper design.
- CO-3:** Explains various sensors like touch sensors, tactile sensor, vision sensors, light and pressure sensors which are used in robots.
- CO-4:** Explains robot applications like Material handling, Machine loading and unloading, assembly, Inspection, Welding, Spray painting and undersea robot.
- CO-5:** Effectively discuss Actuators of Micro/Nano robotic system.

**Syllabus**  
**Generic Electives**

**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****6**

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****6**

Introduction To Java script - Advantage Of Java script Java script Syntax – Data type - Variable-Array-OperatorAndExpression-LoopingConstructor-Function-DialogBox.

**UNIT III OBJECTS IN JAVASCRIPT****6**

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****6**

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, Dropdown List, List Box, Data Grid, Repeater.

**UNIT V NETWORK & SECURITY****6**

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: 30 Hours**

### **Books for References:**

1. Web Enable Commercial Application Development Using HTML, DHTML, Javascript, P I. Bayross, en CGI, BPB Publications,2000.
2. ASP 3 Programming Bible, Eric A. Smith, Wiley-Dreamtech India (P) Ltd,2003.
3. ASP3.0 Beginners Guide, Dave Mercer, TataMcGraw-Hill Edition, Sixth reprint,2004.
4. Mastering Javascript,J. Jaworski BPB Publications,1999.
5. Complete Reference HTML (Third Edition),T. A. Powell ,TMH,2002.

### **COURSE OUTCOME**

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

**CO-1:** To execute HTML basic commands for programming.

**CO-2:** To understand the Scripting functions.

**CO-3:** To understand the web application programs

**CO-4:** To work with multiple applications

**CO-5:** To understand the concepts of connecting and MySQL.

**Course Objective:**

This course gives introduction to the concepts of ASP, VB Script and Java Script, WorkingwithASP.NETtoenhancecommunicationandsecurityandtodevelopwebpage.

**UNIT I INTRODUCTION****6**

Introduction To` Vbscript - Adding Vbscript Code To An Html Page - Vb Script Basics - Vbscript Data Types - Vbscript Variables - Vbscript Constants -Vbscript Operators – Mathematical- Comparison-Logical - Using Conditional Statements - Looping Through Code - Vbscript Procedures – Type Casting Variables - Math Functions – Date Functions – String Functions – Other Functions - Vbscript Coding Conventions - Dictionary Object In Vbscript - Err Object.

**UNIT II JAVASCRIPT****6**

Introduction To Javascript – Advantages Of Javascript – Javascript Syntax - Data Type – Variable-Array–Operator & Expression – Looping – Control Structures - constructor Function – User Defined Function Dialog Box .

**UNIT III OBJECTMODEL****6**

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****6**

ASP.NET Language Structure – Page Structure – Page Event, Properties & Compiler Directives. HTML Server Controls – Anchor, Tables, Forms, Files. Basic Web Server Controls – Lable, Text Box, 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 SECURITY****6**

Request And Response Objects, Cookies, Working With Data – OLEDB Connection Class, Command Class, Transaction Class, Data adapter 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: 30 Hours**

**Books for References:**

1. Web Enable Commercial Application Development Using HTML,DHTML, Javascript, I.Bayross ,Perl CGI, BPB Publications,2000.
2. Mastering Active Server Pages 3, A.Russell Jones,and BPB Publications.
3. Internet Programming with VB Script and JavaScript, HathleenKalata, Thomson Learning.
4. XML Harness the Power of XML in easy steps, Mike McGrath, Dreamtech Publications.
5. Complete Reference HTML, T.A. Powell, TMH,2002.
6. Mastering Javascript, J.Jaworski, BPB Publications,1999.

**COURSE OUTCOME**

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

**CO-1:** To program and debug applications using a variety of client side and server side Technologies.

**CO-2:** To exhibit the knowledge of programming with basic building blocks of scripting language.

**CO-3:** To gain deep knowledge in different controls using client server.

**CO-4:** To apply the features of all objects, caching and session management for every client.

**CO-5:** To develop applications which connects client servers using scripting language.

# PHOTOSHOP

2002

## Course Objective:

To understand the fundamentals of Photoshop & can able to retouch & repair, Work with multiple layers, Slice & clone, Design basic web templates, and create animations.

