



# **B.Sc., Computer Science (Cyber Security)**

## **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**

**VELS INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES**

**SCHOOL OF COMPUTING SCIENCES**

**DEPARTMENT OF COMPUTER SCIENCE**

**VISION AND MISSION OF THE DEPARTMENT**

### **VISION**

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

### **MISSION**

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

## **PROGRAMME EDUCATIONAL OUTCOMES (PEO)**

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

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

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

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

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

## **PROGRAMME OUTCOMES (PO)**

**PO1: Critical Thinking:** Apply knowledge of Cyber Security to identify, analyse problems and to provide effective solution 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 the society.

**PO7: Self Directed and Life-long Learning:** Engaged in lifelong 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 (Cyber Security)- 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 (Cyber Security) 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 REQUIRMENTS 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 student's 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 Compulsory Course (AECC), 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

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



## **8. EXAMINATION AND EVALUATION**

### **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

<b>SECTION – A</b>	10 Questions	10 X 2 = 20 Marks
<b>SECTION – B</b>	5 Answer any Five pattern	5 X 8 = 40 Marks
<b>SECTION – C</b>	5 Answer any Two pattern	2 X10 = 20 Marks

**Total 100 Marks**

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

- 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:  $= \frac{\sum_i C_i G_i}{\sum_i C_i}$  That is, GPA is the sum of the multiplication of grade points by the credits of the courses divided by the sum of the credits of the courses in a semester.

Where,  $C_i$  = Credits earned for course  $i$  in any semester,  $G_i$  = Grade Points obtained for course  $i$  in any semester  $n$  = Semester in which such courses were credited.

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

<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 period beyond the normal period to clear the backlog to be qualified for the degree. (Time Span = N + 2 years for the completion of programme)
- 16.2. In exceptional cases like major accidents and child birth an extension of one year considered beyond maximum span of time (Time Span= N + 2 + 1 years for the completion of programme).

## **17. REVISION OF REGULATIONS, CURRICULUM AND SYLLABI**

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

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

**B.Sc., Computer Science (Cyber Security)**

**Courses of Study and Scheme of Assessment**

**B.Sc., Computer Science (Cyber Security) 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>

# **Learning Outcomes based Curriculum Framework**

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## **1. Introduction**

Cyber Security has been evolving as an important branch of Computer 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. Cyber Security 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. Cyber Security 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 Cyber Security 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, Cyber Security, Artificial Intelligence, Computational Science, and Software Engineering. Drawing from a common core of computer science knowledge, each specialty area focuses on specific challenges. Cyber Security 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 Cyber Security as this discipline evolved itself to a multidisciplinary discipline. Information Technology is growing rapidly. Increasing applications of computers in almost all areas of human endeavour has led to vibrant industries with concurrent rapid change in technology. Unlike other basic disciplines, developing core competency in this discipline that can be reasonably stable becomes a challenge. In India, it was initially introduced at the Master (postgraduate) level as MCA and M.Tech. Later on, engineering programmes such as B.Tech and B.E in Cyber Security & Engineering and in Information Technology were introduced in various engineering College/Institutions to cater to the growing demand for



trained engineering manpower in IT industries. Parallely, BSc and MSc programmes with specialisation in Computer Science were introduced to train manpower in this highly demanding area. B.Sc in Cyber Security are being planned and introduced in different colleges and institutions.

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

The Learning Outcome-based Curriculum Framework in Cyber Security 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 Cyber Security 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 Cyber Security can be achieved only by programming a computer for several different meaningful purposes. All students must, therefore, have access to a computer with a modern programming language installed. The computer science framework does not prescribe a specific language. The teacher and students will decide which modern programming languages students will learn. More

importantly, students will learn to adapt to changes in programming languages and learn new languages as they are developed.

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

- To develop an understanding and knowledge of the basic theory of Cyber Security and Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation.
- To develop the ability to use this knowledge to analyse new situations
- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.
- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems
- To learn skills and tools like mathematics, statistics, physics and electronics to find the solution, interpret the results and make predictions for the future developments.

## **2. Curriculum Planning- Learning Outcomes-based Approach**

### **2.1 Nature and Extent of the B.Sc – CS (Cyber Security) Programme**

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

Framing and implementation of curricula and syllabi is envisaged to provide an understanding of the basic connection between theory and experiment and its importance in understanding the foundation of computing. This is very critical in developing a scientific temperament and to venture a career which a wide spectrum of applications as well as theoretical investigations. The undergraduate curriculum provides students with theoretical foundations and practical experience in both hardware and software aspects of

computers. The curriculum in cyber security 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 cyber security 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 with Cyber Security**

B.Sc. or Bachelor of Science with Computer Science (Cyber Security) 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 (Cyber Security) is required to choose two other subjects from a pool of subjects which include Physics, Mathematics, Statistics, Electronics, Chemistry. Different institutions offer different choice of combinations of subjects. Most popular combinations are Physics and Mathematics, Physics and Electronics, Mathematics and Electronics, but there are also combinations like Statistics and Economics or Commerce and Economics along with Computer Science.

### **Types of Courses Core Course (CC)**

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

is to ensure that all the institutions follow a minimum common curriculum so that each institution/ university adheres to common minimum standard.

### **Electives**

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

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

### **Discipline Specific Elective (DSE)**

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

### **Generic Elective (GE)**

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

## **Dissertation/Project**

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

## **Ability Enhancement Courses (AEC)**

The Ability Enhancement Courses may be of two kinds:

### **A. Ability Enhancement Compulsory Courses (AECC):**

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

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

### **B. Skill Enhancement Courses (SEC):**

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

### **C. Generic Elective Courses(GE)**

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

## **Practical/Tutorial**

For each core course and DSE course there will be one practical. The list of practical provided is suggestive in nature and each university has the freedom to

add/subtract/edit practical from the list depending on their faculty and infrastructure available. Addition will however be of similar nature.

## **2.2 Aims of Bachelor of Science Programmes in Cyber Security**

The Bachelor of Science degree in Cyber Security 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 cyber security courses such as programming languages, Embedded systems, computer-based communication networks, Artificial intelligence, Intrusion detection and prevention system, Cybercrime investigation and digital forensics, information security, database systems, operating systems, and software engineering; as well as elective courses in Robotic process automation, block chain & cryptocurrency, Penetration testing, Cyber laws in India, distributed computing, graphics, human-computer interaction, multimedia, scientific computing, web technology, and other current topics in cyber security.

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 BSc programs in cyber security are twofold: (1) to prepare the student for a position involving the design, development and implementation of computer software/hardware, Security Applications and (2) to prepare the student for entry into a program of postgraduate study in computer science/cyber security/engineering and related fields.

The Bachelor of Science program Computer Science with Cyber Security 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 Cyber Security -- its fundamental algorithms, programming languages, Security concepts, 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.

- a. Knowledge of the discipline
- b. Creativity
- c. Intellectual Rigour
- d. Problem Solving and Design
- e. Ethical Practices
- f. Lifelong Learning
- g. 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 Cyber Security**

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

##### **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 judgement. The students are expected in having clarity in

thinking. This capability involves engaging constructively and methodically when exploring ideas, theories and philosophies. It also relates to the ability to analyse and construct knowledge with depth, insight and intellectual maturity.

### **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 behaviour involves tolerance and responsibility. It includes being open-minded about cultural diversity, linguistic difference, and the complex nature of our world. It also means behaving appropriately towards colleagues and the community and being sensitive to local and global social justice issues.

### **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 (Cyber Security)**

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

- GA 1.** A commitment to excellence in all scholarly and intellectual activities, including critical judgement
- GA 2.** Ability to think carefully, deeply and with rigour when faced with new knowledge and arguments.
- GA 3.** Ability to engage constructively and methodically, when exploring ideas, theories and philosophies
- GA 4.** Ability to consider other points of view and make a thoughtful argument
- GA 5.** Ability to develop creative and effective responses to intellectual, professional and social challenges
- GA 6.** Ability to apply imaginative and reflective thinking to their studies.
- GA 7.** Commitment to sustainability and high ethical standards in social and professional practices.
- GA 8.** To be open-minded about cultural diversity, linguistic difference, and the complex nature of our world
- GA 9.** Ability to be responsive to change, to be inquiring and reflective in practice, through information literacy and autonomous, self-managed learning.
- GA 10.** Ability to communicate and collaborate with individuals, and within teams, in professional and community settings
- GA 11.** Ability to 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 in by showing in design an understanding of the practical methods, and using modern design tools competently for complex real-life IT problems

- GA 13.** Ability to use a range of programming languages and tools to develop computer programs and systems that are effective solutions to problems.
- GA 14.** Ability to understand, design, and analyse precise specifications of algorithms, procedures, and interaction behaviour.
- GA 15.** Ability to apply mathematics, logic, and statistics to the design, development, and analysis of software systems
- GA 16.** Ability to be equipped with a range of fundamental principles of Computer Science and Cyber Security 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. with CS (Cyber Security)**

On completion of B.Sc. with CS (Cyber Security), the expected learning outcomes that a student should be able to demonstrate are the following.

- QD-1.** Fundamental understanding of the principles of Cyber Security and its connections with other disciplines.
- QD-2.** Procedural knowledge that creates different types of professionals related to Cyber Security, including research and development, teaching and industry, government and public service;
- QD-3.** Skills and tools in areas related to Cyber Security 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 Cyber Security for formulating solutions
- QD-5.** Communicate the results of studies undertaken in Cyber Security 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 Cyber Security knowledge and transferable skills to new/unfamiliar contexts,
- QD-8.** Demonstrate subject-related and transferable skills that are relevant to industry and employment opportunities.

#### **5. Programme Learning Outcomes**

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

##### **5.1 Programme Learning Outcomes for BSc., CS(Cyber Security)**

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

**PLO-A.** Demonstrate the aptitude of Computer Programming and Computer based problem solving skills.

**PLO-B.** Display the knowledge of appropriate theory, practices and tools for the specification, design, implementation

**PLO-C.** Ability to learn and acquire knowledge through online courses available at different MOOC Providers.

**PLO-D.** Ability to link knowledge of Cyber Security 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 Cyber Security. Applications of the same may be explained from time to time so that the student can appreciate the theory.

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

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

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

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

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

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

## **7.Assessment Methods**

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

In the Bachelor's programmes leading to degrees such as BSc with CS(Cyber

Security), 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 (CYBER SECURITY)****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	23CBCY11	C Programming and Embedded System	4	1	0	5
CORE	23CBCY12	Cyber Security	3	1	0	4
CORE	23PBCY11	C Programming and Embedded System 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>			<b>18</b>	<b>2</b>	<b>6</b>	<b>23</b>



Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
<b>SEMESTER II</b>						
LANG	23LTAM21/ 23LHIN21/ 23LFRE21	Tamil- II / Hindi-II / French- II	3	0	0	3
ENG	23LENG21	English- II	3	0	0	3
CORE	23CBCY21	Object Oriented Programming Languages	4	1	0	5
CORE	23CBCY22	Mobile and Web Application Security	3	1	0	4
CORE	23PBCY21	Object Oriented Programming Languages Lab	0	0	4	2
CORE	23BMA002	Mathematics – II	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>			<b>19</b>	<b>2</b>	<b>4</b>	<b>23</b>

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
<b>SEMESTER III</b>						
CORE	23CBCY31	Problem Solving using Python Programming	4	0	0	4
CORE	23CBCY32	Advanced Database Systems	4	0	0	4
CORE	23CBCY33	Information Security and Audit Monitoring System	4	0	0	4
CORE	23CBCY34	Internet of Things (IOT)	3	1	0	4
CORE	23PBCY31	Problem Solving using Python Programming Lab	0	0	4	2
CORE	23PBCY32	Advanced Database Systems 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	-	-	-	-
TOTAL			19	1	8	24

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
<b>SEMESTER IV</b>						
CORE	23CBCY41	Data Communication and Networking	4	1	0	5
CORE	23CBCY42	Software Engineering	4	0	0	4
CORE	23CBCY43	Firewall and Internet Security	3	1	0	4
CORE	23CBCY44	Cloud Computing and its Security	4	0	0	4
CORE	23PBCY41	Network Communication Lab	0	0	4	2
SEC	23SSKU31	Soft Skills III / Sector Skill Council Course	2	0	0	2
SEC		Internship / Capability Enhancement Programme / Industrial Visit	0	0	2	2
<b>TOTAL</b>			<b>17</b>	<b>2</b>	<b>6</b>	<b>23</b>

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
<b>SEMESTER V</b>						
CORE	23CBCY51	Applied Cryptography	4	0	0	4
CORE	23CBCY52	Artificial Intelligence	4	0	0	4
CORE	23CBCY53	Intrusion Detection and Prevention System	4	0	0	4
CORE	23PBCY51	Cryptography Lab	0	0	4	2
DSE	23DBCY41	Discipline Specific Elective-I	3	0	0	3
DSE	23DBCY51	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>			<b>18</b>	<b>0</b>	<b>8</b>	<b>22</b>

Category	Code No.	Course	Hours/Week			Credits
			Lecture	Tutorial	Practical	
<b>SEMESTER VI</b>						
CORE	23CBCY61	Cyber Crime Investigation and Digital Forensics	4	0	0	4
CORE	23CBCY62	Operating Systems and Security	4	0	0	4
CORE	23PBCY63	Cyber Crime Investigation and Digital Forensics Lab	0	0	4	2
DSE	23DBCY52	Discipline Specific Elective-III	3	0	0	3
DSE	23DBCY61	Discipline Specific Elective-IV	3	0	0	3
DSE / GE		Generic Elective	2	0	0	2
SEC		Entrepreneurship Development	2	0	0	2
DE	23RBCY61	Project Work	0	0	8	4
SEC		Technical Seminar / Innovation Council / Start up Initiative	0	0	2	1
<b>TOTAL</b>			<b>18</b>	<b>0</b>	<b>14</b>	<b>25</b>

**CA- Continuous Assessment**

**SEE - Semester End Examination**

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

	Robotic Process Automation
	Security Architecture
	Cyber Threat & Model
	Biometric Security
	Block Chain & Crypto currency
	Penetration testing
	Big data & IoT security
	Ethical hacking
	Risk management in Cyber Security
	Database security
	Mobile, wireless, VoIP security
	Hardware Security
	Cyber Laws in India
	Management Information System
	Software Quality Assurance
	Ecommerce
	System Software
	Multimedia and its Applications

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

	Advanced Excel
	Office Automation Tools
	MySQL

### **LIST OF ABILITY ENHANCEMENT COMPULSORY COURSES**

	Communication Skill
<b>23EVS201</b>	Environmental Science

### **LIST OF SKILL ENHANCEMENT COURSES**

23SSKU11	Soft Skills-I
23SSKU21	Soft Skills-II
23SSKU31	Soft Skills-III
	Responsive Web designing
	Entrepreneurship Development
	Technical Seminar

# **SEMESTER I**



பாடக் குறியீட்டு எண்: 23LTAM11  
பருவம்-1, தமிழ்மொழிப்பாடம்-1,  
பகுதி-1, தகுதிப்புள்ளி: 3,  
வாரப் பாட நேரம்: 3.

