# RATHINAM COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

### Rathinam Tech Zone, Eachanari, Coimbatore – 641021.

# DEPARTMENT OF COMPUTER SCIENCE



## Syllabus for

## B.Sc.CS with Cyber Security

## (I and II Semester)

## 2024 – 2025 Batch onwards

*Rathinam College of Arts and Science (Autonomous), Coimbatore-21.*
*For candidates admitted in B.Sc. CS with Cyber Security in the academic year 2024-2025 and Onwards*
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*Regulations 2024*

## Vision and Mission of the Institution

### Vision

To emerge as a world-renowned Institution that is integrated with industry to impart Knowledge, Skills, Research Culture and Values in youngsters whocan accelerate the overall development of India

### Mission

To provide quality education at affordable cost, build academic and research excellence, maintain eco-friendly and robust infrastructure, and to create a team of well qualified faculty who can build global competency and employability among theyouth of India

### Motto

Transform the youth into National Asset

## Vision and Mission of the Department

### Vision

To become a globally recognized department which is deeply connected with tech industry, fostering, transfer of knowledge and skills, instilling a research culture and values in aspiring computer scientists, empowering them to drive India's holistic technological advancement.

### Mission

To empower students and cultivate academic and research brilliance and provide them to leverage Technology as a tool for innovation and fostering global competitiveness and employability in diverse field

### Motto

Industry – Ready Education

## Program Educational Objectives (PEO)

| | | |
|---|---|---|
| PEO1 | : | Besuccessfulintopgraduateschoolsandinprofessionalpositionswithinacademic&researchinstitutionsand industries,andinentrepreneurialandconsultancyventures. |
| PEO2 | : | ContributetheirInformationTechnologyexpertiseeffectivelyasmembersoftechnologicalTeams. |
| PEO3 | : | Demonstratelifelonglearningandengagementthroughcontinuedprofessionaldevelopment,andparticipa tionandleadershipinprofessionalsocietiesandorganizations. |
| PEO4 | : | Conductthemselvesinaresponsible,professional,andethicalmanner. |
| PEO5 | : | Emergeasagloballycompetentanduniversallyemployableprofessionalwhoacceleratestheoveralldevelo pmentofIndia. |

## Mapping of Institute's Mission to PEO

| Institute's Mission | PEO's |
|---|---|
| To provide quality education at affordable cost, build academic and research excellence maintain eco-friendly and robust infrastructure, and | PEO1,PEO2 |
| To create a team of well qualified faculty who can build global competency and employability among the youth of India. | PEO2,PEO5 |

## Mapping of Department Mission to PEO

| Department Mission | PEO's |
|---|---|
| Toempowerstudentsandcultivateacademicandresearchbrilliance | PE01,PE02 |
| ProvidethemtoleverageTechnologyasatoolforinnovation | PEO3 |
| Fosteringglobalcompetitivenessandemployabilityindiversefield | PE04,PE05 |
| Toempowerstudentsandcultivateacademicandresearchbrilliance | PE01,PE02 |

## Program Outcomes (PO):

| | | |
|---|---|---|
| PO1 (DisciplinaryKnowledge) | : | Demonstrateknowledgecompetencyinrequireddisciplinesin Universitylevelcourses appropriatetothestudyprogram. |
| PO2 (ProblemAnalysis) | : | Applyappropriateknowledgeandadoptsuitableskillstoidentify,formulate, analyzeandsolvecomplexproblemsinreallifesituationsandreachsubstantiatedconclusions. |
| PO3 (Investigation) | : | Conduct investigation of complex problems by following scientific approach toknowledge development that include appropriate experiments, analysis, evaluateevidence,arguments,claims,beliefsonthebasisofempiricalevidence;interpretation ofdata,formulationofcoherentargumentsandsynthesisofinformation(assumptions,hypoth esisorimplications)inordertoreachvalid conclusions. |
| PO4 (DesignofSolution s) | : | Designsolutionsforcomplex,open-endedreal- lifeproblemsandtodesignsystems,componentsorprocessesthatmeetspecificneedswithappr opriateattentiontohealthandsafetyrisks,applicablestandards,andeconomic,environmental, culturalandsocietalconsiderations. |
| PO5 (ModernToolUsage) | : | Create, select,apply, adapt,and extend appropriatetechniques, resources,and modern tools to a range of activities, from simple to complex, with anunderstandingofthe associatedlimitations. |