### UNIT I BASICS OF ADOBE PHOTOSHOP 6

Learn The Tools And What They Do-- Basic Workflow- Creating Effective Storing- Batch Renaming- How To Save Your Photos- Digital Asset Management- File Types- File Sizes- Color Types.

### UNIT II LAYERS 6

Layer Styles-Layers Palette-Working With Layers-New Layers via Cut-New Layers Via Copy- Hiding/Showing Layers-Repositioning Layers-Flattening Images-Working With Adjustment Layers-Layer Effects-Opacity- Adjustment Layers.

### UNIT III BASIC RETOUCHING 6

Color Manipulations- Levels- Curves- Seeing Color Accurately- Patch Tool- Cropping- Reading Your Palettes- Dust and Scratches.

### UNIT IV ADVANCED RETOUCHING 6

Smoothing Skin-Strategy for Retouching-Resolution and Image Size-Cropping and Image- Adjusting the tonal image-Removing a Color Cast- Smoothing Wrinkles- Special Color Effects: Black And White, Sepia, Grainy.

### UNIT V WORKING WITH A LOT OF IMAGES 6

Cataloging Your Images- Editing Our Photo shoot- Naming Your Shoot- Automating Your Shoot- Batch Processing- Introduction to Action.

**TOTAL: 30 Hours**

### **Books for References:**

1. Fundamental Photoshop, Greenberg, Tata McGraw-Hill,1995
2. Photoshop 7,The Ultimate Reference, Laurie Ann Ulrich, Dream Tech Press,2002
3. Photoshop CS2 in Simple Steps, Shalini Gupta, Adity Gupta, Dreamtech Press, 2006.
4. Adobe Photoshop CS6 Bible, Lisa Danae Dayley, Brad Dayley, Wiley India,2012.

### **COURSE OUTCOME**

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

**CO - 1:** To understand the basics of Photoshop concepts and its advantages.

**CO – 2:** To implement the basics of Photoshop

**CO – 3:** To build the designing structure of Photoshop concepts of Relational Algebra.

**CO - 4:** Acquire necessary knowledge about Case study in various areas.

**CO- 5:**To be able to design using Photoshop.



**Course Objective:**

This course provides hands-on experience with Adobe Flash, a Web-authoring and animation tool. Students gain understanding of fundamental Flash paradigms (Stage, Symbols, Library and Timeline) and Create simple, tasteful animation effects. Students use Buttons and Action Script to enable basic user interaction.

**UNIT I SYMBOLS, INSTANCES, AND THE LIBRARY****6**

Understanding the Document Library - Defining Content Types- Editing Symbols- Modifying Instance Properties -Slice Scaling for Movie Clip Backgrounds - Color Basics - Working in the Swatches Panel - Using the Color Panel - Working with Droppers, Paint Bucket, and Ink Bottles.

**UNIT II WORKING WITH TEXT AND GRAPHICS****6**

Text Field Types in Flash - The Text Tool and the Property Inspector - Font Export and Display - Sampling and Switching Fills and Strokes - Transforming Gradients and Bitmap Fills - Gradient Transform Used for Lighting Effects - Applying Modify Shape Menu Commands - Free Transform Commands and Options - Modifying Item Types - Using the History Pane.

**UNIT III ANIMATION STRATEGIES****6**

Establishing Ground Rules -Defining Variables - Adding Personality - Manipulating Perceptions and Illusion - Understanding the Laws of Nature -Timeline Animation - Basic Methods of Flash Animation -Frame-by-Frame Animation - Modifying Multiframe Sequence - Using Tweens for Animation -Integrating Multiple Animation Sequence - Organizing Symbol Instances on the Main Timeline -Reusing and Modifying Symbol Instances - Duplicating Tweened Animation Properties with the Copy Motion Command.

**UNIT IV APPLYING FILTERS, EFFECTS AND LAYER TYPES****6**

Applying Filters in Flash -Controlling Color -Layering Graphics with Blend Mode - Using Timeline Effects for Graphics and Animation - Motion Guides -Mask Layers - Motion Guides and Movie Clip Masks -Using Distribute to Layers.