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 மலர்கள்** தொகுப்பில் **காகிதப்பூக்கள்** என்னும் தலைப்பிலான கவிதை.
2. அப்துல் ரகுமான் - **ஆலாபனை** தொகுப்பில் **போட்டி** என்னும் தலைப்பிலான கவிதை
3. ஈரோடு தமிழன்பன் - **ஒரு வண்டி சென்ரியு** தொகுப்பில் தேர்ந்தெடுக்கப்பட்ட சென்ரியு கவிதைகள்
4. ஆண்டாள் பிரியதர்ஷினி - **முத்தங்கள் தீர்ந்துவிட்டன** தொகுப்பில் **'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 அக்காடெமி, 2007.
6. செம்மொழி தமிழின் சிறப்பியல்புகள் - முனைவர் மறைமலை இலக்குவனார்;  
<https://www.youtube.com/watch?v=HHZnmJb4jSY>
7. பாடநூல் தேடலுக்கான இணையம் - <https://archive.org/>

	<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 (prashasanik vakyansh: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 ’by Kumar 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, ardha sarkaari pathra, kaaryalaya aadesh), Technical words: takniki shabd-25.	<b>9</b>

**TOTAL HOURS: 45**

**Course Outcome:**

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

**CO 1:** Students will be familiar with official letter writing.

**CO 2:** Sill understands their responsibility in the society.

**CO 3:** Students will be molded 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.



	<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 I INTRODUCTION***

**9**

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

***UNIT II- LECON 1-3***

**9**

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

***UNIT III-LECON 4-6***

**9**

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

***UNIT IV-LECON 7-9***

**9**

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

***UNIT V- COMPOSITION :***

**9**

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

**TOTAL HOURS: 45**

## **Course Outcome:**

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

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

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

**CO 3:** This imparts the additional information in terms of general in the sense of geographical and culture.

**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:***

1. 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/>

	<b>ENGLISH – 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>

### ENGLISH I – PROSE

#### Course Objective: ( Skill Development)

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

#### **UNIT I** **09**

1. Dangers of Drug Abuse - Hardin B Jones
2. Tight Corners - E. V. Lucas

#### **UNIT II** **09**

3. Futurology - Aldous Huxley
4. If You are Wrong, Admit it - Dale Breckenridge Carnegie

#### **UNIT III** **09**

5. Industry - Dr.M.Narayana Rao & Dr.B.G.Barki
6. Turning Point of My Life - A.J Cronin

#### **UNIT IV** **09**

7. Excitement - Mack R. Douglas
8. The Kanda Man Eater - Jim Corbett

#### **UNIT V** **09**

9. Vocabulary and Exercises under the Lessons

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

**TOTAL HOURS: 45**

#### **Course Outcome**

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

- CO 1:** Examine the language of prose.
- CO 2:** Utilize instructions on fundamentals of grammar
- CO 3:** Develop their own style of writing after studying diverse prose essays.
- CO 4:** Classify different essays on the basis of their types.
- CO 5:** Critically comment on the textual content of prose.

**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 Chithra Pub.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 Objective:**

To express algorithms and draw flowcharts in a language independent manner. Write, compile and debug programs in C language. Use different data types in a computer program. To describe the techniques for creating program modules in C using functions and recursive functions. To provide an overview of principles of Embedded System. To provide a clear understanding of role of firmware, operating systems in correlation with hardware systems.

**UNIT- I INTRODUCTION TO C PROGRAMMING****15**

Introduction- Algorithm, Pseudo code, Flow chart, Identifiers, Data Types, Variables, Constants, Input / Output, Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Storage classes-auto, register, static, extern, scope rules,

**UNIT-II CONTROL STRUCTURES AND FUNCTIONS****15**

Statements- Selection Statements– if and switch statements, loops- while, for, do-while, Functions- Introduction to Structured Programming, Functions- basics, user defined functions, call by value, call by reference.

**UNIT-III ARRAYS AND POINTERS****15**

Arrays– Basic concepts, one-dimensional arrays, two – dimensional arrays, multidimensional arrays, arrays to functions, recursive functions, Pointers – pointers to pointers, Pointer Applications, Arrays and Pointers, Pointer Arithmetic, memory allocation functions, array of pointers, command –line arguments, Introduction to structures and unions.

**UNIT – IV INTRODUCTION TO EMBEDDED SYSTEMS****15**

Definition of Embedded System, Embedded Systems vs General Computing Systems, History

of Embedded Systems, Classification of Embedded Systems, Major application areas, Purpose of Embedded Systems, Characteristics and Quality attributes of Embedded Systems.

## **UNIT– V EMBEDDED C PROGRAMMING**

**15**

The Typical Embedded System - Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System components. Embedded Firmware Design and Development- Embedded Firmware Design, Embedded Firmware Development Languages, Introduction to Softwares, Kiel Compiler, Proteus, Introduction to Embedded C- Difference between C & Embedded C, Advantages of Embedded C, Embedded C Program: Basics, Keywords, Data Types, Structure, Components, Programming style, Applications of the Embedded C Program.

**Total: 75 Hours**

### **Course Outcome:**

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

- CO-1:** To teach how to write modular, efficient and readable C programs. To impart knowledge in creating and using Arrays of the C data types
- CO-2:** Design programs involving decision structures, loops, arrays and functions.
- CO-3:** Identify the difference between call by value and call by reference.
- CO-4:** Expected to understand the selection procedure of processors in the embedded domain.
- CO-5:** Design procedure of embedded firm ware.

### **Books for References:**

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F.Gilberg, Third Edition, Cengage Learning.
2. Balaguruswamy, “Programming in ANSI C”, 8<sup>th</sup> Edition, McGraw Hill Education, ISBN: 978-93-5316-513-0.
3. Yashavant P. Kanetkar, “Let Us C”, 16<sup>th</sup> Edition, 2019, BPB Publications, ISBN: 978- 93-8728-449-4.
4. The C Programming Language by Brian Kernighan and Dennis Ritchie 2nd edition.
5. Shibu K V, “Introduction to Embedded Systems”, Second Edition, Mc Graw Hill.
6. Rajkamal, Embedded Systems Architecture, Programming and Design, Tata McGraw-

Hill.

7. Frank Vahid and Tony Givargis, “Embedded Systems Design” - A Unified Hardware/Software Introduction, John Wiley
8. <https://www.electronicshub.org/basics-of-embedded-c-program/>
9. <https://www.mygreatlearning.com/blog/embedded-c/>

**Course Objective:**

This course provides the foundation for understanding the key issues associated with protecting information assets. The purpose of the course is to provide the student with an overview of the field of information security and assurance.

**UNIT I INTRODUCTION****12**

Introduction to Cyber Security - Importance and challenges in Cyber Security - Cyberspace - Cyber threats - Cyber warfare - CIA Triad - Cyber Terrorism - Cyber Security of Critical Infrastructure - Cyber security -Organizational Implications.

**UNIT II HACKERS AND CYBER CRIMES****12**

Types of Hackers - Hackers and Crackers - Cyber-Attacks and Vulnerabilities - Malware threats - Sniffing - Gaining Access - Escalating Privileges - Executing Applications - Hiding Files - Covering Tracks - Worms - Trojans - Viruses - Backdoors

**UNIT III ETHICAL HACKING AND SOCIAL ENGINEERING****12**

Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance - Threat Modeling - Enterprise Information Security Architecture - Vulnerability Assessment and Penetration Testing - Types of Social Engineering - Insider Attack - Preventing Insider Threats - Social Engineering Targets and Defense Strategies.

**UNIT IV CYBER FORENSICS AND AUDITING****12**

Introduction to Cyber Forensics - Computer Equipment and associated storage media - Role of forensics Investigator - Forensics Investigation Process - Collecting Network based Evidence - Writing Computer Forensics Reports - Auditing - Plan an audit against a set of audit criteria - Information Security Management System Management. Introduction to ISO 27001:2013.

## **UNIT V CYBER ETHICS AND LAWS**

**12**

Introduction to Cyber Laws - E-Commerce and E-Governance - Certifying Authority and Controller - Offences under IT Act- Computer Offences and its penalty under IT Act 2000 - Intellectual Property Rights in Cyberspace.

**Total: 60 Hours**

### **Course Outcome:**

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

**CO-1:** Understand the broad set of technical, social & political aspects of Cyber Security.

**CO-2:** Explore about Various types of Hackers and Threats and ways of sniffing.

**CO-3:** Understand the importance of ethical hacking tool and Process.

**CO-4:** Implementing ethical hacking tools in an organization.

**CO-5:** Apply methods for authentication, access control, intrusion detection and prevention and conduct research in Cyber Security.

### **Books for References:**

1. Donaldson, S., Siegel, S., Williams, C.K., Aslam, A., “Enterprise Cyber security -How to Build a Successful Cyber defense Program against Advanced Threats”, Apress, 1<sup>st</sup> Edition, 2015.
2. Nina Godbole, Sumit Belapure, “Cyber Security”, Willey, 2011.
3. Roger Grimes, “Hacking the Hacker”, Wiley, Ist Edition, 2017.
4. Cyber Law by Bare Act, Govt of India, It Act 2000.

**Course Objective:**

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

**LIST OF PROGRAMS:**

1. Write a C program to find grade of a list of students given their marks.
2. Write a C program for counting the number of vowels, consonants, words, white spaces in a line of text and array of lines.
3. Write a C program for palindrome.
4. Write a C program for Fibonacci sequence.
5. Write a C program to find GCD of two numbers.
6. Write a program to find NCR and NPR.

**Embedded C**

1. Write a simple program to show a delay.
2. Write a loop application to copy values from P1 to P2.
3. Write a C program for counting the no of times that a switch is pressed & released.
4. Write a simple program to create a portable hardware delay.
5. Write a C program to test loop time outs.
6. Develop & implement a program for intruder alarm system

**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**

**Course Outcome:**

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

**CO 1:** Critically evaluate the underlying assumptions of analysis tools and relations of Set Theory

**CO 2:** Understand and discuss the applications of matrices and utilizes.

**CO 3:** Discuss critically the uses and limitations of Theory of equations

**CO 4:** Describe and discuss the key terminology, concept tools and techniques used in trigonometry

**CO 5:** Discuss and describe the maxima and minima in detailed ways and the applications of partial differential equations.

**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. ManickavasagamPillai – Ancillary Mathematics, S. Viswanathan Printers, 1986, Chennai.

**REFERENCE BOOKS**

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

**WEB RESOURCES:**

1. [machinelearningmastery.com/gentle-introduction-linear-algebra/](http://machinelearningmastery.com/gentle-introduction-linear-algebra/)  
[www.geeksforgeeks.org/trigonometry/](http://www.geeksforgeeks.org/trigonometry/)



## **SEMESTER II**

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)

**அலகு 2: சிற்றிலக்கியம்**

9 மணி நேரம்

முத்தொள்ளாயிரம்

1. சேரன் - வீரம் 14, 15 பாடல்கள்
2. சோழன் - காதல் 23, 24 பாடல்கள்
3. பாண்டியன் - நாடு 87, 88 பாடல்கள்
4. தமிழ்விடு தூது - முதல் 20 கண்ணிகள்
5. திருக்குற்றாலக் குறவஞ்சி - மலைவளம் கூறுதல் -  
முதல் 5 பாடல்கள்
6. முக்கூடற்பள்ளு - மூத்த பள்ளி நாட்டு வளம் கூறுதல் 3  
பாடல்கள், இளைய பள்ளி நாட்டு வளம் கூறுதல் 3  
பாடல்கள்.
7. கலிங்கத்துப் பரணி - பாலை பாடியது - முதல் 5  
பாடல்கள்

**அலகு 3: சிறுகதை**

9 மணி நேரம்

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

பேச்சுத் திறன்- விளக்கம் - 9 மணி நேரம்  
 அடிப்படைகள் - வகைகள் - பேச்சுத்திறனின்  
 உடையாடல் - பயிற்சிகள் - மேடைப்பேச்சு -

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

1. கலைச் சொல்லாக்கம் - தேவைகள் - கலைச்சொற்களின் பண்புகள் - அறிவியல் கலைச் சொற்கள் - 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.

#### பாடநூல் தேடலுக்கான இணையம்

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

<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>9</b>
<b>Unit II</b>		‘pitha ‘ by gyanranjan (kahani), Translation - Anuvadak ke gun	<b>9</b>
<b>Unit III</b>	-	jamun ka ped by Krishna chander ‘ (kahani) , Translation Practice	<b>9</b>
<b>Unit IV</b>	-	adhi rath ke baad by Shankar shesh (naatak), Translation Practice	<b>9</b>
<b>Unit V</b>	-	adhi rath ke baad by Shankar shesh (naatak), Translation Practice	<b>9</b>

**TOTAL HOURS: 45**

**Course Outcome**

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

**CO 1:** Students will know the importance & process of translation

**CO 2:** Understand the values of elders in a family & extend their support

**CO 3:** Will know the different writing skills of authors

**CO 4:** Gain knowledge in Hindi literature

**CO 5:** Will acquire knowledge in Hindi Sahithya

**Text/Reference book :**

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&oq=pitha+by+gya&aqs=chrome>.

1.69i57j 0i13j0i22i30.10387j0j4&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)

	<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 tires de la leçon-grammaire ;présent progressif passe récent ou future proche-complément d'Object directe-complément d'objet

**UNIT II- LECON 12-13**

**9**

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

**UNIT III-LECON 14-15**

**9**

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

**UNIT IV-LECON 16-18**

**9**

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

**UNIT V- COMPOSITION:**

**9**

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

**TOTAL HOURS: 45**

**Course Outcome:**

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

**CO 1:** This enables 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:**

1. 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/>

	<b>ENGLISH - 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>

### ENGLISH II – POETRY

**Course Objective: (Skill Development)**

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

<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**

**Course Outcome:**

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

**CO 1:** Learn to employ Poetic expressions in the course of daily speech.

**CO 2:** Prove their better communicative ability.

**CO 3:** Prove their skill in writing sentences with poetic impact.

**CO 4:** Develop different sensibilities in approaching life.

**CO 5:** Solve life's problems as highlighted in the selections.

**Books Prescribed:**

1. Selections from Caribbean Literature. Mahaam Publishers, Chennai.
2. Our Casuarina Tree - Vasan 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/>



## **23CBCY21 OBJECT ORIENTED PROGRAMMING LANGUAGES 4105**

### **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++ 15**

Principles of Object-Oriented Programming – Beginning with C++ - Applications of C++ - Tokens –Keywords- Expressions – Data Types – Storage Classes – Operators –Manipulators- Typecast 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 15**

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 15**

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 15**

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 15**

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: 75 Hours**

**Books for Reference:**

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 write object-oriented programs of moderate complexity in Java. An understanding the concepts of class, objects and methods in java and strings.

**CO-5:** An ability to create packages, accessing a package and adding a class to package and threads.

**Course Objective:**

To address the growing threat to mobile devices & web applications, networks and services delivered over the mobile & web application infrastructure. To provide an introduction to mobile and web application security. To explore the unique challenges facing mobile and web security This course also covers the security of mobile and web application services(WAS), such as VoIP, text messaging, WAP and mobile HTML.

**UNIT I INTRODUCTION TO MOBILE SECURITY 12**

Introduction to Mobile Security – Building Blocks – Basic security and cryptographic techniques. - Security of GSM Networks - Security of UMTS Networks -LTE Security -WiFi and Bluetooth Security - SIM/UICC Security

**UNIT II MOBILE SECURITY IMPLEMENTATION 12**

Mobile Malware and App Security- Android Security Model - IOS Security Model -Security Model of the Windows Phone - SMS/MMS, Mobile Geo location and Mobile Web Security- Security of Mobile VoIP Communications - Emerging Trends in Mobile Security.

**UNIT III SECURITY FUNDAMENTALS 12**

Introduction to WWW security-Input Validation-Attack surface Reduction-Classifying and prioritizing threats-Hacking Methodology.

**UNIT IV WEB APPLICATION SECURITY PRINCIPLES 12**

Authentication-Authorization-Browser Security Principles-Cross site Scripting-Cross site Request Forgery.

**UNIT V CASE STUDY 12**

Mobile Application Protection Suite (MAPS): Find & Fix Security issues – Evaluate smart phone security issues-Web Applications Security and Vulnerability Analysis Financial Web Applications Security Audit – Securing Web Applications

**Total:60 Hours**

**Course Outcome:**

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

**CO-1:** Detect and Classify Mobile and Web application security threats.

**CO-2:** Knowledge and understanding of Basics of Mobile and web application security.

**CO-3:** To be familiar with Mobile and web app security designs using available secure solutions.

**CO-4:** To apply computer systems concepts to manage the scalability of the web application, and provide prominent service to large numbers of simultaneous users.

**CO-5:** To apply computer security concepts to designing a web application which is robust to known and unknown attacks.

**Books for References:**

1. Himanshu Dwiwedi, Chris Clark and David Thiel, “Mobile Application Security”, 1st Edition, 2010.
2. Bryan Sullivan, Vincent Liu, “Web Application Security-A Beginner’s Guide”, Mc Graw Hill, 1<sup>st</sup> edition, 2011.
3. Michael Cross, “Developer’s Guide to Web Application Security”, Syngress Publications, 1<sup>st</sup> edition, 2007.
4. Nouredine Boudriga, “Security of Mobile Communications”, 2009.

## **23PBCY21 OBJECT ORIENTED PROGRAMMING LANGUAGES LAB 0042**

### **Course Objective:**

The purpose of this course is to introduce to 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.