| | | |
|---|---|---|
| PO6 (IndividualandTeamWork) | : | Work effectively and respectfully as a member and leader in teams, facilitatecooperative or coordinated effort, act together as a group or a team in theinterestsofacommoncauseandworkefficiently,preferablyinamulti-disciplinarysetting.Possessknowledgeofthevaluesandbeliefsofmultiple culturesandaglobalperspective. Taskmapping,settingdirection,buildingateam,formulatinganinspiring vision,motivatingandinspiringteammemberswhocanhelpachievethe vision,andguidepeopletotherightdestination. |
| PO7 (Communication) | : | Express complex concepts within the profession and withsocietyat large.Such ability includeslistening, speaking,reading and writing,and the abilitytocomprehendandwriteeffectivereportsanddesigndocumentation,andto giveandeffectivelyresponddtoclearinstructions. |
| PO8 (Professionalism) | : | Understandtheprofessionalroles andresponsibilitiesinsociety,especiallytheprimaryroleofprotectionofthepublicandthepublicinterest. |
| PO9 (EnvironmentandSustainability) | : | Analyzesocialandenvironmentalaspectsof the activities.Suchabilityincludes anunderstandingoftheinteractionsthathaswiththeeconomic,social,health, safety,legal,andculturalaspectsofsociety,theuncertaintiesinthepredictionofsuchinteractions;andtheconceptsofsustainabledesignanddevelopmentand environmentalstewardship. |
| PO10(MoralandEthical Awareness) | : | Embrace moral/ ethical values; formulate a position/ argument about an ethical issue from multiple perspectives and apply professional ethics, accountability and equity. |
| PO11 (Economics and Project Management) | : | Appropriately incorporate economics and business practices including project, risk, and change management into the practice of the system and to understand their limitations. |
| PO12(Life-longLearning) | : | Identify and address their own educational needs in a changing World in ways sufficient to maintain their competence and to allow them to contribute to theadvancement of knowledge. |

## Program Specific Outcomes (PSO):

| | | |
|---|---|---|
| PSO1 | : | Graduates contribute to fortifying society's digital infrastructure against cyber threats, safeguarding critical systems and personal data. |
| PSO2 | : | Students engage with industry professionals, attend conferences, and participate in competitions, expanding their professional network and potential career paths. |
| PSO3 | : | Graduates develop skills to adapt to evolving cyber threats and technologies, ensuring their long-term relevance and employability. |

## Correlation between the PO/PSO and the PEOs

| Program Outcomes | | PEO 1 | PEO 2 | PEO 3 | PEO 4 | PEO 5 |
|---|---|---|---|---|---|---|
| PO1 | : | 3 | 1 | 3 | 2 | 3 |
| PO2 | : | 3 | 2 | 3 | 1 | 3 |
| PO3 | : | 1 | 2 | 3 | 3 | 2 |
| PO4 | : | 3 | 1 | 3 | 3 | 3 |
| PO5 | : | 3 | 3 | 2 | 3 | 1 |
| PO6 | : | 2 | 3 | 3 | 2 | 1 |
| PO7 | : | 2 | 3 | 1 | 2 | 3 |
| PO8 | : | 3 | 2 | 1 | 3 | 1 |
| PO 9 | : | 2 | 2 | 3 | 2 | 2 |
| PO 10 | : | 1 | 3 | 1 | 3 | 3 |
| PO 11 | : | 3 | 2 | 2 | 2 | 1 |
| PO 12 | : | 3 | 1 | 2 | 2 | 3 |
| PSO1 | : | 2 | 3 | 1 | 1 | 2 |
| PSO2 | : | 3 | 2 | 2 | 3 | 1 |
| PSO3 | : | 2 | 3 | 3 | 3 | 3 |

3 – Strong correlation; 2-moderate correlation; 1-Less correlation; Blank-no correlation

## Components considered for Course Delivery is listed below:

a. Class room Lecture
b. Laboratory class and demo
c. Assignments
d. Mini Project
e. Project
f. Online Course
g. External Participation
h. Seminar
i. Internship

## Mapping of POs with Course Delivery:

| Program Outcome | Course Delivery | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | a | b | C | d | e | f | g | h | i |
| PO1 | 2 | 3 | 1 | 1 | 2 | 1 | 3 | 3 | 1 |
| PO2 | 3 | 2 | 2 | 3 | 3 | 3 | 1 | 2 | 3 |
| PO3 | 3 | 3 | 1 | 3 | 1 | 1 | 1 | 2 | 2 |
| PO4 | 2 | 3 | 2 | 3 | 3 | 1 | 1 | 3 | 1 |
| PO5 | 3 | 2 | 1 | 2 | 1 | 3 | 3 | 3 | 3 |
| PO6 | 2 | 3 | 3 | 2 | 3 | 1 | 2 | 3 | 3 |
| PO7 | 2 | 3 | 1 | 3 | 1 | 1 | 2 | 3 | 2 |
| PO8 | 2 | 2 | 1 | 2 | 3 | 3 | 2 | 3 | 2 |
| PO9 | 1 | 1 | 2 | 3 | 3 | 3 | 2 | 3 | 3 |
| PO10 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 |
| PO11 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 3 |
| PO12 | 1 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 3 |
| PSO1 | 2 | 3 | 1 | 3 | 2 | 3 | 1 | 3 | 3 |
| PSO2 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 |
| PSO3 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 3 |