## UNIT V CHARACTER ANIMATION TECHNIQUES

6

Working with Large File Sizes -Some Cartoon Animation Basics - Animator's Keys and Inbetweening -Coloring the Art -Flash Tweening-.Adding- Sound Identifying- Sound File Import and Export Formats -Importing Sounds into Flash -Assigning a Sound to a Button - Adding Sound to the Timeline.

**TOTAL: 30 Hours**

### **Books for References:**

1. Adobe Flash CS3 Professional by Robert Reinhardt, Snow Dowd,2007
2. Flash 5 for PC/MAC, Sami Ben-Yahia, ENI,2001.
3. Flash in a Flash Web Development, Anushka Wirasinha, PHI,2002.
4. Flash 8 Action script Bible, Lott, Joey, John Wiley & Sons,2006.

### **COURSE OUTCOME**

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

**CO - 1:** To understand the basics of Flash

**CO - 2:** To implement the basics of Drawing and Coloring

**CO – 3:** To build the designing structure of Working with Layers and Symbols

**CO– 4:** Gain necessary knowledge in Export keyboard shortcuts as HTML

**CO - 5:** To be able to Publish Profiles using animation techniques.

**Course Objective:**

This course provides concepts of Advance Excel such as Financial Functions, Date and Time Functions, VLookup, Analysis Tool Pack.

**UNIT I INTRODUCTION****6**

Understanding Excel's Files, Ribbon and Shortcut: Createa Workbook - Enter Data in a Worksheet - Format a Worksheet - Format Numbers in a Worksheet - Create an Excel Table - Filter Data by using an Autofilter - Sort Data by using an Autofilter.

**UNIT II DATEANDTIME****6**

Working With Dates And Times &Text: Working With Dates & Time, Creating Formulas that Manipulate Text – Upper, Proper, Lower, Concatenate, Text to Column- Creating Formulas that Count, Sum, SubTOTAL: Create a Formula - Use a Function In A Formula - Creating Formulas that Look Up Values: Vlookup, Hlookup, Match & Index .

**UNIT III FINANCIAL FUNCTIONS****6**

Creating Formulas For FINANCIAL Applications: Introduction To Formulas E.G. PV, PMT, NPER, RATE, Creating Balance Sheet, Investment Calculations, Depreciation Calculations- Creating Charts And Graphics: Chart Your Data, Creating Sparkline Graphics, Using Insert Tab Utilities.

**UNIT IV FORMATTING****6**

Using Custom Number Formats: Right Click, Format Cells Window - Using Data Tab And Data Validation: Getting External Data, Remove Duplicates, Apply Data Validation & Using Utilities from Data Tab - Protecting your work: Using Review Tab Utilities - Performing Spreadsheet What-If Analysis: Create a Macro - Activate and use an Add-In.

**UNIT V ANALYSIS****6**

Analyzing Data with the Analysis Tool Pack: Anova, Correlation, Covariance, Descriptive Statistics, Histogram, Random Number Generation, Rank And Percentile, Regression, T-Test, Z Test - Using Pivot Tables For Data Analysis: Create Data Base for Pivot, Analyzing Data With Pivot Tables, Producing Report With a Pivot.

**TOTAL: 30 Hours**

### **Books for References:**

1. Excel 2010 Bible[With CDROM]byJohnWalkenbach,JohnWiley&Sons,2010.
2. Maturing Financial modeling in Microsoft excel, Day, Alastair, Pearson Education, 2<sup>nd</sup> Edition,2007.
3. Excel 2007 for Dummies, Greg Harvey, John Wiley & Sons,2006.
4. New Perspectives on Microsoft Office Excel 2007, June Jamrich Parsons , Dan Oja , Roy Ageloff , Patrick Carey, Course Technology; 1 edition,2013.

### **COURSE OUTCOME**

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

**CO-1:** To learn to modify Excel options and protect data in worksheets and workbooks.

**CO-2:** To import data into Excel and export data from Excel.

**CO-3:** To group cells and use outlines to manipulate the worksheet.

**CO-4:** To use the Data Consolidation feature to combine data from several workbooks into one.

**CO-5:** Ability to use data linking to create more efficient workbooks.



- Comparing Three or More Groups Using Parametric Statistics - One-Way ANOVA and Post-Hoc Tests - Comparing Three or More Groups Using Non-Parametric Statistics - Kruskal-Wallis Test - For Studies With Two Independent Variables.