### **LIST OF 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:**

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

**UNIT-I INTEGRAL CALCULUS****12**

Integral calculus: Integration – Definite integrals – Bernoulli's formula -Reduction formula for

$$\int \sin^n x dx, \int \cos^n x dx, \int \tan^n x dx, \int x^n e^{ax} dx$$

**UNIT-II DIFFERENTIAL EQUATIONS****12**

Ordinary Differential Equations: First order of higher degree equations – Second order and non-homogenous linear differential equations with constant coefficient. Partial Differential Equations: Formation of partial differential equations by eliminating arbitrary constants and arbitrary function- Solutions of four standard types of first order equation-Lagrange method of solving linear partial differential equation  $Pp + Qq = R$

**UNIT-III FOURIER SERIES****12**

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

**UNIT-IV LAPLACE TRANSFORM****12**

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

**UNIT – V VECTOR DIFFERENTIATION****12**

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

**TOTAL : 60 HOURS****Course Outcome:**

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

**CO 1:** Discuss the key terminology, concept tools and techniques used in Integral calculus

**CO 2:** Understand and discuss the applications of differential equations.

**CO 3:** Discuss the uses, limitations and applications of Fourier series

**CO 4:** Evaluate and understand of Laplace transform and its applications

**CO 5:** Discuss the key terminology, concept tools and techniques used in Vector Differentiation.

**TEXT BOOKS:**

1. P. Kandaswamy and K.Thilagavathy, Allied Mathematics paper II, 2<sup>nd</sup> Semester, S.Chand Publishing Pvt. Ltd. 1<sup>st</sup> Edition, 2004
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> Edition 2009.
2. A.Singaravelu, Allied Mathematics, Meenakshi Agency, 2007.
3. P. Duraipandian and S.UdayaBaskaran, Allied Mathematics, Vol. I & II Muhil Publications, Chennai.

**WEB SOURCES:**

1. [www.cfm.brown.edu/people/dobrush/am33/Mathematica/ch6/laplace.html](http://www.cfm.brown.edu/people/dobrush/am33/Mathematica/ch6/laplace.html)
2. [www.mathsisfun.com/calculus/differential-equations.html](http://www.mathsisfun.com/calculus/differential-equations.html)

# **SEMESTER III**



**Course Objective:**

The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language. It is an interpreted language, with a rich programming environment. Student interested in using computation to enhance their problem-solving abilities.

**UNIT I INTRODUCTION TO PYTHON      12**

Algorithms - building blocks of algorithms: statements – state - control flow –functions- Notation: pseudo code - flow chart -programming language - algorithmic problem solving - simple strategies for developing algorithms: iteration, recursion. Define Python - Advantages of Python - History - Features - Uses - Variable and Data Types - Python Interpreter - Identifiers and keywords - Literals - Operators(Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator) - Defining Functions.

**UNIT II OBJECTS AND DATA STRUCTURE      12**

Structure of a Python Program - Elements of Python Input and Output Statements - Control statements (Branching, Looping, Conditional Statement) - Exit function, Difference between break, continue and pass - Default arguments - Multiple assignment - while statement - for statement - A find function - Looping and counting.

**UNIT III FUNCTIONS, STRINGS AND LISTS      12**

Strings and Lists – String Manipulation - Accessing Strings - Basic Operations with String slices - Function and Methods - Recursion, Stack diagrams for recursive functions. List - Working with list - List values - Accessing elements - List membership - List operations - List deletion - Cloning lists - Nested lists- Using Python as calculator - Python shell - Indentation and Atoms.

## **UNIT IV OBJECT ORIENTED PROGRAMMING**

**12**

Introduction to Classes - Objects and Methods - Standard Libraries - Tuples - Accessing tuples - Exception handling - Iteration - Conditional execution - Return statement and Operations – Opening and closing file - Reading and writing files - Dictionaries - Working with dictionaries - Exception Handling - Except clause – Try, Finally clause.

## **UNIT V CASE STUDY**

**12**

Basic Syntax - Setting up path - Working with Python – CGI – Networking – Multithreading - Generators and closures - Importing module - Math module - Packages - Composition – Sample Programs- Analyze Sales Outcome in Business - Automate the School Details to Analyze Performance.

**Total: 60 Hours**

### **Course Outcome:**

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

- CO-1:** To Develop a basic understanding of programming and the Python programming language.
- CO-2:** To learn how to identify Python object types.
- CO-3:** To define the structure and components of a Python program.
- CO-4:** To learn how to write loops and decision statements in Python.
- CO-5:** To learn how to build and package Python modules for reusability.

### **Books for References:**

1. Paul Barry, Mark Lutz, “Programming Python: Powerful Object- Oriented Programming”, (4th Edition), 2011.
2. Allen Downey, Jeff Elkner and Chris Meyers, “ Learning with Python: How to Think Like a Computer Scientist” ,2016.
3. John Zelle , “Python Programming: An Introduction to Computer Science”, 3rd Edition, January 2016.
4. Michael Urban and Joel Murach,” Python Programming”, Shroff/Murach, 2016.
5. Mark Lutz, “Programming Python”, O`Reilly, 4th Edition, 2010.

6. Guido van Rossum and Fred L. Drake Jr, “An Introduction to Python – Revised and updated for Python 3.2”, Network Theory Ltd., 2011.
7. John V Guttag, “Introduction to Computation and Programming Using Python“, Revised and expanded Edition, MIT Press, 2013.
8. Robert Sedgewick, Kevin Wayne, Robert Dondero, “Introduction to Programming in Python: An Inter-disciplinary Approach”, Pearson India Education Services Pvt. Ltd., 2016.

**Web Sources:**

1. Reference Link: [www.py4inf.com](http://www.py4inf.com)
2. Reference Link: [www.pythonlearn.com](http://www.pythonlearn.com)
3. <https://www.tutorialspoint.com/python>

**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, Save point. 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**

**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.

**Books for References:**

1. Date C. J, “An Introduction to Database Systems”, Addison Wesley Longman, 8th Edition, 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. Charles F. Goldfarb, Paul Prescod, "The XML Handbook, Prentice Hall", 5th Edition, 2004.
5. Thomas M. Connolly, Carolyn Begg, "Database Systems: Practical approach to Design, Implementation and Management", Pearson Education Limited, 6th edition, 2012.

## **23CBCY33 INFORMATION SECURITY AND AUDIT MOINITORING SYSTEM 4 0 0 4**

### **Course Objective:**

To introduce the fundamental concepts and techniques in computer and network security, giving students an overview of information security and auditing, and to expose students to the latest trend of computer attack and defense.

### **UNIT I A MODEL FOR INTERNETWORK SECURITY 12**

Conventional Encryption Principles & Algorithms (DES, AES, RC4, Blowfish), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution, Public key cryptography principles, public key cryptography algorithms (RSA, Diffie-Hellman, ECC), public Key Distribution.

### **UNIT II APPROACHES OF MESSAGE AUTHENTICATION 12**

Secure Hash Functions (SHA-512, MD5) and HMAC, Digital Signatures, Kerberos, X.509 Directory Authentication Service, Email Security: Pretty Good Privacy (PGP) IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

### **UNIT III WEB SECURITY REQUIREMENTS 12**

Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Firewalls: Firewall Design principles, Trusted Systems, Intrusion Detection Systems.

### **UNIT IV AUDITING FOR SECURITY 12**

Introduction, Basic Terms Related to Audits, Security audits, The Need for Security Audits in Organization, Organizational Roles and Responsibilities for Security Audit, Auditors responsibility in Security Audits, Types of Security Audits.

### **UNIT V CASE STUDY 12**

Approaches to Audits, Technology based Audits Vulnerability Scanning and Penetration Testing, Resistance to Security Audits, Phase in security audit, Security audit Engagement Costs and other aspects, Budgeting for security audits, Selecting external Security Consultants, Key Success

factors for security audits.

**Total: 60 Hours**

**Course Outcome:**

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

**CO-1:** Describe various information security issues and encryption principles.

**CO-2:** Identify IP addresses range owned/used by the organization/systems in target.

**CO-3:** Implemented measures such as policies, systems to protect organizations from unauthorized access/transactions.

**CO-4:** Identify threats within the organization and surrounding the information systems.

**CO-5:** Perform external audit through professional agencies to ensure that organizations security systems.

**Books for References:**

1. W.Stalling, "Cryptography and Network Security Principles and Practices", 7th Edition, Pearson of India, 2018.
2. A.J. Elbirt, "Understanding and Applying Cryptography and Data Security", CRC Press, Taylor Francis Group, New York, 2015.
3. M. Merkow and J. Breithaupt," Information Security: Principles and Practices", Pearson Education, 2006.
4. Mark Stamp , "Information Security", Wiley – INDIA, 2006.
5. Robert Bragg, Mark Rhodes, " Network Security: The complete reference", TMH, 2017.
6. Rick Lehtinen, Deborah Russell & G. T. Gangemi Sr., " Computer Security Basics" , SPD O'REILLY 2006.
7. Wenbo Mao, " Modern Cryptography", Pearson Education 2007.
8. Whitman, " Principles of Information Security", CENGAGE Learning Custom Publishing; 4th ed. Edition, 2011.



**Course Objective:**

To understand the fundamentals of Internet of Things and to apply the concept 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**

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**

**Course Outcome:**

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

**CO-1:** To assess the vision and introduction of IoT and 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 :** Able to understand building blocks of Internet of Things and characteristics.

**Book for References:**

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 a New Age of Intelligence”, 1st Edition, Academic Press, 2014.
2. Peter Waher, “Learning Internet of Things”, PACKT publishing, Birmingham, Mumbai, 2005.
3. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2012.

**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.

**LIST OF PROGRAMS:**

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:**

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.

# **SEMESTER IV**

**Course Objective:**

To familiarize the students with networking concepts, to understand OSI reference model for networking protocols, TCP/IP implementation, LANs/WANs, internetworking technologies, Routing and Addressing.

**UNIT I INTRODUCTION TO DATA COMMUNICATION****15**

Computer Network- Advantages and Disadvantages of Computer Network- Communication system- Analog and digital data-Network as platform- The Elements of Network- Converged network- The Architecture of Internet- Trends in Networking- Data Transmission- Analog Transmission- Digital Transmission-Transmission impairment- Introduction to LANs, WANs and Internetworks.

**UNIT II APPLICATION LAYER AND TRANSPORT LAYER****15**

Application Layer Functionality and Protocols- Introduction, making provision for applications and services- Application layer protocols and services- OSI Transport Layer- The TCP protocol – communicating with reliability, Managing TCP sessions-The UDP protocol communicating with low overheads.

**UNIT III NETWORK LAYER AND ADDRESSING****15**

OSI Network Layer- Introduction, Networks-dividing host into groups, Routing –How our data packets are handled- Routing process- Congestion Control Algorithm-Addressing the Network - IPv4, Introduction-Address for different purpose- Assigning address- Calculating address-testing the Network layer, Subnetting.

**UNIT IV DATA LINK LAYER AND PHYSICAL LAYER****15**

Introduction-Data Link Layer-Accessing the media -Media Access Control Techniques-Media Access Control Addressing and Framing Data- Flow Control- Stop and Wait-Sliding Window- Error Detection- Error Control-HDLC Physical Layer-Data Encoding- Digital data-digital signals-Analog signals- Analog data- Synchronous and Asynchronous transfer- Multiplexing-

Frequency division multiplexing- Time division multiplexing Transmission- Twisted pair- Coaxial cable- Optical Fibers- Wireless transmission- Microwaves- Radio waves- Infrared.

## **UNIT V ETHERNET AND CASE STUDY**

**15**

Overview of Ethernet, Ethernet Communication through the LAN- The Ethernet Frame- Ethernet Media Access Control - Ethernet Physical Layer- Hubs and Switches-Address Resolution Protocol (ARP) - Case Study on Planning and Cabling Networks - LANs-Making the Physical connections- Device Selection Factors- Device Interconnecting.

**Total: 75 Hours**

### **Course Outcome:**

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

**CO-1:** Understand the concept of Computer networks and Data Transmission.

**CO-2:** Understand different types of protocols used for transmission of data.

**CO-3:** Apply Algorithm for congestion control.

**CO-4:** Apply error detection and control methods.

**CO-5:** Model the LAN and WAN configuration using different media.

### **Books for References:**

1. Behrouz Forouzan, “Data Communications and Networking”, Edition 5, Tata McGraw-Hill., 2012.
2. Andrews S. Tanenbaum, David J Wetherall, “Computer Networks”, Edition 5, Pearson Education, 2012.
3. William Stallings, “Data & Computer Communications”, PHI, Edition 6, 2012.
4. Jerry Fitzgerald, Alan Dennis, “Business Data Communications & Networking” , John Wiley & Sons Inc, 2010.

**Course Objective:**

This course introduces the basic concepts of software Engineering such as Planning, Design, Coding, Quality Assurance, Formal Verification, Code Metrics, Test Plans, Walk through and Distributed database.

**UNIT I FUNDAMENTAL CONCEPTS OF SOFTWARE ENGINEERING 12**

Introduction - Generic view of Software Process- Software Engineering: A Layered Technology - A Process Framework - Software Process Models-Management spectrum - Software project management-Measures and metrics

**UNIT II REQUIREMENT ANALYSIS 12**

Software project planning – scope – resources-decomposition techniques- empirical estimation model- cocomo model - Risk analysis - Risk identification - Risk projection-Risk management- Monitoring RMMM plan.

**UNIT III SOFTWARE DESIGN CONCEPTS 12**

Design Concepts - Quality Elements, Quality Attributes- Fundamentals of Software Design concepts- Design Models- Design Elements - Abstraction – Modularity - Coupling and Cohesion - Data flow diagram – Structured flowchart - Design techniques

**UNIT IV SOFTWARE TESTING 12**

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

**UNIT V SOFTWARE MANAGEMENT 12**

Change Management - Software Configuration Management- The SCM Repository- The SCM Process-Quality Management - Quality Concepts - Software Quality Assurance - Software



Review- Formal Technical Reviews- Formal Approaches to SQA- Software Reliability- The ISO 2000 Quality Standards- The SQA Plan.

**Total: 60 Hours**

**Course Outcome:**

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

**CO-1:** Identify, formulate, analyze, and solve problems, as well as identify the computing requirements appropriate to their solutions.

**CO-2:** Learn to design software and apply strategies of project management.

**CO-3:** To study and practice methods for analysis, design, testing, and implementation of large, Complex software systems

**CO-4:** To study the various perspectives on software quality and change management.

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

**Books for References:**

1. Roger Pressman, Software Engineering: A Practitioner's Approach, Sixth Edition, 2005, McGraw Hill. New York.
2. Waman S Jawadekar , Software Engineering: a Primer, First Edition, 2008, Tata McGraw Hill. New Delhi.
3. Deepak Jain, Software Engineering: Principles and Practices, First Edition, 2009, Oxford University Press.
4. James Peters & Witold Pedrycz, Software Engineering: An engineering Approach, First Edition, 2007, Wiley-India.

**Course Objective:**

This course introduces the basic concept of Firewalls, fundamentals of internet security and security architecture, the different kinds of security threats in networks, databases and their solutions.

**UNIT I FIREWALLS AND SECURITY MECHANISM****12**

Introduction – Types of Firewalls – Packet filters – Application gate ways – Limitations of firewalls - Internet Security - Email security – PGP - S/MIME - IP security – Overview – IP Security Architecture Web security - SSL, TLS, SET.

**UNIT III PROGRAM SECURITY****12**

Secure programs – Non-malicious Program Errors – Viruses – Targeted Malicious code – Controls against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project Top 10 Flaws – Common Weakness Enumeration Top 25 Most Dangerous Software Errors.

**UNIT III OPERATING SYSTEM SECURITY****12**

Protected objects and methods of protection- Memory address protection- Control of access to general objects- File protection mechanism-Authentication: Authentication basics- Password-Challenge- response- Biometrics.

**UNIT IV SECURITY IN DATABASES****12**

Security requirements of database systems – Reliability and Integrity in databases – Two Phase Update – Redundancy/Internal Consistency – Recovery – Concurrency/Consistency – Monitors – Sensitive Data – Types of disclosures – Inference.

**UNIT V SECURITY IN NETWORKS AND CASE STUDY****12**

Threats in networks – Encryption – Virtual Private Networks – PKI – SSH – SSL – IPSec –

Content Integrity – Access Controls – Wireless Security – Honeypots – Traffic Flow Security –  
Firewalls – Intrusion Detection Systems – Secure e-mail.