3 – Strong correlation; 2-moderate correlation; 1-Less correlation; Blank-no correlation

# RATHINAM COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

## B.Sc. CS with Cyber Security DEGREE PROGRAMME

## B.Sc (CS) Curriculum Structure - Regulation – 2024

## (For students admitted from 2024-2025 and onwards)

| S.No. | Sem | Part | Sub Type | Course Code | Course Name | Credit | Hours | INT | EXT | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | L1 | | Language - I | 3 | 5 | 50 | 50 | 100 |
| 2 | 1 | 2 | L2 | | English - I | 3 | 5 | 50 | 50 | 100 |
| 3 | 1 | 3 | Core | | Core Course – Problem Solving Technique in C | 4 | 5 | 50 | 50 | 100 |
| 4 | 1 | 3 | Core | | Core Course – Practical : Programming Lab in C | 4 | 4 | 50 | 50 | 100 |
| 5 | 1 | 3 | Allied | | Allied-I - Numerical Methods | 4 | 5 | 50 | 50 | 100 |
| 6 | 1 | 4 | SEC | | Skill Enhancement Courses – Web Designing **Rsmart : DBMS** | 4 | 4 | 50 | 50 | 100 |
| 7 | 1 | 4 | AEC | | Ability Enhancement Course I Environmental Studies **or** Universal Human Values & Professional Ethics | 2 | 2 | 50 | 0 | 50 |
| | | | | | | **24** | **30** | **350** | **300** | **650** |
| | | | | | | | | | | |
| 1 | 2 | 1 | L1 | | Language - II | 3 | 5 | 50 | 50 | 100 |
| 2 | 2 | 2 | L2 | | English - II | 3 | 5 | 50 | 50 | 100 |
| 3 | 2 | 3 | Core | | Core Course – Object Oriented Programming with Java **Rsmart : Python Programming** | 4 | 5 | 50 | 50 | 100 |
| 4 | 2 | 3 | Core | | Core Course – Practical:Object Oriented Programming with Java Lab **Rsmart : Python Programming Lab** | 4 | 4 | 50 | 50 | 100 |
| 5 | 2 | 3 | Elective | | Elective - I Entreprenuership Development **Rsmart : Data Structure** | 4 | 4 | 50 | 50 | 100 |
| 6 | 2 | 3 | Allied | | Allied-II - Discrete Mathematics | 4 | 5 | 50 | 50 | 100 |
| 7 | 2 | 4 | AEC | | Ability Enhancement Course II Design Thinking | 2 | 2 | 50 | 0 | 50 |
| 8 | 2 | 5 | Ext | | Extension Activity - I (NASA) | 1 | 0 | 25 | 0 | 25 |
| | | | | | | **25** | **30** | **375** | **300** | **675** |
| | | | | | | | | | | |
| 1 | 3 | 1 | L1 | | Language - III | 3 | 4 | 50 | 50 | 100 |
| 2 | 3 | 2 | L2 | | English - III | 3 | 4 | 50 | 50 | 100 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 3 | 3 | Core | | Core Course – Relational Database Management System **Rsmart : Linux & Shell Programming** | 4 | 6 | 50 | 50 | 100 |
| 4 | 3 | 3 | Core | | Core Course – Practical: RDBMS using ORACLE Lab **Rsmart : Linux & Shell Programming Lab** | 4 | 4 | 50 | 50 | 100 |
| 5 | 3 | 3 | Allied | | Allied-III - Optimization Techniques **Rsmart : Quantitative Aptitude** | 4 | 5 | 50 | 50 | 100 |
| 6 | 3 | 4 | SEC | | Skill Enhancement Courses – Computer Networks | 4 | 5 | 50 | 50 | 100 |
| 7 | 3 | 4 | AEC | | Ability Enhancement Course III Soft Skill-1 | 2 | 2 | 50 | 0 | 50 |
| 8 | 3 | 3 | ITR | | Internship / Industrial Training (Summer vacation at the end of II semester activity) | 2 | 0 | 50 | 0 | 50 |
| 9 | 3 | 5 | Ext | | Extension Activity - II (NASA) | 1 | 0 | 25 | 0 | 25 |
| | | | | | | **27** | **30** | **425** | **300** | **725** |
| | | | | | | | | | | |
| 1 | 4 | 1 | L1 | | Language - IV | 3 | 4 | 50 | 50 | 100 |
| 2 | 4 | 2 | L2 | | English - IV | 3 | 4 | 50 | 50 | 100 |
| 3 | 4 | 3 | Core | | Core Course – Php and MySql **Rsmart : Operating System Security** | 4 | 6 | 50 | 50 | 100 |
| 4 | 4 | 3 | Core | | Core Course – Practical : Php and MySql Lab **Rsmart : Operating System Security Lab** | 4 | 4 | 50 | 50 | 100 |
| 5 | 4 | 3 | Allied | | Allied-IV - Mathematics for Computer Science | 4 | 5 | 50 | 50 | 100 |
| 8 | 4 | 3 | Elective | | Elective - II - i) Software Testing ii) Grid Computing iii) Operating System **Rsmart : Web Technologies** | 4 | 5 | 50 | 50 | 100 |
| 7 | 4 | 4 | AEC | | Ability Enhancement Course IV Soft Skill-2 | 2 | 2 | 50 | 0 | 50 |
| 8 | 4 | 5 | Ext | | Extension Activity - III (NASA) | 1 | 0 | 25 | 0 | 25 |
| | | | | | | **25** | **30** | **375** | **300** | **675** |
| | | | | | | | | | | |
| 1 | 5 | 3 | Core | | Core Course – **Ethical Hacking** | 4 | 6 | 50 | 50 | 100 |
| 2 | 5 | 3 | Core | | Core Course – Practical : **Ethical Hacking Lab** | 4 | 6 | 50 | 50 | 100 |
| 3 | 5 | 3 | Elective | | Elective - III - i) **Data Communication and Computer Networks** ii) | 4 | 6 | 50 | 50 | 100 |