**TOTAL: 30 Hours**

**Books for References:**

1. Discovering Statistics Using IBM SPSS Statistics, Andy Field, SAGE Publications Ltd, 4th edition,2013.
2. SPSS: Stats Practically Short and Simple, Sidney Tyrrell, Bookboon,2009
3. SPSS for you, Rajathi.A, MJP Publishers2010.
4. SPSS for Dummies, Griffith, Arthur, John Wiley,2007.

**COURSE OUTCOME**

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

**CO-1:** To learn concepts of statistical population and sample, variables and attributes.

**CO-2:** To learn Conditions for the consistency and criteria for the independence of data based on attributes.

**CO-3:** To learn Measures of central tendency, Dispersion, Skewness and Kurtosis.

**CO-4:** To learn Important theorems on probability and their use in solving problem

**CO-5:** To learn Concept of Principle of least squares for curve fitting and regression lines.

**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****6**

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****6**

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****6**

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****6**

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.

**UNIT V MS POWERPOINT****6**

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: 30 Hours**

### **Books for References:**

1. Computing Fundamentals & C Programming, E.Balagurusamy , TataMcGraw hill.
2. MS office 2000, Sanjay Saxena, Vikas publication house pvt .ltd.
3. Microsoft Office 2003: The Complete Reference, Jennifer Ackerman Kettell, Guy Hart-Davis,
4. Curt Simmons, McGraw-Hill Osborne, 2nd edition,2003.
5. E.Balaguruswamy , “Office Automation & Word Processing” , TMH,

### **COURSE OUTCOME**

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

**CO-1:** Understand the Evolution and Classification of Computers.

**CO-2:** Understand different types of Soft wares.

**CO-3:** Apply Knowledge of converting Doc into WWW pages.

**CO-4:** Automating your work and Printing documents.

**CO-5:** Finding Information in Databases and importing data from other databases.



**Course Objective:**

This course introduces the basic concepts of desktop publishing with document setup, fonts, composing machines, graphics, tones, book preparation and file maintenance.

**UNIT I FUNDAMENTALS OF COMPUTERS****6**

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 SETUP****6**

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****6**

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:****6**

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:**

**6**

Printing – Types of Printers – Different Types of File Formats – Icc Based Color Management–PreparationofProjectWork–BindingTechniques–CoreldrawCaseStudy.

**TOTAL: 30 Hours**

### **Books for References:**

1. Rapidex DTP Course, Shirish Chavan ,UNICORN Books Pvt. Ltd.,2007
2. A First Course in Computers, Sanjay Saxena, , Vikas Publishing House,2005.
3. DTP Manual, Pete Yeo, Chapman Hall.
4. Rapidex DTP Course: Coreldraw – 2005, Shirih Chauan, Unicorn Books.

### **COURSE OUTCOME**

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

**CO-1:** Understand the basics of computers, Hardware and Software.

**CO-2:** Understand File Downloading and Uploading.

**CO-3:** Inserting special effects and images for the document.

**CO-4:** Designing page using graphics.

**CO-5:** Understand different types of printers and file formats.

**Course Objective:**

This course introduces the basic concepts, various queries, triggers and stored routine of Mysql. It also gives the Cursor management, event management and user management of Mysql.

**UNIT I INTRODUCTION TO SQL BASICS**

**6**

**Introduction:** To Databases, Relational and Non-Relational Database System Mysql As A Non-Procedural Language. View of Data. **SQL Basics:** Statements, Names (Table & Column Names), Data Types, Creating Database, Inserting Data, Updating Data, Deleting Data, Expressions, Built-In-Functions, Missing Data CREATE, USE, ALTER, RENAME, SHOW, DESCRIBE And DROP, PRIMARY KEY FOREIGN KEY (One And More Columns) Simple Validity Checking Using CONSTRAINTS.

**UNIT II SIMPLE,NESTED,SUBQUERIES**

**6**

**Simple Queries:** The SELECT Statement Multi-Table Queries: Simple Joins (INNER JOIN), SQL Considerations For Multitable Queries (Table Aliases, Qualified Column Names, All Column Selections Self Joins). **Nested Queries:** Using Sub Queries, Sub Query Search Conditions, Sub Queries & Joins, Nested Sub Queries, Correlated Sub Queries, Sub Queries In The HAVING Clause. Simple Transaction Illustrating START, COMMIT, and ROLLBACK.