**Total: 60 Hours**

**Course Outcome:**

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

**CO-1:** To understand the fundamentals of firewalls and internet security.

**CO-2:** To understand the concept of controls against program threat and to find the vulnerabilities in programs.

**CO-3:** To learn about the concept of database security and to write secured transactions in databases.

**CO-4:** To expose the students to the proposals for multilevel security.

**CO-5:** To understand the concept of Intrusion detection systems and virtual private networks.

**Books for References:**

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, “Security in Computing”, Fourth Edition, Pearson Education, 2007.
2. Matt Bishop, “Computer Security: Art and Science”, Pearson Education, 2003.
3. William Stallings, “Cryptography and Network Security: Principles and Practices”, Fifth Edition, Prentice Hall, 2010.
4. Michael Howard, David LeBlanc, John Viega, “24 Deadly Sins of Software Security: Programming Flaws and How to Fix Them”, First Edition, Mc Graw Hill Osborne Media, 2009.
5. Kaufman, Perlman, Speciner, “Network Security”, Prentice Hall, 2nd Edition, 2003.
6. Eric Maiwald, “Network Security: A Beginner’s Guide”, TMH, 1999.
7. Macro Pistoia, Java Network Security, Pearson Education, 2nd Edition, 1999.
8. Whitman, Mattord, Principles of Information Security, Thomson, 2nd Edition, 2005.

**Course Objective:**

The course introduces the fundamental concepts of cloud computing, its services and Tools. It concentrates the basic concepts of security systems and cryptographic protocols, which are widely used in the design of cloud security. The issues related multi tenancy operation, virtualized infrastructure security and methods to improve virtualization security are also dealt with in this course.

**UNIT 1 CLOUD COMPUTING****12**

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

**UNIT 2 WEB-BASED APPLICATION****12**

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

**UNIT III SECURITY CONCEPTS****12**

Confidentiality – Privacy – Integrity – Authentication - Non-repudiation – Availability - Access control Defence in depth – Least privilege - How these concepts apply in the cloud - Importance in PaaS, IaaS and SaaS. - User authentication in the cloud- Cryptographic Systems: Symmetric cryptography – Stream ciphers - Block ciphers - Modes of operation - Public-key cryptography – Hashing - Digital signatures - Public-key infrastructures - Key management - X.509 certificates - OpenSSL.

**UNIT IV MULTI-TENANCY ISSUES****12**

Isolation of users/VMs from each other - Virtualization System Security Issues- ESX and ESXi Security - ESX file system security - Storage considerations - Backup and Recovery - Virtualization System Vulnerabilities - Management console vulnerabilities - Management

server vulnerabilities - Administrative VM vulnerabilities - Guest VM vulnerabilities - Hypervisor vulnerabilities - Hypervisor escape vulnerabilities - Configuration issues - Malware.

## **UNIT V LEGAL, COMPLIANCE ISSUES AND CASE STUDIES**

**12**

Responsibility - Ownership of data - Right to penetration test - Examination of modern Security Standards - How standards deal with cloud services and virtualization - C compliance for the cloud provider vs. compliance for the customer – Case Studies: Cryptography for Remote Access and Support - A Secure Network for a Private Cloud.

**Total: 60 Hours**

### **Course Outcome:**

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

**CO-1:** To provide students the knowledge of fundamentals and essentials of Cloud Computing.

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

**CO-3:** Compare modern security concepts as they are applied to cloud computing.

**CO-4:** Evaluate the security issues related to multi-tenancy.

**CO-5:** Analyze authentication, confidentiality and privacy issues in cloud computing.

### **Books for References:**

1. Michael Miller, “Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online”, Que Publishing, August 2008.
2. Haley Beard, “Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs”, Emereo Pty Limited, July 2008.
3. Tim Mather, Subra Kumaraswamy, ShahedLatif, “Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance”, O’Reilly Media; 1 edition [ISBN: 0596802765], 2009.
4. Ronald L. Krutz, Russell Dean Vines, “Cloud Security”, [ISBN: 0470589876], 2010.
5. John Rittinghouse, James Ransome, “Cloud Computing” ,CRC Press; 1<sup>st</sup> Edition [ISBN: 1439806802], 2009.
6. J.R. ("Vic") Winkler, “Securing the Cloud” ,Syngress [ISBN: 1597495921] , 2011.

**Course Objective:**

The student learns to work with various Redundancy Check Algorithms, Sliding Window Protocol, Routing Algorithm, Subnetting Procedures.

**LIST OF PROGRAMS:**

1. To detect Errors using Vertical Redundancy Check (VRC).
2. To detect Errors using Longitudinal Redundancy Check (LRC).
3. To detect Errors using Cyclic Redundancy Check (CRC).
4. Socket programming to implement Asynchronous Communication.
5. Socket programming to implement Isochronous Communication.
6. To implement Stop & Wait Protocol.
7. To implement Sliding Window Protocol.
8. To implement the Shortest Path Routing using Dijkstra algorithm.
9. Socket Programming to Perform file transfer from Server to the Client.
10. To implement Remote Procedure call under Client / Server Environment.
11. Code simulating PING and TRACEROUTE commands
12. Implementing of Subnetting

# **SEMESTER V**

**Course Objective:**

To understand the basics of cryptography for learning and to find the vulnerabilities in programs and to overcome them, know the different kinds of security threats in networks and its solution. There are different kinds of security threats in databases and solutions available and to learn about the models and standards for security.

**UNIT I INTRODUCTION TO CRYPTOGRAPHY 12**

Introduction to Cryptography, Security Threats, Vulnerability, Active and Passive attacks, Security services and mechanism, Conventional Encryption Model- Classical Cryptography: Dimensions of Cryptography, Classical Cryptographic Techniques.

**UNIT II BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY 12**

Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES). Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management – Diffie-Hellman Key Exchange-Elliptic curve cryptosystem.

**UNIT III HASH FUNCTIONS AND DIGITAL SIGNATURE 12**

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD4&MD5 Message Digest Algorithm – SHA – HMAC – CMAC – Digital signature and authentication protocols – DSS – Elgamal – Schnorr signature.

**UNIT IV SECURITY PRACTICE AND SYSTEM SECURITY 12**

Authentication applications – Kerberos – X.509 Authentication services – Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls – Firewall designs – SET for E-Commerce Transactions.

**UNIT V E-MAIL SECURITY AND CASE STUDY 12**

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- Internet Key Exchange Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability.

**Total: 60 Hours**

**Course Outcome:**

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

**CO-1:** Apply cryptographic algorithms for encrypting and decryption for secure data transmission.

**CO-2:** Get the knowledge about the security services available for internet and web applications.

**CO-3:** Gain the knowledge of security models and published standards.

**CO-4:** Identify and investigate network security threat.

**CO-5:** Analyze and design network security protocols.

**Books for References:**

1. William Stallings, “Cryptography and Network Security: Principles and Practices”, 6th Edition, Pearson Education Ltd, 2016.
2. Bart Preneel, Christof Paar, Jan Pelzl, “Understanding Cryptography”, Springer-Verlag Berlin Heidelberg, 2010.
3. Atul Kahate, “Cryptography and Network Security”, Mc Graw Hill, 3rd Edition, 2011.
4. Behrouz A.Forouzan, Debdeep Mukhopadhyay, “Cryptography and Network Security”,
5. Tata McGraw Hill Second Edition, 2010.
6. Wenbo Mao, “ Modern Cryptography: Theory and Practice”, Prentice Hall PTR, 1<sup>st</sup> Edition, 2003.
7. Douglas R. Stinson , “Cryptography: Theory and Practice”, CRC press, 3<sup>rd</sup> Edition, 2005.

**Course Objective:**

The course will address key AI technologies in an attempt to help in understanding their role in cyber security and the implications of these new technologies to the world of politics. AI deficiently will complement and strengthen the cyber security practices and will improve their applications in enhancing our security.

**UNIT I INTRODUCTION TO ARTIFICIAL INTELLIGENCE 12**

Introduction–Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems- Algorithms and Optimization Problems -Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games.

**UNIT II SOFTWARE AGENTS AND APPLICATIONS 12**

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems- AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware –Perception – Planning – Moving.

**UNIT III CYBER SECURITY VULNERABILITIES AND SAFEGUARDS 12**

Cyber Security Vulnerabilities-Overview- vulnerabilities in software-System administration- Complex Network Architectures- Open Access to Organizational Data-Weak Authentication- Unprotected Broadband communications-Poor Cyber Security Awareness- Cyber Security Safeguards - Access control- Cryptography- Deception-Denial of Service Filters-Ethical Hacking- Firewalls-Intrusion Detection Systems- Threat Management.

**UNIT IV SECURING WEB APPLICATION, SERVICES AND SERVERS 12**

Basic security for HTTP Applications and Services- Basic Security for SOAP Services- Identity Management and Web Services- Authorization Patterns- Security Considerations- Challenges - Malware infection, Intrusion detection and Prevention Techniques, Anti-

Malware software- Botnet Detection-Spam filter applications-Hacking incident forecasting- cyber security ratings.

## **UNIT V CYBER FORENSICS AND CASE STUDIES**

**12**

Introduction to Cyber Forensics- Conducting disk-based analysis- Investigating Information- hiding-Scrutinizing E-mail- Tracing Internet access- Tracing memory in real-time-Case study: Cyber Security Regulations- Roles of International Law- Cyber Security Standards-The INDIAN Cyberspace- National Cyber Security Policy 2013.

**Total: 60 Hours**

### **Course Outcome:**

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

**CO-1:** Understand the Future of Artificial Intelligence and cyber security.

**CO-2:** Evaluate the security issues of web applications, services and servers.

**CO-3:** Assess different Cyber Security Vulnerabilities.

**CO-4:** Illustrate the methods and tools used for cybercrime investigation.

**CO-5:** Design a method to solve a problem in different perspective.

### **Books for References:**

1. Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, 2010.
2. James Graham, Richar Howard,Ryan Olson, "Cyber Security Essentials", CRC Press, Tailor and Francis Group, 2011.
3. Nina Godbole, Sunit Belapur, "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Publications, April, 2011.
4. <https://www.cyberralegalservices.com/detail-casestudies.php>.

**Course Objective:**

To prepare students to know regarding the common threats faced today and the necessity of intrusion detection systems for securing the systems. To understand the essential concepts of intrusion detection and prevention. Be familiar with principles and techniques used in intrusion detection and taxonomy of intrusion detection systems. Acquiring knowledge on the state of art of the research in intrusion detection and prevention systems. Enable students to do independent research and be able to model and implement intrusion detection systems.

**UNIT I INTRODUCTION 12**

Understanding Intrusion Detection –Intrusion detection and prevention basics –IDS and IPS analysis schemes, Attacks, Detection approaches –Misuse detection – anomaly detection – specification-based detection – hybrid detection.

**UNIT II THEORETICAL FOUNDATIONS OF DETECTION 12**

Taxonomy of anomaly detection system –fuzzy logic –Bayes theory –Artificial Neural networks. Support vector machine –Evolutionary computation –Association rules –Clustering.

**UNIT III ARCHITECTURE AND IMPLEMENTATION 12**

Centralized – Distributed –Cooperative Intrusion Detection -Tiered architecture.

**UNIT IV JUSTIFYINGINTRUSIONDETECTION 12**

Intrusion detection in security –Threat Briefing –Quantifying risk –Return on Investment (ROI)

**UNIT V CASE STUDY 12**

Tool Selection and Acquisition Process - Bro Intrusion Detection – Prelude Intrusion Detection - Cisco Security IDS -Snorts Intrusion Detection –NFR security Legal Issues and Organizations Standards: Law Enforcement / Criminal Prosecutions –Standard of Due Care –Evidentiary Issues, Organizations and Standardizations.

**Total: 60 Hours**

**Course Outcome:**

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

- CO-1:** Understand the physical location, the operational characteristics and the various functions performed by the intrusion detection and prevention system.
- CO-2:** Understand the taxonomy of the anomaly detections using fuzzy logic.
- CO-3:** To understand the concepts of Prior strong experience in operating system and prior hands-on training.
- CO-4:** Describe how components in different layers inter-operate in the intrusion detection and prevention system.
- CO-5:** Apply intrusion detection alerts and logs to distinguish attack by using SNORT tool.

**Books for References:**

1. Ali A. Ghorbani, Wei Lu, “Network Intrusion Detection and Prevention: Concepts and Techniques”, Springer, 2010.
2. Carl Enrolf, Eugene Schultz, Jim Mellander, “Intrusion detection and Prevention”, McGraw Hill, 2004.
3. Paul E. Proctor, “The Practical Intrusion Detection Handbook “, Prentice Hall, 2001.
4. Ankit Fadia and Mnu Zacharia, “Intrusion Alert”, Vikas Publishing house Pvt., Ltd, 2007.
5. Earl Carter, Jonathan Hogue, “Intrusion Prevention Fundamentals”, Pearson Education, 2006.

**Course Objective:**

This course is that to understand the principles of encryption algorithms, conventional and public key cryptography practically with real time applications.

**LIST OF PROGRAMS:**

1. Write a program to implement Linear Congruential Algorithm to generate 5 pseudo random numbers in C.
2. Write a program to implement Fermat Primality Testing Algorithm in C.
3. Write a program to implement Rabin-Miller Primality Testing Algorithm in C.
4. Write a program to implement the Euclid Algorithm to generate the GCD of an array of 10 integers in C.
5. Write a Java program to perform encryption and decryption using the algorithms:
  6. a) Ceaser Cipher b) Substitution Cipher c) Hill Cipher
7. Write a Java program to perform encryption and decryption using the algorithms:
  8. a) Playfair Cipher b) Vigenere Cipher
9. Write a Java program to implement the DES algorithm logic
10. Write a JAVA program to implement the BlowFish algorithm logic
11. Write a JAVA program to implement the Rijndael algorithm logic.
12. Using Java Cryptography, encrypt the text “Hello world” using BlowFish. Create your ownkey using Java keytool.
13. Write a Java program to implement RSA Algorithm
14. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

# **SEMESTER VI**

**Course Objective:**

To understand the basic concepts of Operating Systems. To explore the process management concepts including scheduling, synchronization, threads and deadlock. To understand the memory, file and I/O management activities of OS To understand the requirements of a trust model. To learn how security is implemented in various operating systems.

**UNIT I OPERATING SYSTEM OVERVIEW 12**

Computer-System Organization — Architecture — Operating-System Operations — Resource Management — Security and Protection — Distributed Systems — Kernel Data Structures — Operating-System Services — System Calls — System Services — Why Applications Are Operating-System Specific — Operating-System Design and Implementation - Operating-System Structure — Building and Booting an Operating System.

**UNIT II PROCESS MANAGEMENT 12**

Process Concept — Process Scheduling — Operation on Processes, Inter-process Communication— Threads — Overview — Multithreading models — Threading issues; CPU Scheduling — Scheduling criteria, Scheduling algorithms; Process Synchronization — critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; Deadlock — System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Detection, Recovery.

**UNIT III MEMORY MANAGEMENT AND FILE SYSTEMS 12**

Main Memory — Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation — Virtual Memory — Demand Paging, Page Replacement, Allocation, thrashing; Allocating Kernel Memory. Mass Storage system - HDD Scheduling - File concept, Access methods, Directory Structure, Sharing and Protection; File System Structure, Directory implementation, Allocation Methods, Free Space Management



**UNIT IV SECURE SYSTEMS AND VERIFIABLE SECURITY GOALS 12**

Security Goals — Trust and Threat Model — Access Control Fundamentals — Protection System — Reference Monitor — Secure Operating System Definition — Assessment Criteria — Information Flow — Information Flow Secrecy Models — Denning’s Lattice Model — Bell LaPadula Model — Information Flow Integrity Models — Biba Integrity Model — Low-Water Mark Integrity — Clark-Wilson Integrity.

**UNIT V SECURITY IN OPERATING SYSTEMS 12**

UNIX Security — UNIX Protection System — UNIX Authorization — UNIX Security Analysis — UNIX Vulnerabilities — Windows Security — Windows Protection System — Windows Authorization — Windows Security Analysis — Windows Vulnerabilities — Address Space Layout Randomizations — Retrofitting Security into a Commercial Operating System — Introduction to Security Kernels.