| | | | | | Course Name | Credit | Hours | INT | EXT | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Computing Intelligence iii) Information Technology | | | | | |
| | 5 | 3 | PRJ | | Project | 0 | 6 | 0 | 0 | 0 |
| 4 | 5 | 4 | SEC | | Skill Enhancement Courses – Vue JS | 4 | 6 | 50 | 50 | 100 |
| 5 | 5 | 3 | ITR | | Internship / Industrial Training (Summer vacation at the end of IV semester activity) | 2 | 0 | 50 | 0 | 50 |
| 6 | 5 | 5 | Ext | | Extension Activity - IV (NASA) | 1 | 0 | 25 | 0 | 25 |
| | | | | | | **19** | **30** | **275** | **200** | **475** |
| | | | | | | | | | | |
| 1 | 6 | 3 | Core | | Core Course – **Tools & Techniques for Cyber Security** | 4 | 6 | 50 | 50 | 100 |
| 2 | 6 | 3 | Core | | Core Course – Practical: **Cyber Security Lab** | 4 | 4 | 50 | 50 | 100 |
| 3 | 6 | 3 | Elective | | Elective – IV- i) Mobile Computing ii) **Wireless Network** iii)Cyber Crime and Law | 4 | 6 | 50 | 50 | 100 |
| 4 | 6 | 3 | PRJ | | Core Project | 8 | 8 | 100 | 100 | 200 |
| 5 | 6 | 4 | SEC | | Skill Enhancement Courses – **Multimedia Systems** | 4 | 6 | 50 | 50 | 100 |
| | | | | | | **24** | **30** | **300** | **300** | **600** |
| | | | | | **Total credit** | **144** | **180** | **2100** | **1700** | **3800** |

| | | | | | Additional Credits | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S.No. | Sem | Part | Sub Type | Course Code | Course Name | Credit | Hours | INT | EXT | Total |
| 1 | 2 | 6 | VAC | | VAC - Microsoft CoE Course / NPTEL – **Rsmart : Malware Analysis** | 2 | 2 | 50 | 0 | 50 |
| 3 | 4 | 6 | IDC | | VAC - Microsoft CoE Course / NPTEL **Rsmart : Social Network & Security** | 2 | 2 | 50 | 0 | 50 |
| 4 | 5 | 6 | VAC | | VAC - Microsoft CoE Course / NPTEL **Rsmart : Security & Privacy in cloud** | 2 | 2 | 50 | 0 | 50 |

| Parts | Sem I | Sem II | Sem III | Sem IV | Sem V | Sem VI | Total Credits |
|---|---|---|---|---|---|---|---|
| **Part I** | 3 | 3 | 3 | 3 | | | 12 |
| **Part II** | 3 | 3 | 3 | 3 | | | 12 |
| **Part III** | 12 | 16 | 15 | 16 | 15 | 20 | 94 |
| **Part IV** | 6 | 2 | 6 | 2 | 4 | 4 | 24 |
| **Part V** | | 1 | 1 | 1 | 1 | | 4 |
| **Total** | **24** | **25** | **28** | **25** | **20** | **24** | **146** |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| 11T | Part I Tamil | 3 | 6 | 1 | 0 | Theory |