**UNIT III MYSQL TRIGGERS AND STORED ROUTINE**

**6**

**Mysql Triggers:** Basics of Trigger, Create and Drop a Trigger, Find All Triggers in Database. **Mysql Stored Routine:** Stored Routine, Create and Invoke a Stored Routine, Alter a Stored Routine, Drop a Stored Routine.

**UNIT IV MYSQL CURSOR MANAGEMENT AND EVENTS**

**6**

**Utilize Functionalities of Mysql Cursor:** Basics of Cursor, Defining the Cursor, Retrieve Values from Cursor, Close the Cursor. **Mysql Events:** Events, Turning Event Scheduler on Create the Event, Find all Events in Database, Change the Event and Drop the Event.

## **UNIT V USER MANAGEMENT, BACKUP AND RECOVERY**

**6**

User Management in MySQL: Basics of MySQL User, Access Control List, Manage User Accounts, GRANT and REVOKE Command, Reset Root Password. Backup and Recovery: Backup Mysql, Uses for Backup, Backup Frequency, Copy Database into another Machine, Recovery from Crashes.

**TOTAL: 30 Hours**

### **Books for References:**

1. SQL a complete reference - Alexis Leon & Mathews Leon TMG.
2. Learning MySQL - Seyed M. M. and Hugh Williams, O'REILLY.
3. PHP & MYSQL in easy steps, MCGrath, MIKE, MGH,2012.
4. MySQL Administrator- Sheeri Cabral.

### **COURSE OUTCOME**

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

**CO-1:** Analyze the difference between Relational and Non-Relational Database System.

**CO-2:** Apply validity checking using CONSTRAINTS.

**CO-3:** Apply sub queries & joins for the statements.

**CO-4:** Understanding Simple Transaction using Commit & Rollback.

**CO-5:** Understand MySQL cursor management and Events.

**Course Objective:**

The course intends to inculcate the significance of cyber space and to enlighten the various legal, social and international issues and the various remedies available under the Information Technology Act for the breach and commission of offence in cyberspace. The course also outlines international best techniques and the various legal mechanisms to control the various offences in the cyberspace.

**UNIT I INTRODUCTION****6**

Introduction to cyberspace -UNCITRAL Model Law - Information Technology Act, 2000 with recent amendments - Jurisdictional issues - Digital signatures - regulation of - certifying authorities - Cyber Regulation Appellate Tribunal – Human Rights Issues.

**UNIT II ONLINE CONTRACTS****6**

Formation of online contracts - E banking transactions, online payment options, online advertising - Electronic and digital signatures - Taxation issues in cyber space- indirect tax, tax evasion, double tax, international tax, permanent establishment - Protection of trade secrets and deceptive trade practices.

**UNIT III CYBERCRIMES****6**

Understanding cyber crimes - Identifying Theft and Frauds - Types of crimes in the internet: Against person, against property, against government - Digital evidence- investigation and adjudication of cybercrimes in India- cyber arbitration, cyber conflict investigation- cyber Terrorism.

**UNIT IV INTELLECTUAL PROPERTY RIGHTS (IPR) AND CYBERSPACE****6**

Copyright issues in the internet- protection of computer software, caching, international regime-OSS, DMCA, Data Protection Directive - Trademark issues in the internet – Domain Name Registration, Domain Name Dispute, ICANN, UDRP policy, linking, framing, tagging - Database issues in the internet.

**UNIT V THE INDIAN EVIDENCE ACT OF 1872 V.INFORMATION TECHNOLOGY ACT, 2000****6**

Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements, Proving Electronic Messages.

## **CASE STUDY- PROTECTION OF CYBER CONSUMERS IN INDIA:**

Are Cyber Consumers Covered Under the Consumer Protection Act? Goods and Services, Consumer Complaint, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Reliefs Under CPA, Beware Consumers, Consumer Foras, Jurisdiction and Implications on cyber Consumers in India, Applicability of CPA to Manufacturers, Distributors, Retailers and Service Providers Based in Foreign Lands Whose Goods are Sold or Services Provided to a Consumer in India.