**Total: 60 Hours**

**Course Outcome:**

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

**CO-1:** To gain understanding on the concepts of operating systems.

**CO-2:** To acquire knowledge on process management concepts including scheduling, synchronization threads and deadlock.

**CO-3:** To have understanding on memory, file and I/O management activities of OS.

**CO-4:** To understand security issues in operating systems and appreciate the need for security models.

**CO-5:** To gain exposure to the operating systems security models of window and UNIX OS.

**Books for References:**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, John Wiley & Sons, Inc., 10<sup>th</sup> Edition, 2021.
2. Trent Jaeger, Operating System Security, Morgan & Claypool Publishers series, 2008.
3. Morrie Gasser, “Building A Secure Computer System”, Van Nostrand Reinhold, New York, 1988.
4. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015.

5. William Stallings, “Operating Systems — Internals and Design Principles”, 9th Edition, Pearson, 2017.
6. Michael Palmer, “Guide to Operating Systems Security”, Course Technology — Cengage Learning, New Delhi, 2008.
7. Introduction to Hardware, Security and Trust, book by Mohammad Tehranipoor, Cliff Wang, Springer, 2012.
8. Gary McGraw, Software Security: Building Security In, Addison Wesley software security series, 2005.

## **23BCY62 CYBER CRIME INVESTIGATION AND DIGITAL FORENSICS 4004**

### **Course Objective:**

To understand the basic concepts of cybercrime and forensics, to create the awareness through simple practical tips and tricks. The students to learn how to avoid becoming victims of cybercrimes. They have familiar with forensics tools and learn to analyze and validate forensics data.

### **UNIT I INTRODUCTION TO CYBERCRIME 12**

Introduction-Classifications of Cybercrimes: E-Mail Spoofing-Spamming-Cyber defamation-Internet Time Theft-Newsgroup Spam-Crimes from Usenet Newsgroup-Industrial Spying-Industrial Espionage- Hacking-OnlineFrauds-PornographicOffenses-SoftwarePiracy-Password Sniffing-Credit Card Frauds and Identity Theft.

### **UNIT II CYBER OFFENSES 12**

Cyber offenses: How Criminals Plan that attack-Categories of Cybercrime, Passive Attack, Active Attacks- Scanning/Scrutinizing gathered Information-Attack on Gaining and Maintaining the System Access-Social Engineering-cyber stalking-Cyber cafe and Cybercrimes. Bottleneck: The Fuel for Cybercrime-Attack Vector and Cloud Computing.

### **UNIT III INTRODUCTION TO COMPUTER FORENSICS 12**

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques – Incident and incident response methodology – Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. – Forensics Technology and Systems – Understanding Computer Investigation – Data Acquisition.

### **UNIT IV DIGITAL FORENSICS 12**

Introduction to Digital Forensics - Forensic Software and Hardware - Analysis and Advanced Tools - Forensic Technology and Practices - Forensic Ballistics and Photography - Face, Iris and Fingerprint Recognition - Audio Video Analysis - Windows System Forensics - Linux System Forensics - Network Forensics.

## UNIT V LAWS AND CASE STUDY

12

Laws and Ethics - Digital Evidence Controls - Evidence Handling Procedures - Basics of Indian Evidence ACT IPC and CrPC - Electronic Communication Privacy ACT - Legal Policies. Case Studies - Cyber Attack on Cosmos Bank- Nasscom Internet fraud-crime using E-Mail in Tamil Nadu- Call Centre Fraud- BSNL unauthorized access- SMS fraud- Phishing in people's account-Credit card fraud.

**Total: 60 Hours**

### **Course Outcome:**

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

**CO-1:** Understand the types of cybercrime and fundamentals.

**CO-2:** Describe the types of cybercrime offenses and attacks.

**CO-3:** Explain computer forensics and use forensics tools.

**CO-4:** Assess the methods and tools used in digital forensics.

**CO-5:** Design a method to solve a problem in different perspective.

### **Books for References:**

1. Nina Godbole, Sunit Belapur, "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Publications, April, 2011.
2. James Graham, Richar Howard, Ryan Olson, "Cyber Security Essentials", CRC Press, Taylor and Francis Group, 2011.
3. Robert Jones, "Internet Forensics: Using Digital Evidence to Solve Computer Crime", O'Reilly Media, October, 2005.
4. Chad Steel, "Windows Forensics: The field guide for conducting corporate computer investigations", Wiley India Publications, December, 2006.
5. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.

### **Web Resources:**

1. <https://www.cyberralegalservices.com/detail-casestudies.php>.
2. <https://rtinagpur.cag.gov.in/uploads/CaseStudies/CaseStudiesonCyberCrimesNOTSENT/>
3. Case Studies on CyberCrimes.pdf.

**Course Objective:**

This Course provides basic insight of Computer Forensics Analysis and to perform E-Mail Investigations. To get deep Knowledge in various Computer Forensic Tools used in Investigation of different Operating System Environments.

**LIST OF PROGRAMS:**

1. Computer Hacking & Network Intrusion.
2. Survey of Latest developments in Cyber Forensics.
3. Registry Editing and Viewing using native tools of OS.
4. Hex analysis using Hex Editors.
5. Bit level Forensic Analysis of evidential image using FTK, Encase and ProDiscover Tools.
6. Hash code generation, comparison of files using tools like HashCalcetc.
7. File analysis using Sleuthkitetc and Graphical File analysis and Image Analysis.
8. Email Analysis involving Header check, tracing route.
9. Performing a check on Spam mail and non-Spam mail.
10. Create a file on a USB drive and calculate its hash value like FTK Imager. Change the file and calculate the hash value again to compare the files.
11. Extracting of files that have been deleted.
12. Locate and extract Image (JPEG) files with altered extensions.

**Syllabus**  
**Discipline Specific**  
**Electives**

**Course Objective:**

To understand the basic concepts of Robotic Process Automation. o expose to the key RPA design and development strategies and methodologies. To learn the fundamental RPA logic and structure. To explore the Exception Handling, Debugging and Logging operations in RPA

**UNIT I INTRODUCTION TO ROBOTIC PROCESS AUTOMATION 9**

Emergence of Robotic Process Automation (RPA), Evolution of RPA, Differentiating RPA from Automation - Benefits of RPA - Application areas of RPA, Components of RPA, RPA Platforms. Robotic Process Automation Tools - Templates, User Interface, Domains in Activities, Workflow Files.

**UNIT II AUTOMATION PROCESS ACTIVITIES 9**

Sequence, Flowchart & Control Flow: Sequencing the Workflow, Activities, Flowchart, Control Flow for Decision making. Data Manipulation: Variables, Collection, Arguments, Data Table, Clipboard management, File operations Controls: Finding the control, waiting for a control, Act on a control, UiExplorer, Handling Events.

**UNIT III APP INTEGRATION, RECORDING AND SCRAPING 9**

App Integration, Recording, Scraping, Selector, Workflow Activities. Recording mouse and keyboard actions to perform operation, scraping data from website and writing to CSV. Process Mining.

**UNIT IV EXCEPTION HANDLING AND CODE MANAGEMENT 9**

Exception handling, Common exceptions, Logging- Debugging techniques, Collecting crash dumps, Error reporting. Code management and maintenance: Project organization, Nesting workflows, Reusability, Templates, Commenting techniques, State Machine.

**UNIT V DEPLOYMENT AND MAINTENANCE 9**

Publishing using publish utility, Orchestration Server, Control bots, Orchestration Server to deploy

bots, License management, Publishing and managing updates. RPA Vendors - Open-Source RPA, Future of RPA.

**Total: 45 Hours**

### **Course Outcome:**

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

**CO-1:** Enunciate the key distinctions between RPA and existing automation techniques and platforms.

**CO-2:** Use UiPath to design control flows and work flows for the target process

**CO-3:** Implement recording, web scraping and process mining by automation

**CO-4:** Use UiPath Studio to detect, and handle exceptions in automation processes.

**CO-5:** Implement and use Orchestrator for creation, monitoring, scheduling, and controlling of automated bots and processes. To learn to deploy and maintain the software bot.

### **Books for References:**

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath by Alok Mani Tripathi, Packt Publishing, 2018.
2. Tom Taulli , “The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems”, Apress publications, 2020.
3. Frank Casale (Author), Rebecca Dilla (Author), Heidi Jaynes (Author), Lauren Livingston (Author), Introduction to Robotic Process Automation: a Primer, Institute of Robotic Process Automation, Amazon Asia-Pacific Holdings Private Limited, 2018.
4. Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become An RPA Consultant, Amazon Asia-Pacific Holdings Private Limited, 2018.
5. A Gerardus Blokdyk, “Robotic Process Automation RPA A Complete Guide“, 2020.



## SECURITY ARCHITECTURE

3 0 0 3

### Course Objective:

This course introduces the basic concepts of Security and its needs, architecture and models and the students gain knowledge about security, information, components, issues, analysis, architecture, various models, security types and its applications.

### UNIT I SECURITY INTRODUCTION 9

Introduction: Information Security, Critical Characteristics of Information, Components of an Information System, Securing the Components, Balancing Security and Access,

### UNIT II SECURITY ANALYSIS 9

Need for security, Business needs, Threats, Attacks, Legal, Ethical and Professional Issues.

### UNIT III LOGICAL DESIGN 9

Blueprint for security, Information Security policy, NIST Models, VISA International security Models, Design of Security Architecture, planning for continuity.

### UNIT IV PHYSICAL DESIGN 9

Security Technology, IDS, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

### UNIT V ARCHITECTURE TYPES AND CASE STUDY 9

Architecture: Types- Low-level, Mid-level and High-level Architecture, Case study- Business cases for Security.

**Total: 45 Hours**

**Course Outcome:**

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

**CO - 1:** Become proficient in concepts like Security components, balancing and Access.

**CO - 2:** Ability to Understand Ethical and Professional issues concepts.

**CO – 3:** To understand the concepts of logical design and security policy.

**CO - 4:** To understand the concepts of Access control, physical security and personnel.

**CO - 5:** Become proficient in various Architectures like Low, Mid and High level.

**Books for References:**

1. Matt Bishop, “Computer Security Art and Science”, Addison Wesley, 2018.
2. Micki Krause, Harold F. Tipton, “ Handbook of Information Security Management”, Vol 1-3, CRC Press LLC, 2004.
3. Michael E Whitman and Herbert J Mattord, “Principles of Information Security”, Vikas Publishing House, New Delhi, 4<sup>th</sup> Edition, 2012.

**Course Objective:**

The learner understands the basic concepts of cyber security threats and modeling. Also can learn about email threats, web threats and cyber threat management.

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

Security threats - Sources of security threats- Motives - Target Assets and vulnerabilities – Consequences of threats- E-mail threats - Web-threats - Intruders and Hackers, Insider threats, Cybercrimes. Network Threats: Active/ Passive – Interference – Interception – Impersonation – Worms –Virus – Spam’s – Ad ware - Spy ware – Trojans and covert channels –Backdoors – Bots – IP, Spoofing - ARP spoofing - Session Hijacking - Sabotage-Internal treats Environmental threats - Threats to Server security.

**UNIT II SECURITY THREAT MANAGEMENT****9**

Risk Assessment - Forensic Analysis - Security threat correlation –Threat awareness - Vulnerability sources and assessment- Vulnerability assessment tools –Threat identification - Threat Analysis - Threat Modeling - Model for Information Security Planning.

**UNIT III SECURITY ELEMENTS****9**

Authorization and Authentication - types, policies and techniques – Security certification - Security monitoring and Auditing - Security Requirements Specifications – Security Policies and Procedures – Firewalls – IDS - Log Files - Honey Pots.

**UNIT IV SECURITY MODELS****9**

Access control, Trusted Computing and multilevel security - Security models - Trusted Systems- Software security issues- Physical and infrastructure security- Human factors – Security awareness - Training - Email and Internet use policies.

**UNIT V CASE STUDY****9**

Carbank: The Great Bank Robbery - Cyber Security Updates Onboard - Monitoring of Log Files and Alerts – Security analysis of industrial control Systems.

**Total: 45 Hours**

**Books for References:**

1. Jocelyn O. Padallan ,” Cyber Security” , Arcler Press Publisher ,2019
2. Swiderski, Frank and Syndex , “Threat Modeling” , Microsoft Press,2004.
3. William Stallings and Lawrie Brown, “ Computer Security: Principles and Practice, Prentice Hall”, 2008.
- 4.Thomas Calabres and Tom Calabrese, “Information Security Intelligence: Cryptographic Principles & Application”,, Thomson Delmar Learning Publication, 2004.

**Course Outcomes:**

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

- CO-1:** To gain the knowledge of the cyber threats like email threats, web threats and how to modeling.
- CO-2:** Understand the concept of cyber security threat management.
- CO-3:** To gain knowledge of Access control, Trusted Computing and multilevel security.
- CO-4:** Analyze and construct the security awareness and Training.
- CO-5:** To analyze the Email and Internet use policies.

**Course Objective:**

To provide students with understanding of biometrics, biometric equipment and standards applied to security.

**UNIT I INTRODUCTION TO BIOMETRICS****9**

Biometrics– Introduction- benefits of biometrics over traditional authentication systems – benefits of biometrics in identification systems–selecting a biometric for a system–Applications – Key biometric terms and processes – biometric matching methods – Accuracy in biometric systems.

**UNIT II PHYSIOLOGICAL BIOMETRIC TECHNOLOGIES****9**

Fingerprints – Technical description –characteristics – Competing technologies – strengths – weaknesses – deployment – Facial scan – Technical description – characteristics – weaknesses– deployment – Iris scan – Technical description – characteristics – strengths – weaknesses – deployment – Retina vascular pattern.

**UNIT III BEHAVIORAL BIOMETRIC TECHNOLOGIES****9**

Technical description – characteristics – strengths – weaknesses –deployment – Hand scan – Technical description–characteristics – strengths – weaknesses deployment – DNA biometrics. Behavioral Biometric Technologies: Handprint Biometrics – DNA Biometrics.

**UNIT IV FEATURE EXTRACTION****9**

Signature and handwriting technology – Technical description –classification – keyboard / keystroke dynamics – Voice – data acquisition – feature extraction – characteristics – strengths –weaknesses– deployment.

**UNIT V MULTI BIOMETRICS & CASE STUDY****9**

Multi biometrics and multi factor biometrics – two–factor authentication with passwords – tickets and tokens – executive decision – implementation plan. Case study: Biometrics for banking security – Biometric for Education – implementation of multi biometrics system.

**Total: 45 hours**

## **Course Outcome:**

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

**CO-1:** Demonstrate knowledge of the basic physical and biological science and engineering principles underlying biometric systems.

**CO-2:** Understand and analyze biometric systems at the component level.

**CO-3:** To be able to work effectively in teams and express their work and ideas orally and in writing.

**CO-4:** Identify the sociological and acceptance issues associated with the design and implementation of biometric systems.

**CO-5:** Understand various Biometric security issues.

## **Books for References:**

1. Samir Nanavathi, Michel Thieme, and Raj Nanavathi: “Biometrics –Identity verification in a network”, 1st Edition, Wiley Eastern, 2002.
2. John Chirillo and Scott Blaul: “Implementing Biometric Security”, 1st Edition, Wiley Eastern Publication, 2005.
3. James wayman, Anil k. Jain, Arun A. Ross, Karthik Nandakumar, —Introduction to Biometrics, Springer, 2011.
4. Khalid saeed with Marcin Adamski, Tapalina Bhattasali, Mohammed K. Nammous, Piotr panasiuk, mariusz Rybnik and soharab H.Sgaikh, —New Directions in Behavioral Biometrics, CRC Press 2017.
5. John Berger: “Biometrics for Network Security”, 1st Edition, Prentice Hall, 2004.
6. Benjamin Muller, Security, Risk and the Biometric State: Governing Borders and Bodies, 1st Edition, Routledge, 2010.

## **Websites:**

1. <https://www.tutorialspoint.com/biometrics/index.htm>.
2. <https://www.javatpoint.com/biometrics-tutorial>.

**Course Objective:**

To understand how block chain systems work, where they are used, their limitations, and how they affect organizations and society now and in the future.

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

Data 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, and Zero Knowledge Proof.

**UNIT II BLOCKCHAIN****9**

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

**UNIT III DISTRIBUTED CONSENSUS****9**

Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

**UNIT IV CRYPTOCURRENCY****9**

History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin Cryptocurrency Regulation: Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy.