**Introduction:**
பகுதி முதல் பாடமாக அமையும், தமிழ்ப்பாடம்கவிதைகள், இலக்கணம், இலக்கியவரலாறு ஆகியவைகள் கொண்டு அமைந்து உள்ளது. ஐந்துஅலகுகளாக பகுக்கப்பட்டுள்ளது.

**Course Outcome:**

| CO1 | : | பாரதியார், பாரதிதாசன், சிற்பி, சுரதா ஆகிய கவிதைகளின் விளக்கத்தை மாணவர்கள் அறிந்து கொள்ளுவதால், தன்னம்பிக்கையை வெளிக்கொணரும் வகையில் உள்ளது. |
|---|---|---|
| CO2 | : | பெண் கவிஞர்களின் படைப்பு கவிதையை அறிவதன் மூலம் வாழ்வியல் செய்திகளையும், யதார்த்த நிலையும் அறிய உதவுகிறது. |
| CO3 | : | எண்ணங்களே ஏணிப்படிகள் -வாழ்வில் வெற்றி பெற வேண்டுமானால் எண்ணங்களை வளர்ந்துக் கொள்ள வேண்டும். சிந்தனையில் மூழ்கினர்ல் தெளிவு கிடைக்கும் என்ற கருத்துக்களை அறியும் வகையில் அமைந்துள்ளது. |
| CO4 | : | படைப்புத்திறனை வெளிப்படும் விதமாகவும், இலக்கணத்தை அறிய பயனுள்ளதாக அமைகிறது. |
| CO5 | : | இலக்கியவரலாறு பற்றியச் செய்திகளைக் கொண்டு அதன் வளர்ச்சி நிலையை அறிவும் வகையில் உள்ளது |

**Unit I : [12 periods]**
பாரதியார் - பெண் விடுதலை, பாரதிதாசன் - வீரத் தமிழன், சிற்பி – நிலவுப்பூ, சுரதா - நாடுஆகியவற்றின் விளக்கம் தருதல்

**Unit II: [12 periods]**

தாமரை - தொலைந்துபோனேன், அ. வெண்ணிலா - நீரிலலையும் முகம் மாலதி மைத்ரி - கன்னியாகுமரி, க்ருஷாங்கினி - புன்னை மரம் ஆகிய பெண் கவிதைகளின் செய்திகளை அறிவதால் வாழ்வியல் சூழலையும், யாதர்த்த நிலையையும் விளக்குதல்.

**Unit III: [12 periods]**

எண்ணங்களே ஏணிப்படிகள் - தெளிவான இலக்கு - ஆற்றல் நதி பெருகட்டும்- அறிவை விரிவு படுத்துக்கள்- முன்னேற்றப் படிகள்- வெற்றிச் சிகரம்- எப்பொழுதும் வெற்றி ஆகியவைகள் வாழ்வின் முன்னேற்றதுக்கான செய்திகள் அறியப்பயன்படும்.

**Unit IV: [12 periods]**

பெயர் சொல், வினைச்சொல், இடைச்சொல், உரிச்சொல், எச்சம் - இலக்கணத்திற்கு விளக்கம் அளித்தல் - படைப்பிலக்கியப் பயிற்சி, கவிதை எழுதல் வானொலித் தமிழ், தொலைக்காட்சித் தமிழ், பயன்பாட்டுத்தமிழ், இலக்கண நோக்கில் பயிற்றுவித்தல் எழுதுதல் கவிதை + வானொலி பேச்சுத்திறன் வளர்த்தல். ஆகியவைகள் கொண்டு திறன் வளர்க்க உதவுதல்.

**Unit V: [12 periods]**

இலக்கியவரலாறு பற்றியச் செய்திகள் மற்றும் புதுக்கவிதைகளின் தோற்றங்கள், வளர்ச்சிகள் அறிவும்

வகையில் உள்ளது. ஹைக்கூ, குக்கூ, சென்ட்ரியூ, கஜல். ஆகியவற்றுக்கு விளக்கம் தருதல்.