**Total: 30 Hours**

### **Books for References:**

1. Computers, Internet and New Technology Laws – Karnika Seth ,Cyber Lawyer and Expert and is the Managing Partner of Seth Associates, Edition2012.
2. Legal dimensions of cyber space – S.K.Verma, Raman mittal, Indian Law Institute, New Delhi: Indian Institute,2004.
3. Law Relating to Computers Internet & E-commerce - A Guide to Cyber laws & the Information Technology Act, Rules, Regulations and Notifications along with Latest CaseLaws,2012.
4. Cyber security Law, by Jeff Kosseff , Wiley Publications, Edition –2017.
5. Information technology law – Ian. J. Lyod, Information Technology Act 2000, its amendment and IT Rules2014.
6. Cyber space law commentaries and Materials- Yee fen Lim, second edition, Galexia Consulting Pty Ltd, Australia.
7. Cyber law – Yatindra Singh, The Indian Law Institute of Technology2000.

### **COURSE OUTCOME**

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

**CO-1:** To introduce the cyber world and cyber law in general.

**CO-2:** Develop knowledge of major incidents of cybercrime and their resulting impact.

**CO-3:** Critically consider specific laws and policies governing cybercrime detection and prosecution.

**CO-4:** To enhance the understanding of problems arising out of online transactions and provoke them to find solutions.

**CO-5:** To clarify the Intellectual Property issues in the cyber space and the growth and development of the law in this regard.

**SYLLABUS**  
**ABILITY ENHANCEMENT**  
**COMPULSORY COURSES (AECC)**

**Course Objective:**

- This course is to subject the students to practice the components in various units.
- To make students ready for placement interviews within campus.
- To Infuse Confidence To Face Job Situations.

	<b>Credit Hours</b>
<b>UNIT I</b>	<b>06</b>
Resume and CV Writing	
Complaint Letter	
Social Correspondence	
Letter of Enquiry	
<b>UNIT II</b>	<b>06</b>
Short Essay Writing	
<b>UNIT III</b>	<b>06</b>
Explaining Proverbs	
<b>UNIT IV</b>	<b>06</b>
Use of Prepositions	
<b>UNIT V</b>	<b>06</b>
Synonymous Words	
<b>Total</b>	<b>30 Hours</b>

**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**

1. For Unit I–V Effective Communication For You – V.  
Syamala Emerald Publishers, Chennai.
2. Cameron, David. Mastering Modern English, Hyderabad: Orient Blackswan, 1978  
(rpt. 1989, 1993, 1995, 1998).
3. Freeman, Sarah. Written Communication in English, Hyderabad: Orient  
Blackswan, 1977 (21st Impression, 2007).
4. Singh, Vandana R. The Written Word. New Delhi: Oxford university Press, 2003  
(3rd Impression, 2007)



5. Seely, John. Oxford Guide to Effective Writing and Speaking. New Delhi: Oxford University Press, 2000 (4<sup>th</sup> Impression, 2008)

**Web Sources:**

1. <https://www.myperfectresume.com/career-center/resumes/how-to/write>
2. <https://www.englishgrammar.org/>
3. <https://www.thesaurus.com/browse/>

**UNIT I INTRODUCTION 6**

The multidisciplinary nature of the 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 conservation 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**

**TextBook:**

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

2002

### Course Objective:

- .To enable participants Business Communication Skills
- a. To enhance participants E-mail writing skills
- b. To impart Leadership and Team Bonding Skills

### **UNIT I: EFFECTIVE COMMUNICATION SKILLS 06**

Talking About Your company–Making Polite requests–Introducing yourself and others–  
Socializing with others – Talking about work activities – Talking about your job –  
Communication Practice–Role Plays

### **UNIT II: WRITTEN BUSINESS COMMUNICATION 06**

Essential mail writing skills–Formal and In formal E-mails–Usage Informal 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–Teamwork–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**

### Books Prescribed

- c. Raman, M. & Sangeeta Sharma. Technical Communication. OUP. 2008
- d. Taylor, Grant. English Conversation Practice. Tata McGraw Hill Education Pvt. Ltd. 2005
- e. Tiko, Champa & Jaya Sasikumar. Writing with a Purpose. OUP. New Delhi. 1979