**UNIT V CASE STUDY****9**

Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain. Naive Blockchain construction, Memory Hard algorithm – Hashcash implementation, Direct Acyclic Graph, Play with Go-Ethereum, Smart Contract Construction, Toy application using Blockchain, Mining puzzles.

**Total: 45 Hours**

## **Course Outcome:**

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

- CO-1:** Understand that how bitcoin works, when a transaction is created and when it is considered part of the blockchain.
- CO-2:** To learn about different kinds of forking and explain the Bitcoin's network mechanisms for maintaining and upgrading
- CO-3:** Explain about Nakamoto consensus. To describe differences between proof-of-work and proof- of-stake consensus.
- CO-4:** Establishing deep understanding of the Ethereum model, its consensus model, code execution, operation of its network, storage options and main actors that participate on its protocol.
- CO-5:** Expertise various development environments and different approaches and evaluate security, privacy, and efficiency of a given block chain system.

## **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, 2016.
2. Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", O'Reiley, 1<sup>st</sup> Edition, 2014.
3. Satoshi Nakamoto, " Bitcoin: A Peer-to-Peer Electronic Cash System", 2008.
4. Dr. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger", Yellow paper, 2014.
5. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, "A survey of attacks on Ethereum smart contracts", 2016.



**Course Objective:**

To provide a fundamental knowledge of Network Penetration testing and determines how well the security defenses are protecting our IT assets. Network penetration testing helps address the concerns about the actual impact an attack could have on the organization.

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

Basics of a Network, Network Utilities, OSI Model, TCP/IP, IPv4 Addressing, IPv6 Addressing, Assessing Likely Threats to the Network, Classifications of Threats, Likely Attacks, Threat Assessment, Security Terminologies, Choosing a Network Security Approach, Network Security and the Law, Security Resources.

**UNIT II NETWORK DEFENSE****9**

Denial of Service Attacks, Buffer Overflow Attacks, IP Spoofing, Session Hacking, Virus and Trojan horse Attacks. Firewall – Basic concepts, Implementing Firewalls, Selecting and Using a Firewall, Proxy Servers, Single Machine Firewalls, User Account Control, Windows and Linux Firewalls, Small Office/Home Office Firewalls, Medium-Sized Network Firewalls, Enterprise Firewalls. IDS – Basic concepts, Implementing IDS Systems, Implementing Honey Pots. Virtual Private Networks - Basic VPN Technology, Using VPN Protocols for VPN Encryption, IPSec, SSL, Implementing VPN Solutions.

**UNIT III COMMUNICATION DEFENSE & SYSTEM DEFENSE****9**

Basic concepts, Modern Encryption Methods, Identifying Good Encryption, Digital Signatures and Certificates, Decryption, Cracking Passwords, Steganography, Steganalysis, Exploring the Future of Encryption. System Defence: Basic concepts, Configuring Windows, Configuring Linux, Patching the Operating System, Configuring Browsers. Virus - Virus Scanners, Antivirus Policies and Procedures, Additional Methods for Defending the System, Procedure to defend against Virus infected system. Trojan Horses, Spyware, and Adware. Security policies, assessing system security, Security standards, Physical security, Disaster recovery, Techniques used by attackers.

#### **UNIT IV WIRELESS NETWORK DEFENCE**

**9**

Wireless communication primer, Wireless LAN and their components, Network standards, Secure concerns, Secure WLAN Implementation, Examining wireless security solutions and countermeasures.

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

**9**

Working with the sample Network penetration testing commands – Vulnerability Assessment, Exploitation, Privilege Escalation, Web Applications, Password Attacks, Networking & Shells, Metasploit.

**Total: 45 Hours**

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

1. Chuck Easttom, “Network Defense and Countermeasures: Principles and Practices”, Pearson education, Second edition, 2014.
2. Randy Weaver, Dawn Weaver, Dean Farwood, “Guide to Network Defense and Countermeasures”, Cengage Learning, Third edition, 2014.
3. E-council, “Network defence Architect” - [http://www.eccouncil.org/Certification/certifiednetwork- defense-architect](http://www.eccouncil.org/Certification/certifiednetwork-defense-architect).
4. <https://www.virtualhackinglabs.com/?courses=penetration-testing>

#### **Course Outcome:**

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

**CO-1:** To Defend against the most common attacks to networks.

**CO-2:** To determine what type of firewall solution, Intrusion detection and Prevention system is appropriate.

**CO-3:** To Use point-to-point tunnelling protocol (PPTP), layer 2 tunnelling Protocol (L2TP) as an encryption tool.

**CO-4:** To add security with privacy to a communication using IPSec for VPNs.

**CO-5:** To Expertise in wireless security solutions.

**Course Objective:**

To explore, design and implement basic concepts of big data & methodologies for analyzing structured and unstructured data with emphasis on the relationship between the Data Scientist and its application to the business needs. To understand the fundamentals of Internet of Things with security and to apply the concept in Real World Scenario.

**UNIT I INTRODUCTION TO BIG DATA 9**

Big data - Introduction to Big Data Platform - Big Data Skills and Sources - Big Data Adoption - Characteristics of Big Data - Key aspects of a Big Data Platform - Challenges of Conventional Systems Nature of Data - Evolution Of Analytic Scalability Governance for Big Data - definition and taxonomy Big data value for the enterprise.

**UNIT II BIG DATA COMPONENTS 9**

Technical Details of Big Data Components - Text Analytics and Streams - Intelligent data analysis- Analytic Processes and Tools - Modern Data Analytic Tools - Cloud and Big Data - Overview of High Value BDUse Cases – Examples - The Big Data and Data Science - Big Data Exploration - Security and Intelligence - Operations Analysis.

**UNIT III BIG DATA STREAMS 9**

First steps with the Hadoop “ecosystem” – Introduction to Hadoop - Exercises - Hadoop components – Map Reduce/Pig/Hive/HBase - Loading data into Hadoop - Handling files in Hadoop - Getting data from Hadoop - Introduction to the SQL Language - Querying big data with Hive - Big Data & Machine Learning.

**UNIT IV OVERVIEW OF IoT AND IoT SECURITY 9**

IoT - An Architectural Overview - Main design principles and needed capabilities Devices and gateways - Data management - Business processes in IoT- Everything as a Service (XaaS) - IoT Security Requirements - IoT Privacy Preservation Issues - Cyber-Physical Object Security -Hardware Security - Front-end System Privacy Protection - Networking Function Security.

## **UNIT V    ATTACKS AND SECURITY AND CASE STUDY**

**9**

Attack Models - Attacks to RFIDs in IoTs - Attacks to Network Functions - Attacks to Back-end Systems - Security in Front and back end Sensors and Equipment -Prevent Unauthorized Access to Sensor Data – Case Study - Setting up the demo Environment, IoT and the Industrial Sector, IoT and the Connected Home, IoT and Consumer Wearable.

**Total: 45 Hours**

### **Course Outcome:**

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

**CO -1:** To 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 framework of Visual data analysis techniques and interaction techniques.

**CO-3:** To explore on Big Data real time analytics platform applications.

**CO-4:** To Implement Data, Knowledge Management and use of Devices in IoT technology.

**CO-5:** To classify Real World IoT Design Constraints, Industrial Automation in IoT.

### **Books for References:**

1. Stephan Kudyba, “Big Data Mining and Analytics, Components of Strategic Decision Making”, Auerbach Publications, March 12, 2014.
2. Eliot P. Reznor, “Big Data: A Beginner’s Guide to using Data Science for Business”, 2017.
3. Fei HU, “Security and Privacy in Internet of Things (IoT): Models, Algorithms, and Implementations”, CRC Press, 2016.
4. Dirk deRoos , “Hadoop for Dummies”, 2014.
5. Prajapati, “Big Data Analytics with R and Hadoop”, 2014.
6. Dawn E. Holmes, Big Data: A Very Short Introduction, 2017.
7. Ollie Whitehouse, “Security of Things: An Implementers' Guide to Cyber-Security for Internet of Things Devices and Beyond”, NCC Group, 2014.

**Course Objective:**

This course covers the theory and practices of finding the vulnerabilities through forming the different attacks and then defining the appropriate security policy including the action to detect or prevent the attacks and thus reduce the damages.

**UNIT I INTRODUCTION TO ETHICAL HACKING 9**

Security Fundamental - Security Testing - Hacker and Cracker – Descriptions - Test Plans-keeping it legal - Ethical and Legality-Technical Foundations of Hacking: The Attacker's Process - The Ethical Hacker's Process- Security and the Stack.

**UNIT II FOOTPRINTING AND SCANNING 9**

Information Gathering - Determining the Network Range - Identifying Active Machines-Finding Open Ports and Access Points - OS Fingerprinting Services - Mapping the Network Attack Surface - Enumeration and System Hacking: Enumeration - System Hacking.

**UNIT III MALWARE THREATS AND SESSION HIJACKING 9**

Viruses and Worms- Trojans - Covert Communication - Keystroke Logging and Spyware - Malware Counter Measures- Sniffers - Session Hijacking - Denial of Service - Distributed Denial of Service.

**UNIT IV WEB SERVER HACKING AND ATTACKS 9**

Web Server Hacking - Web Application Hacking - Database Hacking - Wireless Technologies - Mobile Security and Attacks: Wireless Technologies - Mobile Device Operation and Security – Wireless LANs.

**UNIT V CASE STUDY 9**

Intrusion Detection Systems - Firewalls - Honeypots - Physical Security - Social Engineering – Case Studies: Intrusion detection Real Secure Tripwire Dragon Snort ,Packet sniffing Leave the sniffer running, Passwords in procedures & documents.

**Course Outcome:**

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

**CO-1:** To Describe and understand the basics of the ethical hacking

**CO-2:** Able to perform the foot printing and scanning

**CO-3:** Characterize the malware and their attacks and detect and prevent them.

**CO-4:** To understand the basic concepts of sniffers and session hijacking.

**CO-5:** Able to learn Intrusion Detection Systems and physical security.

**Books for References:**

1. Michael Gregg, "Certified Ethical Hacker", Version 10, Third Edition, Pearson IT Certification, 2019.
2. Roger Grimes, "Hacking the Hacker", 1<sup>st</sup> Edition, Wiley, 2017.
3. Ankit Fadia, "The Unofficial Guide to Ethical Hacking", Laxmi Publications, 2<sup>ns</sup> Edition, 2006.

**Course Objective:**

This course will address the issues faced by management responsible for ensuring the security of organizational technology, communications and data infrastructure. These typically fall under the purview of the chief information officer (CIO). It will address topics in operational risk, project management, cyber security, disaster recovery and protecting intellectual property.

**UNIT I INTRODUCTION TO CYBERSECURITY 9**

The Security Environment: Threats, vulnerabilities, and consequences - Advanced persistent threats - The state of security today. Principles of Cybersecurity: The interrelated components of the computing environment - Cybersecurity models - Variations on a theme: computer security, information security, and information assurance. Cybersecurity Management Concepts: Management models, roles, and functions. Enterprise Roles and Structures: Information security roles and positions.

**UNIT II STRATEGIC PLANNING AND SECURITY PLANS 9**

Strategy and Strategic Planning: Strategy - Strategic planning and security strategy - The information security lifecycle - Architecting the enterprise. Security Plans and Policies: Levels of planning - Planning misalignment - The System Security Plan (SSP)- Policy development and implementation. Security Standards and Controls: Security standards and controls - Certification and accreditation (C&A).

**UNIT III RISK MANAGEMENT 9**

Risk Management: Principles of risk - Types of risk - Risk strategies - The Risk Management Framework (RMF). Physical Security and Environmental Events: Physical and environmental threats - Physical and environmental controls. Contingency Planning: Developing a contingency plan - Understanding the different types of contingency plan - Responding to events.

## **UNIT IV SECURITY AWARENESS**

**9**

Security Education, Training, and Awareness: Human factors in security - Developing and implementing a security training plan - Cross-domain training (IT and other security domains).  
The future of cyber security: Key future uncertainties - Possible future scenarios - How to apply what you've learned.

## **UNIT V CASE STUDY**

**9**

Case Study on Pune Citibank MphasiS Call Center Fraud – The Bank NSP Case – UTI Bank hooked in a phishing attack – Mumbai Police can now nail web offenders – Orkut: The new danger.

**Total: 45 Hours**

### **Course Outcome:**

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

- CO-1:** An organizational asset that has utility, and a value – which may be relative depending on the perspective taken, and therefore can be classified to reflect its importance to an organization or individual.
- CO-2:** The security models and management concepts are taken as additional concepts in learning process of risk management in cyber security.
- CO-3:** Information risk management is a term referring to the process of documenting what information is at risk, type and level of risk realized; and the impact of realization.
- CO-4:** A lifecycle from creation through to deletion and protection may be required and may change throughout that lifecycle.
- CO-5:** Apply the acquired knowledge in solving the problem in existing case studies.

### **Books for References:**

1. Rhodes-Ousley, Mark. “Information Security: The Complete Reference, Second Edition, . Information Security Management: Concepts and Practice”, New York, McGraw-Hill, 2013.
2. Whitman, Michael E. and Herbert J. Mattord, “ Roadmap to Information Security for IT



and Infosec Managers”, Boston, MA: Course Technology, 2011.

3. Michael E. Whitman and Herbert J. Mattord, “Principles of Information Security”, Course Technology, Cengage Learning, Fourth Edition, Nov, 2014.

**Web Resources:**

1. <file:///C:/Users/admin/Desktop/Online%20work/Course/Risk%20management%20in%20Cyber%20Security/Whitman.pdf>
2. <https://www.cyberralegalservices.com/detail-casestudies.php>.
3. <https://rtinagpur.cag.gov.in/uploads/CaseStudies/CaseStudiesonCyberCrimesNOTSENT/CaseStudiesonCyberCrimes.pdf>.

**Course Objective:**

To study the different models involved in database security and their applications in real time world to protect the database and information associated with them.

**UNIT I INTRODUCTION 9**

Introduction to Databases Security Problems in Databases Security Controls Conclusions Security Models - Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases

**UNIT II SECURITY MODELS 9**

Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model the Lattice Model for the Flow Control conclusion Security Mechanisms Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria.

**UNIT III SECURITY SOFTWARE DESIGN 9**

Introduction A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design Statistical Database Protection & Intrusion Detection Systems Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls Evaluation Criteria for Control Comparison. Introduction IDES System RETISS System ASES System Discovery.

**UNIT IV MODELS FOR THE PROTECTION OF NEW GENERATION DATABASE****9**

SYSTEMS 1- Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object-Oriented Data. SYSTEMS 2 - A Model for the Protection of New Generation Database Systems: the Orion Model Jajodia and Kogan's Model a Model for the Protection of Active Databases Conclusions.

## UNIT V CASE STUDY

9

Database Watermarking – Basic Watermarking Process - Discrete Data, Multimedia, and Relational Data – Attacks on Watermarking - Single Bit Watermarking, Multi bit Watermarking.

**Total: 45 Hours**

### **Course Outcome:**

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

**CO-1:** Implement security mechanisms in a database system and provide a secured information flow.

**CO-2:** Design secured software using the methodological approach.

**CO- 3:** Prove that, only authorized user has access to the data and that the data integrity is preserved.

**CO-4:** Solve Complex Problems in a Team of database works.

**CO-5:** Use research-based knowledge and research methods including design of experiments, Analysis Interpretation of data, and synthesis of the information to provide valid Conclusions.

### **Books for References:**

1. Hassan A. Afyouni, “ Database Security and Auditing” , India Edition, CENGAGE Learning, 2009.
2. Castano ,” Database Security” , Second edition, Pearson Education, 2002.
3. Alfred basta, melissa zgola, “ Database security”, CENGAGE learning, 2014.
4. Michael Gertz and Sushil Jajodia, “ Handbook of Database Security: Applications and Trends”, Springer, 2010.
5. Osama S. Faragallah, El-Sayed M. El-Rabaie, Fathi E. Abd El-Samie, Ahmed I. Sallam, and Hala S. El- Sayed, Multilevel Security for Relational Databases”, ISBN 978-1-4822-0539-8. CRC Press, 2014.

### **Web sources:**

1. <https://www.techopedia.com/definition/29841/database-security>
2. <https://www.sisense.com/glossary/database-security/>
3. [https://www.cs.uct.ac.za/mit\\_notes/database/pdfs/chp12.pdf](https://www.cs.uct.ac.za/mit_notes/database/pdfs/chp12.pdf)

**Course Objective:**

To study the specifications and functionalities of various protocols/standards of mobile networks, to study about Wireless networks, protocol stack and standards, to focus on the fundamentals the protocols associate with Voice over IP.