**Text books:**

1. பாரதியார் கவிதைகள், 2. பாரதிதாசன் கவிதைகள், 3. சுரதா கவிதைகள், 4. சிற்பி கவிதைகள்

5. அ. வெண்ணிலா

**Reference Books :**

1 இலக்கியவரலாறு பாக்கியமேரி, 2. இலக்கண நூல், 3. மு.வ. தமிழ் இலக்கிய வரலாறு

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | General English | 4 | 0 | 0 | 4 | Theory |

**Introduction:**
To encourage students to inculcate and use effective communication skills in their day-to-day life. To develop the LSRW skills to enhance the culture and thoughts through language

**Course Outcome:**

| CO1 | : | Develop and integrate the use of the four language skills i.e. Reading, Listening, Speaking, and Writing |
|---|---|---|
| CO2 | : | Understand the total content and underlying meaning in the context |
| CO3 | : | Form the habit of reading for pleasure and for information |
| CO4 | : | Comprehend material other than the prescribed text |
| CO5 | : | Develop the linguistic competence that enables them, in the future, to present the culture and civilization of their nation. |

**Unit I : [12 periods]**

A Patch of Land –SubramaniaBharathi, JRD-Harish Bhat, The Faltering Pendulum- BhabaniBhattacharya
Listening for General and Specific Information, Vocabulary: Synonyms, Antonyms, Word Formation

**Unit II: [12 periods]**

The Sparrow-Paul Lawrence Dunbar, Us and Them-David Sedaris (From Dress your Family in Corduroy and Denium), How I taught my grandmother to read-Sudha Murthy, Appropriate use of /articles and Parts of Speech, Listening to Giving Instructions/Directions

**Unit III: [12 periods]**

A Nation's Strength- Ralph Waldo Emerson, Uncle Podger Hangs a Picture-Jerome K.Jerome
Self-Introduction, Greeting, Introducing Others, Error Detection

**Unit IV: [12 periods]**

Love Cycle , The Gold Frame-R.K Laxman, Communication and its types, Close Reading

**Unit V: [12 periods]**

Translation, Dialogue Writing, Free Writing, Sentence Types

**Text books:**
1. Steel Hawk and other stories by Bhattacharya, Bhabani, New Delhi Sahitya Akademi,  1967
2. How I Taught my Grandmother to Read and Other Stories, Murthy, Sudha, Penguin Books, India, 2004

**Reference Books :**
1. English in use - A textbook for College Students (English ,Paperback, - T.Vijay Kumar, K Durga Bhavani, YL Srinivas
2. Practical English Usage - 4th Edition By Michael Swan
3. The Art of Civilized Conversation: A Guide to Expressing Yourself with Style and   Grace -Margaret Shepherd, Penny Carter, (Illustrator), Sharon Hogan, 2005.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **P10** | **P11** | **P12** |
| CO1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 |
| CO5 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 2 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Core Course – Problem Solving Techniques in C** | **4** | **6** | **-** | **-** | **Core Theory** |

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**Introduction:**

This subject covers the C Programming Course. Throughout this course, students will learn the fundamental and advanced concepts of C programming, enabling them to write efficient and reliable programs for various applications.

**Course Outcome:**

| CO1 | : | Understand basic C programming concepts and create simple programs confidently. |
|-----|---|---------------------------------------------------------------------------------|
| CO2 | : | Use decision-making and looping tools to solve different problems in programming. |
| CO3 | : | Use advanced methods to make decisions and organize data effectively in programs. |
| CO4 | : | Manage input/output operations and files smoothly in programs. |
| CO5 | : | Organize code effectively using functions and pointers to make programs run better. |

**Unit I : Introduction to C Programming and Basic Constructs**                    **[12 periods]**

Getting Started with C - The C Character Set - Constants, Variables, and Keywords - Form of a C Program - Compilation and Execution - The First C Program - C Instructions - Types of Instructions - Type Declaration Instruction - Arithmetic Instruction - Control Instructions - Types of Operators.