**Web Sources:**

- . <https://www.skillsyouneed.com/ips/communication-skills.html>
- i. <https://blog.smarp.com/top-5-communication-skills-and-how-to-improve-them>
- ii. <https://blog.hubspot.com/service/phone-etiquette>

**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 exchange ideas

CO4 To Impart Leadership Qualities Among The Participants

CO5 To Express Opinions To Enhance Their Social Skills

**Course Objective:**

1. To enable students to develop their communication skills effectively
2. To enhance students Reading, Writing, Listening and Speaking Skills
3. To develop their self-confidence through communication

**UNIT I: READING COMPREHENSION AND VOCABULARY****06**

Reading Techniques–Types of Reading–Skimming–Scanning–Reading For Detail–  
Identifying keywords–Underlining Unfamiliar Keywords–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 Smalltalk – How to start and end a conversation–Exchanging Ideas–  
Expressing Interests – Giving Opinions – Social skills and Etiquette – Informal  
Conversations – Formal Meetings – Group Practice

**UNITV:SELF-INTRODUCTION AND ROLEPLAY****06**

Introducing oneself–Exchange of Greetings – Appropriate Greetings–Usage of Vocabulary  
– Rapport Building – Handshakes and First Impressions – Basic Etiquette

**Total 30 Hours**

### **Books Prescribed**

1. English for Competitive Examinations by R.P.Bhatnagar & Rajul Bhargava  
Macmillan India Ltd. Delhi.
2. Carnegie, Dale. The Quick and Easy Way to Effective Speaking. New York: Pocket  
Books, 1977.
3. Kalish, Karen. How to Give a Terrific Presentation. New York: AMACOM,1996

### **Web Sources:**

1. <https://www.skillsyouneed.com/ips/communication-skills.html>
2. <https://venngage.com/blog/presentation-skills/>
3. <https://gdpi.hitbullseye.com/Group-Discussion.php>

### **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



**Course Objective:**

1. To enable students to develop their soft skills and Body Language
2. To enhance students Reading, Writing, Listening and Speaking skills
3. To develop their self-confidence to excel at Interviews

**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****Books Prescribed**

1. Meena. K and V.Ayothi (2013) A Book on Development of Soft Skills (Soft Skills: A RoadMap to Success) P.R. Publishers & Distributors.
2. Soft Skills – Know Yourself & Know the World, S.Chand & Company LTD, Ram Nagar, NewDelhi
3. Prasad, H. M. How to Prepare for Group Discussion and Interview. New Delhi: Tata McGraw-Hill Publishing Company Limited,2001
4. Pease, Allan. Body Language. Delhi: Sudha Publications,1998.

**Web Sources:**

1. <https://www.skillsyouneed.com/ips/communication-skills.html>
2. <https://www.businessnewsdaily.com/5836-top-interviewing-skills.html>
3. <https://gdpi.hitbullseye.com/Group-Discussion.php>

**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 interview confidently
- CO5 To enhance their aptitudes abilities

## 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 stylesheets 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 stylesheet.
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**

### 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, Sixth reprint, 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](http://www.w3schools.com)
2. [www.tutorialspoint.com](http://www.tutorialspoint.com)

**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.

**COURSE OBJECTIVE:**

1. To develop and strengthen entrepreneurial quality and motivation in students
2. To impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.
3. 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 V 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 ENTREPRENEUR SHIP 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**

**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. AbhinavGanpule&AdityaDhobale,“EntrepreneurshipDevelopment”,KindleEdition,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/>

**WEB SOURCES**

1. <https://articles.bplans.com/10-great-websites-for-entrepreneurs/>
2. <https://www.entrepreneur.com/article/272185>

**COURSE OUTCOME**

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

At the end of the course, a student will be able to

CO–1:Understand the concept of Entrepreneur ship

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

## **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 are encouraged to participate in seminars, webinars and workshops.
- Every student assign to select their topic of interest in core subject
- Encourage them to participate in various activities allotted to their topic.
- At the end of the semester, every student submits a technical report on their topic.
- Based on documentation and viva students eligible to get their grade.

**Total: 15 Hours**