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

Mobility of Bits and Bytes –Wireless the Beginning – Mobile Computing – Dialogue Control – Networks – Middleware and Gateways – Application and services- Developing Mobile computer Applications – security in mobile computing – Standards \_ Why is it necessary – Standard bodies. Mobile Computing Architecture: History of computers and Internet – Architecture for mobile computing – Three-tier architecture – Design considerations for mobile computing – Mobile computing through Internet – Making exiting applications mobile enabled.

**UNIT II MOBILE COMPUTING THROUGH TELEPHONY****9**

Evaluation of telephony – Multiple access procedures – Mobile computing through telephone – IVR Application – Voice XML – TAPI.

**UNIT III WIRELESS TECHNOLOGIES****9**

Blue Tooth – RFID – WiMAX – Mobile IP – IPv6 – Java Card. GSM : Global System for mobile communications – GSM Architecture – GSM Entities – Call routing in GSM – PLMN Interfaces – GSM Addresses and Identifiers –Network Aspects in GSM – GSM Frequency allocations – Authentications and Security, SMS.

**UNIT IV CDMA and 3G****9**

Spread spectrum technology – Is 95 – CDMA vs GSM – Wireless Data – Third generation networks – Applications on 3G WIRELESS LAN: Wireless LAN advantages – IEEE 802.11 standards – Architecture – Mobile in Wireless LAN – Deploying wireless LAN – Mobile adhoc networks and sensor networks – Wireless LAN Security –WiFi vs 3G.

## **UNIT V VOIP SECURITY AND CASE STUDY**

**9**

Streaming in 3rd generation mobile architecture, Voice and Video over IP (Media over IP), Session Initiation Protocol (SIP) and its use in Media Over IP, Skype as a case study. Security in VoIP. Attacks against the VOIP network, Challenges against implementing VOIP network, WEP (Wired Equivalent Privacy), Effects of using WEP in VOIP networks, Concepts of WPA and WPA2.

**Total: 45 Hours**

### **Course Outcome:**

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

- CO-1:** Design and implement wireless network environment for any application using latest wireless protocols and standards.
- CO-2:** Implement different type of applications for smart phones and mobile devices with latest network strategies.
- CO-3:** Conversant with the latest 3G/4G and WiMAX networks and its architecture.
- CO-4:** Discuss about IEEE protocol standards and learn the uses of wireless LAN advantages.
- CO-5:** Understand the Voice and Video Over IP and explore about, How they can be used, and how they can be extended.

### **Books for References:**

1. Jochen Schiler, "Mobile Communication", Addison Wesley, 2003.
2. B.A. Forouzan, "Cryptography & Network Security", Tata McGrawHill, 2007.
3. Honeyman P Huston L.B, "Communications and Consistency in Mobile File Systems", IEEE Personal communication 2(6), 1996.
4. Asoke K Talukder, Roopa R Yavagal , "Mobile Computing", TMH, 2<sup>nd</sup> Edition, 2017.
5. Biplob k Sikdar, Sipra dasbit , "Mobile Computing", Printice Hall India, 2009.

**Course Objective:**

To understand the importance of handling different security threats on modern hardware design, manufacturing, installation and operating practices. This course borrows concepts from different fields of cryptography, hardware design, circuit testing, algorithms and machine learning.

**UNIT I INTRODUCTION TO DIFFERENT ISSUES OF HARDWARE SECURITY 9**

Introduction to Cryptography- Basics of Digital Design on Field-programmable Gate Array (FPGA), Classification using Support Vector Machines (SVMs)- Cryptographic Hardware and their Implementation- Optimization of Cryptographic Hardware on FPGA,-Physically Unclonable Functions (PUFs)-PUF Implementations- PUF Quality Evaluation- Design Techniques to Increase PUF Response Quality.

**UNIT II ATTACKS ON HARDWARE 9**

Side-channel Attacks on Cryptographic Hardware: Basic Idea-Current-measurement based Side-channel Attacks -Design Techniques to Prevent Side-channel Attacks-Improved Side-channel Attack Algorithms (Template Attack, etc.)-Cache Attacks.

**UNIT III DESIGN, TESTING AND VERIFICATION 9**

Testability and Verification of Cryptographic Hardware: Fault-tolerance of Cryptographic Hardware, Fault Attacks, Verification of Finite-field Arithmetic Circuits-Modern IC Design and Manufacturing Practices and Their Implications: Hardware Intellectual Property (IP) Piracy and IC Piracy-Design Techniques to Prevent IP and IC Piracy-Using PUFs to prevent Hardware Piracy- Model Building Attacks on PUFs.

**UNIT IV OVERVIEW OF TROJANS 9**

Hardware Trojans: Hardware Trojan Nomenclature and Operating Modes, Countermeasures Such as Design and Manufacturing Techniques to Prevent/Detect Hardware Trojans, Logic Testing and Side- channel Analysis based Techniques for Trojan Detection, Techniques to Increase Testing Sensitivity Infrastructure Security: Impact of Hardware Security Compromise

on Public Infrastructure, Defense Techniques x.

## **UNIT V CASE STUDY**

**9**

Implementation of PUF's-Kocher's Attack on DES)-SVM Modeling of Arbiter PUFs-Genetic Programming based Modeling of Ring Oscillator PUF-Smart-Grid Security

**Total: 45 Hours**

### **Course Outcome:**

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

**CO-1:** Knowledge of emerging security and trust issues associated with hardware systems.

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

**CO-3:** To assess vulnerabilities of a hardware device or system.

**CO-4:** To be able to describe attack scenarios that threaten such systems.

**CO-5:** Evaluate the security and trust of hardware systems using different types of system testing.

### **Books for References:**

1. Debdeep Mukhopadhyay and Rajat Subhra Chakraborty, "Hardware Security: Design, Threats, and Safeguards", CRC Press, 1<sup>st</sup> Edition, 2014.
2. Ahmad-Reza Sadeghi and David Naccache (eds.), "Towards Hardware-Intrinsic Security: Theory and Practice", Springer, 2010.
3. Ted Huffmire et al, "Handbook of FPGA Design Security", Springer, 2010.
4. Stefan Mangard, Elisabeth Oswald, Thomas Popp, "Power analysis attacks - revealing the secrets of smart cards", Springer 2007.

**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 cyber space. The course also outlines international best techniques and the various legal mechanisms to control the various offences in the cyberspace.

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

Introduction to cyber space -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****9**

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 CYBER CRIMES****9**

Understanding cybercrimes - 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 CYBER SPACE****9**

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** **9**

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: 45 Hours**

**Course Outcome:**

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

**CO-1:** Define and describe the nature and scope of cybercrime.

**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.

**Books for References:**

1. Karnika Seth, “ Computers, Internet and New Technology Laws” ,Cyber Lawyer and Expert and is The Managing Partner of Seth Associates, Edition 2012.
2. S.K.Verma, Raman mittal , “Legal dimensions of cyber space” ,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

Case Laws”, 2012.

4. Jeff Kosseff , “Cyber security Law”, Wiley Publications, 2017.
5. Ian. J. Lyod , “Information technology law” , Information Technology Act 2000, its amendment and IT Rules, 2014.
6. Yee fen Lim , “Cyber space law commentaries and Materials”, second edition, Galexia Consulting Pty Ltd, Australia.

**Course Objective:**

This course introduces the basic concepts of information system, Basics of computers, Software Development Life Cycle.

**UNIT I MANAGEMENT INFORMATION SYSTEM 9**

Definition of Management Information System – MIS support for planning, organizing and controlling –Structure of MIS –Information for decision –making.

**UNIT II SYSTEM 9**

Concept of system – Characteristics of System – System classification –categories of Information systems – Strategic information system and competitive advantage.

**UNIT III COMPUTERS AND INFORMATION PROCESSING 9**

Classification of computers- Input devices –Output devices – Storage devices - Batch and online processing-Hardware – Software - Database Management Systems

**UNIT IV SYSTEM ANALYSIS AND DESIGN 9**

SDLC – Role of System Analyst – Functional Information system – Personnel, production, material marketing.

**UNIT V DECISION SUPPORT SYSTEM 9**

Definition - Group Decision Support System –Business Process Outsourcing –Definition and function.

**Total: 45 Hours**

### **Course Outcome:**

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

- CO-1:** Determine key terminologies and concepts including IT, marketing, management, economics, accounting, finance in the major areas of business.
- CO-2:** Describe the types of information systems supporting the major functional areas of the business.
- CO-3:** Identify the hardware components, major software and compare the different types of databases in computer system
- CO-4:** Plan projects, work in team settings and deliver project outcomes in time
- CO-5:** Design, develop and implement Information Technology solutions for business problems.

### **Books for References:**

1. Dr. S. P. Rajagopalan, "Management Information System", Margham Publications, 2012
2. Mudick & Ross, "Management Information System", Prentice – Hall of India.
3. Gordan B.Davis , "Management Information System",- Page 46 of 742, 2011.
4. Jame A.Senn , "Information systems Analysis and Design ", 1989.
5. Sadagopan , "Management Information System", Prentice – Hall of India., 2014.
6. CSV Murthy , "Management Information System", Himalaya publications, 2010.

**Course Objective:**

This course introduces the basic concepts of Software Quality Control and Assurance with different quality measures and standards for real time software projects as case studies.

**UNIT I INTRODUCTION 9**

Quality and the quality system - standards and procedures technical activities. Software tasks - management responsibility - quality system - contract review - design control - document control - purchasing product identification and traceability.

**UNIT II PROCESS CONTROL 9**

Checking - Identification of Testing Tools - Control of Nonconforming Product - Corrective Action- Verification: Verification techniques – Inspections, reviews, walk-throughs – Case studies.

**UNIT III QUALITY AUDITS 9**

Handling, Storage, Packing and Delivery - Quality Records - Internal Quality Audits - Training - Servicing - Statistical Techniques-Views On Quality – Cost Of Quality - Quality Models – Quality Frameworks – Verification And Validation – Defect Taxonomy – Defect Management – Statistics And Measurements – IEEE Standards – Quality Assurance And Control Processes.

**UNIT IV QUALITY ASSURANCE TECHNOLOGIES 9**

QA And New Technologies - QA and Human - Computer interface - Process Modeling - Standards and Procedures- Coverages: Block, Conditions, Multiple Conditions, MC/DC, Path – Data Flow Graph – Definition And Use Coverages – C-Use, P-Use, Def clear, Def-Use – Finite State Machines – Transition Coverage.

**UNIT V INDIAN STANDARDS 9**

ISO–ISO Standards-Development Process-ISO Certification-ISO Consulting

Services and Consultants-E-Business- 9001 - Elements Of ISO 9001 - Improving Quality System - Case Study.

**Total : 45 hours**

**Course Outcome:**

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

**CO-1:** Learn about Software Quality Management – Quality Factors, components and Plans.

**CO-2:** To explore the different verification techniques for software development.

**CO-3:** To understand Software Quality Audits and illustrate Quality frameworks concepts.

**CO-4:** To gain knowledge about the various Software Testing Coverages.

**CO-5:** To Understand the Strategic about various quality standards to assess the software.

**Books for References:**

1. Claude Y. Laporte, Alain April, “Software Quality Assurance”, Wiley-IEEE Computer Society Press, 2018.
2. Watts S. Humphrey, “Managing the software process”, Addison Wesley, 1999.
3. Tsum S.Chow, “Software Quality Assurance a Practical Approach”, IEEE Computer Society press, 1985.
4. Roger S. Pressman, ” Software Engineering - A Practitioner’s approach”, McGraw Hill, 8<sup>th</sup> Edition,2019.

**Course Objective:**

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems.

**UNIT I INTRODUCTION TO ECOMMERCE 9**

E-commerce: The revolution is just beginning, Ecommerce : A Brief History, Understanding E-commerce: organizing Themes.

**UNIT II E-COMMERCE BUSINESS MODELS 9**

E-commerce Business Models, Major Business to Consumer (B2C) business models, Major Business to Business (B2B) business models, Business models in emerging E-commerce areas, How the Internet and the web change business: strategy, structure and process, The Internet: Technology Background, The Internet Today, Internet II- The Future Infrastructure, The World Wide Web, The Internet and the Web : Features.

**UNIT III BUILDING AN E-COMMERCE WEB SITE 9**

A systematic Approach, The e-commerce security environment, Security threats in the e-commerce environment, Technology solution, Management policies, Business procedures, and public laws, Payment system, E-commerce payment system, Electronic billing presentment and payment.

**UNIT IV CONSUMER ONLINE 9**

The Internet Audience and Consumer Behaviour, Basic Marketing Concepts, Internet Marketing Technologies, B2C and B2B E-commerce marketing and business strategies, The Retail sector, Analyzing the viability of online firms, E-commerce in action: E-tailing Business Models, Common Themes in online retailing, The service sector: offline and online, Online financial services, Online Travel Services, Online career services

Social networks and online communities, Online auctions, E-commerce portals.

**Total : 45 hours**

**Course Outcome:**

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

- CO-1:** Determine key terminologies and concepts including IT, marketing, management, economics, accounting, finance in the major areas of business.
- CO-2:** Analyze the impact of E-commerce on business models and strategy.
- CO-3:** Understand ethical issues that occur in business, evaluate alternative courses of actions and evaluate the implications of those actions.
- CO-4:** Describe the key features of Internet, Intranets and Extranets and explain how they relate to each other.
- CO-5:** Analyze real business cases regarding their e-business strategies and transformation processes and choices.

**Books for References:**

1. Kenneth C. Laudon, "E-Commerce: Business, Technology, Society", 15th Edition, Pearson, 2019.
2. S. J Joseph, "E-Commerce: an Indian perspective", PHI. 5<sup>th</sup> Edition, 2010.
3. Daniel Minoli & Emma Minoli, "Web Commerce Technology Handbook". Tata McGraw Hill – 2017.



**Course Objective:**

This course introduces the basic concepts of system software, Compilers, Assemblers, Linkers and Loaders.

**UNIT I INTRODUCTION**

**9**

System Software - Components of System Software Evolution by System Software – Model of Computer System; Introduction to Software Processors.

**UNIT II ASSEMBLERS**

**9**

Elements of Assembly Language Programming - Over View of the Assembly Process - Design of Two Pass Assembler - A Single Pass Assembler for the IBM PC - Macros And Macro Processors.

**UNIT III COMPILERS**

**9**

Aspects of Compilation - Overview of the Compilation Process - Programming Languages Grammars – Scanning: - Parsing - Storage Allocation - Compilation of Expressions and Control Structures - Code Optimization – Compiler Writing Tools, Software Process for Interactive Environment

**UNIT IV LOADERS AND LINKAGE EDITORS**

**9**

Loading. Linking and Relocation – Program – Relocatability - Overview of the Editing- A Linkage Editor for the IBM PC - Linking for Program over-lays

**UNIT V SOFTWARE TOOLS**

**9**

Spectrum of software tools - Text editors - Interpreters and program generators - Debug monitors - Programming environments. Device Drivers: Introduction to the Device Driver, Requirements of Device Driver, Types of Device Driver.

**Total : 45 hours**

## **Course Outcome:**

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

- CO-1:** Understand about the different kind of processors available in the market.
- CO-2:** Understand fundamentals of language processing and grammar.
- CO-3:** Apply knowledge of compilation and code optimization steps to mimic a simple Compiler.
- CO-4:** Demonstrate the working of various system software like assembler, loader, linker, editor and device driver.
- CO-5:** Learn about device driver and implement various device driver software.

## **Books for References:**

1. Dhamdhare , “System software”, McGraw Hill, 1<sup>st</sup> Edition, 2011.
2. Leland L.Beck, D.Manjula , “System Software, An Introduction to System Programming”.- Pearson, 3<sup>rd</sup> Edition, 2002.
3. Aho. A.V. Sethi R. and Ulman J.D, “Compilers, Principles, Techniques and Tools”, Pearson., 2<sup>nd</sup> Edition, 2006.

**Course Objective:**

This course introduces the basic concepts of multimedia and its components such as text, Image, Video, Graphics and Animation.