**Unit II: Decision Making and Looping Constructs**                    **[12 periods]**

**Decision Control Instruction**: - The if Statement - The if-else Statement - Nested if-else - Use of Logical Operators - The Conditional Operators - **Loop Control Instruction**:- Loops and the while Loop - The for Loop - The do-while Loop - Break and Continue Statements

**Unit III: Advanced Decision Making and Data Structures**                    **[12 periods]**

Case Control Instruction - Decisions using switch - Comparison of switch and if-else Ladder - The goto Keyword - Data Types Revisited - The C Pre-processor - Arrays and Multidimensional Arrays - Strings and String Functions - Structures and Array of Structures- Console I/O Functions

**Unit IV:Functions, Modular Programming, and Pointers[12 periods]**

Functions - Introduction to Functions - Passing Values between Functions - Scope Rule of Functions - Using Library Functions - Return Type of Function – Pointers - Call by Value and Call by Reference - Introduction to Pointers - Pointer Notation - Pointers and Arrays - Pointers to Functions – Recursion

**Unit V: Input/Output Operations and Structures in C [12 periods]**

Data Organization - File Operations: Opening a File - Reading from a File - Closing the File - Counting Characters – A File-Copy Program - Writing to a File - File Opening Modes - Text Files and Binary Files - Issues in Input / Output - Operations on Bits

**Text books:**
1. Yashavant Kanetkar , "Let us C" , Fourteenth Edition, BPB Publication, 2017.
2. E.Balagurusamy, "Programming in ANSI C", Seventh Edition McGraw Hill, 2017

**Reference Books :**
1. Byron S Gottfried, "Programming with C", Fourth Edition, McGraw-Hill, 2018
2. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw-Hill, 2021

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **P10** | **P11** | **P12** |
| CO1 | 1 | 3 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 1 | 3 |
| CO2 | 1 | 3 | 2 | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 1 | 3 | 3 | 3 | 1 | 2 | 1 | 3 | 3 | 1 | 3 | 1 |
| CO4 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 3 | 2 | 3 | 2 | 1 |
| CO5 | 1 | 2 | 3 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 1 | 1 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Core CoursePractical – Programming Lab in C** | **4** | **-** | **-** | **6** | **Core Practical** |

**Introduction:**

This subject, C Programming Lab, will equip you with the foundational knowledge to excel in programming with C. Students will learn to effectively utilize basic constructs, implement arrays, manipulate strings, work with pointers, and understand structures and file processing techniques.

**Course Outcome:**

| | | |
|---|---|---|
| CO1 | : | Understand and apply C programming constructs effectively. |
| CO2 | : | Develop programs in C using basic constructs proficiently. |
| CO3 | : | Implement arrays in C programs for various applications. |
| CO4 | : | Utilize strings, pointers, and functions proficiently in C applications. |
| CO5 | : | Implement structures and file processing techniques effectively in C applications. |

1. Create a program that calculates the area of a circle given its radius.
2. Implement a program that determines whether a given year is a leap year or not.
3. Display whether the entered number is an Armstrong number or not
4. Create a program that compares three numbers and prints the largest one.
5. Write a program to print the Fibonacci series up to a certain number of terms using a while loop.
6. Write a program that takes an integer input n and prints a triangle pattern with n rows, where each row contains one more asterisk(*) than the previous row.
7. Write a program to find the sum of elements in a one-dimensional array.
8. Implement a program to count the number of vowels in a given string.
9. Create a program to reverse a given string.
10. Write a function that receives marks received by a student in 3 subjects and returns the average and percentage of these marks. Call this function from main( ) and print the results in main( ).
11. Write a program to swap two numbers using pointers.
12. Write a program to calculate the factorial of a number using a recursive function.
13. Write a program to store and display information about students using structures.
14. Write a program to read data from a file and display it on the screen.
15. Write a program to copy contents of one file to another. Whiledoing so replace all lowercase characters to their equivalentuppercase characters.

**Text books:**

1. Yashavant Kanetkar , "Let us C" , Fourteenth Edition, BPB Publication, 2017.
2. E.Balagurusamy, "Programming in ANSI C", Seventh Edition McGraw Hill, 2017

**Reference Books :**

1. Herbert Schildt, "C: The Complete Reference", Fourth Edition, McGraw-Hill, 2021
2. Byron S Gottfried, "Programming with C", Fourth Edition, McGraw-Hill, 2018

**Mapping of Course Outcomes with Program Outcomes:**

| | **Program Outcomes** |
|---|---|

| Course Outcomes | P01 | PO2 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | P10 | P11 | P12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 3 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO2 | 1 | 3 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 1 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| CO4 | 1 | 1 | 1 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 2 | 1 |
| CO5 | 1 | 1 | 1 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 1 | 1 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|

| **Allied I– NUMERICAL METHODS** | **4** | **6** | **-** | **-** | **Theory** |
|---|---|---|---|---|---|

**Introduction:**

This paper enablesthestudentstolearnnumericalapproximationstrategiesandabasicknowledge on the theory supports numerical algorithms.