**UNIT I INTRODUCTORY CONCEPTS 9**

Multimedia – Definitions, CD-ROM and the Multimedia Highway, Uses of Multimedia, Introduction to making multimedia – The Stages of project, the requirements to make good multimedia, Multimedia skills and training, Training opportunities in Multimedia. Motivation for multimedia usage, Frequency domain analysis, Application Domain.

**UNIT II MULTIMEDIA 9**

Hardware and Software: Multimedia Hardware – Macintosh and Windows production Platforms, Hardware peripherals – Connections, Memory and storage devices, Media software – Basic tools, making instant multimedia, Multimedia software and Authoring tools, Production Standards.

**UNIT III MULTIMEDIA MAKING IT WORK 9**

Multimedia building blocks – Text, Sound, Images, Animation and Video, Digitization of Audio and Video objects, Data Compression: Different algorithms concern to text, audio, video and images etc., Working Exposure on Tools like Dream Weaver, Flash, Photoshop Etc.,

**UNIT IV MULTIMEDIA AND THE INTERNET 9**

History, Internet working, Connections, Internet Services, The World Wide Web, Tools for the WWW – Web Servers, Web Browsers, Web page makers and editors, Plug-Ins and Delivery Vehicles, HTML, VRML, Designing for the WWW – Working on the Web, Multimedia Applications – Media Communication, Media Consumption, Media Entertainment, Media games.

## **UNIT V MULTIMEDIA-LOOKING TOWARDS FUTURE:**

**9**

Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing, Assembling and delivering a project-planning and costing, Designing and Producing, content and talent, Delivering, CD-ROM technology.

**Total : 45 hours**

### **Course Outcome:**

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

- CO-1:** Understand fundamentals of multimedia, media and data streams, sound/audio, image, graphics, video and animation.
- CO-2:** Study about Multimedia operating system issues such as real-time operation, resource management, process management, file systems, and Multimedia networking.
- CO-3:** Multimedia synchronization, presentation requirements, reference model, and synchronization techniques.
- CO-4:** Gain knowledge about Multimedia database issues such as data organization, indexing and retrieval.
- CO-5:** Implement conferencing paradigms, structured interaction support, and know about examples from video/audio/graphics conferencing.

### **Books for References:**

1. S. Heath, "Multimedia & Communication Systems", Focal Press, UK., 1999.
2. R.Steinmetz and K. Naharstedt, "Multimedia: Computing, Communications & Applications", Pearson, Delhi, 2014.
3. T. Vaughan, "Multimedia: Making it work", 9<sup>th</sup> Edition, Tata McGraw Hill, New Delhi, 2014.
4. K. Andleigh and K. Thakkar, "Multimedia System Design", PHI, New Delhi, 2000
5. Keyes, "Multimedia Handbook", TMH, 2000.
6. S. Rimmer, "Advanced Multimedia Programming", PHI, New Delhi, 2000.

# **Syllabus**

## **Generic Electives**

**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: Create A 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 DATE AND TIME****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**

**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.

**Books for References:**

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

**Course Objective:**

This course introduces concepts of Statistical Package for Social Sciences and also working with it.

**UNIT I INTRODUCTION 6**

Brief Description and History of SPSS - Running SPSS and the Initial Window(S) - Running SPSS - The Initial SPSS Window(S) Overview the Title Bar -The Menu Bar- The (Power) Tool Bar- The Data Editor (Data View and Variable View) The Status Bar.

**UNIT II OVERVIEW 6**

Sample SPSS Session Overview of This Exercise -Open File - List Cases - Frequencies - Explore - Graphics - Non-Parametric Wilcoxon Test - Correlation –Regression.

**UNIT III COMPUTATION 6**

Creation of A Small Data File and Computation of New Variables Overview- Preliminary Considerations About Data Structures -Creation of a Data Dictionary -Entering Data - Moving around the Data - Editing Data - Computation of New (Or Existing Variables) .

**UNIT IV COMPARATIVE STATISTICS 6**

Data Entry - Descriptive Statistics-. Examining Assumptions of Parametric Statistics - Test for Normality- Test for Homogeneity of Variances- Transformations-Comparative Statistics: Comparing Means Among Groups.

**UNIT V COMPARISON TEST 6**

Comparing Two Groups using Parametric Statistics -Two-Sample T-Test -Paired T-Test - Comparing Two Groups using Non-Parametric Statistics - Mann Whitney U Test - 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**



**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.

**Books for References:**

1. Andy Field , “Discovering Statistics Using IBM SPSS Statistics”, SAGE Publications Ltd, 4th edition, 2013.
2. Sidney Tyrrell, “SPSS: Stats Practically Short and Simple”, Bookboon, 2009
3. Rajathi. A , “SPSS for you”, MJP Publishers 2010.
4. Griffith, Arthur , “SPSS for Dummies” , John Wiley, 2007.

**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**

**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 software.

**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.

**Books for References:**

1. E. Balagurusamy, “ Computing Fundamentals & C Programming”, Tata McGraw hill, 2017.
2. Sanjay Saxena , “MS office 2000”, Vikas publication house pvt.ltd, 2000.
3. Jennifer Ackerman Kettell, Guy Hart-Davis, Curt Simmons, Microsoft Office 2003: The Complete Reference, McGraw-Hill Osborne, 2nd edition, 2003.
4. E. Balaguruswamy , “Office Automation & Word Processing” , TMH, 1987.

**Syllabus**  
**Ability Enhancement**  
**Compulsory Courses**

**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.

	Credit Hours
<b>UNIT I</b>	<b>06</b>
<ul style="list-style-type: none"> <li>• Resume and CV Writing</li> <li>• Complaint Letter</li> <li>• Social Correspondence</li> <li>• Letter of Enquiry</li> </ul>	
<b>UNIT II</b>	<b>06</b>
<ul style="list-style-type: none"> <li>• Short Essay Writing</li> </ul>	
<b>UNIT III</b>	<b>06</b>
<ul style="list-style-type: none"> <li>• Explaining Proverbs</li> </ul>	
<b>UNIT IV</b>	<b>06</b>
<ul style="list-style-type: none"> <li>• Use of Prepositions</li> </ul>	
<b>UNIT V</b>	<b>06</b>
<ul style="list-style-type: none"> <li>• Synonymous Words</li> </ul>	
<b>Total</b>	<b>30 Hours</b>

**Course Outcome:**

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

- 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 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**

**Course Outcome:**

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

**CO-1:** Study about nature of Environment of studies.

**CO-2:** Understand about Natural resources and Renewable resources.

**CO-3:** To impart knowledge about Structures and functions of the ecosystem

**CO-4:** To learn various geographical classification of India and Bio diversity.

**CO-5:** Make awareness of the Role of information technology in Environment and Human health.

**Text Books:**

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 Thangamani

# **Syllabus**

# **Skill Enhancement**

# **Courses**



## SOFTSKILLS I

2 0 0 2

### Course Objective:

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

**Credit Hours**

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

**06**

Talking about your company – Making Polite requests – Introducing yourself and others– Socializing with others – Talking about work activities – Talking about your job – Communication practice – Role plays

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

**06**

Essential Email writing skills – Formal and Informal E-mails – Usage of formal language – Report Writing – Writing project reports – Extended writing practice – Email Etiquette – Understanding Business E-mails

### **UNIT III: TELEPHONE ETIQUETTE**

**06**

The basics of Telephone Etiquette – Customer Service – Being courteous – Making arrangements – Giving clear and concise information – Tone and Rate of speech – Pronunciations – Summarization – Mock Telephonic Conversations

### **UNIT IV: LEADERSHIP SKILLS**

**06**

Essential Leadership Skills – Interpersonal Skills – Team Building – Team work – Do's and Don'ts of Leadership skills – Importance of communication in Leadership – Delegating and Handling of Projects

### **UNIT V: LISTENING AND ANSWERING QUESTION**

**06**

Listening for the main ideas – Listening for details – Listening for specific information – Predicting and listening for opinions – Recognising context – Listening for sequence – Understanding Pronunciation – Listening practice

**Total:30 Hours**

**Course Outcome:**

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

**CO1** To enhance participant's Business Communication Skills

**CO2** To enhance the participant's Reading, Speaking, Listening and Writing capabilities

**CO3** To engage in a conversation with others to exchange ideas

**CO4** To impart leadership qualities among the participants

**CO5** To express opinions to enhance their social skills

**Books Prescribed**

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

**Web Sources:**

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

**Course Objective:**

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

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

Reading Techniques – Types of Reading – Skimming – Scanning – Reading for detail – Identifying key words – Underlining unfamiliar key words – Vocabulary Building – Reading Comprehension practice

**UNIT II: PRESENTATION SKILLS****06**

Presentation Methods – Preparation and Practice – Organizing content – Do's and Don'ts of a Presentation – Presentation Techniques – Mock Presentation

**UNIT III: GROUP DISCUSSION****06**

Introduction to Group Discussion – Preparation for GD – Structure of GD's – Do's and Don'ts – Tips and Strategies – Etiquette and Practice – Body Language and Posture – Sharing Ideas with respect – Understanding Opinions – Mock GD Practice

**UNIT IV: CONVERSATIONAL SKILLS****06**

Introduction to Small talk – How to start and end a conversation – Exchanging ideas – Expressing Interests – Giving Opinions – Social skills and Etiquette – Informal Conversations – Formal Meetings – Group Practice

**UNIT V: SELF – INTRODUCTION AND ROLE PLAY****06**

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

**Total:30 Hours****Course Outcome:**

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

- CO1** To get students to understand the importance of communicating in English
- CO2** To understand effective communication techniques
- CO3** To increase self-confidence through regular practice

**CO4** To encourage active participation in their regular class

**CO5** To enable participants to face large group of audience with confidence

**Books Prescribed**

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 Objective:**

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

**Credit Hours****UNIT I: SKILL ENHANCEMENT****06**

Time Management – Planning and Organisation – Scheduling – Prioritization – Delegation – Task Management – Stress Management – Overcoming anxiety – Confidence Building – Body Language

**UNIT II: RESUME / COVER LETTER WRITING****06**

SWOT Analysis – Details and Resume Writing – Resume Examples – Building Resume using SWOT – Writing Resume – Writing Cover Letter – Resume Correction – Resume Feedback

**UNIT III: INTERVIEW SKILLS****06**

Interview Do's and Don'ts – First Impression – Grooming – Body Language – Frequently asked questions – Useful Language – Mock Interview

**UNIT IV: QUANTITATIVE ABILITY****06**

Permutation & Combinations – Probability – Profit & Loss – Ratio Proportions & Variations – Cubes – Venn Diagrams – Logical Reasoning – Critical Reasoning

**UNIT V: REVISIONARY MODULES****06**

Group Discussions – HR Process – Interview Process – Mock Group Discussions

**Total: 30 Hours****Course Outcome:**

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

- CO1** To develop participants social and professional skills
- CO2** To help participants manage time effectively
- CO3** To build a strong resume to suit corporate requirements
- CO4** To face interviews confidently
- CO5** To enhance their aptitude abilities

### **Books Prescribed**

1. Meena. K and V.Ayothi (2013) A Book on Development of Soft Skills (Soft Skills: A Road Map to Success) P.R. Publishers & Distributors.
2. Soft Skills – Know Yourself & Know the World, S.Chand & Company LTD, Ram Nagar, New Delhi
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>

## SECTOR SKILL COURSE

### Responsive Web Designing

0 0 4 2

#### Objectives:

To build web applications using HTML and CSS technologies use with Microsoft's IIS.  
To build web applications with style sheets in order to provide secure web design.

1. Design a Bio-Data using HTML.
2. Create a webpage with four frames (Picture, table, list, and hyperlink).
3. Program to show all character elements in html.
4. Create a webpage to show the block level elements and text level elements.
5. Create a webpage to show various confectionary items using ordered list and unordered list.
6. Create a webpage to show different hobbies using HTML and CSS.
7. Program to show India map using HTML.
8. Create a web page using style sheet.
9. Create a web page to show registration for recruiting agency
10. Program to show books in inventory in different tables by using row span and colspan
11. Create a Web Page in HTML to show Admission form in college
12. Program to Create a Nested List using HTML and CSS.

**Total: 30 Hours**

#### **Course Outcome: At the end of this course students will be able to,**

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

**CO-1:** Create web page using various HTML building blocks.

**CO-2:** Evaluate the usage of block level and text level elements in HTML.

**CO-3:** Apply list tag in HTML.

**CO-4:** Apply picture, table, list and Hyper link in a web page

**CO-5:** Apply CSS element in web page creation.

**Text Books:**

1. P I. Bayross, “Web Enable Commercial Application Development Using HTML, DHTML, Javascript”, en CGI, BPB Publications, 2000.
2. Eric A. Smith, “ASP 3 Programming Bible”, Wiley-Dreamtech India (P) Ltd, 2003.

**Reference Books:**

1. Dave Mercer, “ASP3.0 Beginners Guide”, TataMcGraw-Hill Edition, Sixthreprint, 2004.
2. J. Jaworski, “Mastering Javascript”, BPB Publications, 1999.
3. T. A. Powell, “Complete Reference HTML (Third Edition)”, TMH, 2002.

**Web Sources:**

1. [www.w3schools.com](http://www.w3schools.com)
2. [www.tutorialspoint.com](http://www.tutorialspoint.com)



**COURSE OBJECTIVE:**

- To develop and strengthen entrepreneurial quality and motivation in students
- To impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.
- To understand the concept and process of entrepreneurship and its contribution in and role in the growth and development of individual and the nation.

**UNIT I ENTREPRENEURSHIP****6**

Entrepreneur – Personality characteristics of successful entrepreneur – Types of Entrepreneurs – Knowledge and skills required for an entrepreneur – Difference between Entrepreneur and Intrapreneur

**UNIT II BUSINESS****6**

Definition, Classification – Characteristics, Ownership Structures – Project Formulation – Steps involved in setting up a Business – Market Survey and Research – Techno Economic Feasibility Assessment

**UNIT III BUSINESS PLAN PREPARATION****6**

Sources of product for business – Pre-feasibility study – Criteria for selection of product – Ownership– Capital – Budgeting project profile preparation – Matching entrepreneur with the project – Feasibility report preparation and evaluation criteria.

**UNIT IV SUPPORT TO ENTREPRENEURS****6**

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Business Incubators – Government Policy for Small Scale Enterprises – Growth Strategies in small industry.

**UNIT V ENTREPRENEURSHIP DEVELOPMENT PROGRAMME****6**

Meaning, Objectives – Phases of EDP – steps in EDP – Strategies for Entrepreneurship development – Institutions in aid of Entrepreneurship Development Programme – Use of IT enabled services in entrepreneurship - E Licensing, E filing.

**COURSE OUTCOME:**

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

**CO – 1:** Understand the concept of Entrepreneurship

**CO – 2:** Identify, create and analyze entrepreneurial opportunities.

**CO–3:** Assess techno economic feasibility of a Business Plan

**CO- 4:** Create Business Plans

**CO-5:** State various statutory institutions involved in the process of Entrepreneurship development

**TEXT BOOKS:**

1. Hisrich R D, Peters M P, “Entrepreneurship” 8th Edition, Tata McGraw-Hill, 2016.
2. Khanka S.S., “Entrepreneurial Development” S Chand & Company; edition, 2016.

**REFERENCE BOOKS:**

1. Sharma, “Entrepreneurship Development”, PHI LEARNING PVT LTD, (2017)
2. Abhinav Ganpule & Aditya Dhobale, “Entrepreneurship Development”, Kindle Edition, Jatayu Publication; 1 edition ,2018.
3. Sangeeta Sharma, “Entrepreneurship Development”, 10th Edition, Kindle Edition PHI Learning, 2018.

**WEBSITES**

1. <http://www.simplynotes.in/e-notes/mbabba/entrepreneurship-development/>
2. <https://openpress.usask.ca/entrepreneurshipandinnovationtoolkit/chapter/chapter-1-introduction-to-entrepreneurship/>

**WEBSOURCES**

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

## Technical Seminar

0 0 2 1

### Course Objective:

To develop technical and communication skill, needed for getting employment opportunities, help to identify the pros and cons of their skill set, help to exhibit the inherent and external personality.

### Content:

- Students encourage to participate seminar, webinar, workshop.
- Every student assign to select their topic of interest in core subject
- Encourage to participate various activities allotted to their topic.
- At the end of the semester, every student submits technical report on their topic.
- Based on documentation and viva students eligible to get their grade.

**Total: 15 Hours**