**Course Outcome:**

| CO1 | : | To demonstrateunderstanding ofcommonnumericalmethodsand howtheyareused to obtainapproximate solutionstootherwiseintractablemathematicalproblem. |
|---|---|---|
| CO2 | : | Toapplynumericalmethodstoobtainapproximatesolutionstomathematicalproblems |
| CO3 | : | To analyse andevaluatetheaccuracyofcommonnumericalmethods |
| CO4 | : | Toanalyseerrorobtainedinthenumericalsolutionoftheproblem |
| CO5 | : | Toapplynumericalmethodsinmodernscientificcomputingwithfiniteprecisioncomputation. |

**Unit I :**                                   **[12 periods]**

Solutions of algebraic and transcendental equations: Introduction – Bisection method – The Iteration method – Newton-Raphson Method – Ramanujan's method.

**Unit II: [12 periods]**

Interpolation – Errors in Polynomial interpolation, Finite differences, Differences of a polynomial, Newton's forward and backward interpolation, Central differences, Gauss, Stirling, Bessel's and Everett's Formulae, Lagrange's Interpolation formula.

**Unit III: [12 periods]**

Linear systems of equations: Consistency of Linear System of equations, Solutions of Linear Systems by direct method: Gaussian elimination, Gauss Jordan, solution of tridiagonal systems, Solutions of linear systems by iterative methods: Jacobi method, Gauss-Seidel method.

**Unit IV: [12 periods]**

Numerical integration: Trapezoidal rule – Geometrical interpretation and error of Trapezoidal rule – Simpson's one third rule and three eighth rule formulae - Romberg integration.

**Unit V: [12 periods]**

Numerical solution for ordinary differential equation-Solution of first order ODE by Taylor series method – Solution of first order ODE by Euler method – Error estimates for the Euler method – Modified Euler method – Runge-Kutta method of second, third and fourth order.

**Text books:**

1. Introductory Methods Numerical Analysis, S. S. Sastry Fifth Edition, Prentice-Hall Of India.

**Reference Books :**

1. Venkataraman M.K., "Numerical methods in Science and Engineering", National Publishing Company, Revised Edition, 2005.
2. Kandasamy P., "Numerical Methods", S.Chand and Co, Reprint 2010
3. M.K.Jain., Iyengar. S.R.K., Jain R.K., "Numerical Methods for Scientific and Engineering

| Computation", (6th Edition), New Age International, 2012. |
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**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **P10** | **P11** | **P12** |
| CO1 | 1 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 |
| CO2 | 1 | 3 | 2 | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 1 | 3 | 3 | 3 | 1 | 2 | 1 | 1 | 3 | 1 | 3 | 1 |
| CO4 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 3 | 2 | 3 | 2 | 1 |
| CO5 | 1 | 2 | 3 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 1 | 1 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
| --- | --- | --- | --- | --- | --- | --- |
| | **Skill – Web Designing** | **4** | **6** | **-** | **-** | **Theory** |

**Introduction:**

This subject covers Web Designing Course. To introduce the fundamentals of Internet, and the principles of web design. To construct basic websites using HTML and Cascading Style Sheets. To build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms. To develop modern interactive web applications using PHP, XML and MySQL.

**Course Outcome:**

| CO1 | : | To introduce the fundamentals of Internet, and the principles of web design. |
|---|---|---|
| CO2 | : | To construct basic websites using HTML and Cascading Style Sheets. |
| CO3 | : | To build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms. |
| CO4 | : | To develop modern interactive web applications using PHP, XML and MySQL |

**Unit I :**                                     **[12 periods]**

**Introduction:** Concept of WWW, Internet and WWW, HTTP Protocol: Request and Response, Web browser and Web servers, Features of latest version of Web. **Web Design:** Concepts of effective web design, Web design issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Website, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation.

**Unit II: [12 periods]**

**HTML :** Basics of HTML, formatting and fonts, commenting code, colour, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of latest version of HTML.

**Unit III:  [12 periods]**

**Style sheets :** Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colours and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of latest version of CSS.Instruction - Loops and the while Loop - The for Loop - The do-while Loop - Break and Continue Statements

**Unit IV: [12 periods]**

**JavaScript :** Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML : Combining HTML, CSS and JavaScript, Events and buttons.

**Unit V: Input/Output Operations and Structures in C [12 periods]**

**PHP and MySQL:** Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and database bugs.

**Text books:**

1. Ralph Moseley and M. T. Savaliya, Developing Web Applications, Wiley-India Private Limited, 2011.

2. Robert W.Sebesta, Programming the World Wide Web, 7th edition, Pearson Education, 2013.

**Reference Books :**

1. Kogent Learning Solutions Inc., Web Technologies Black Book, Dreamtech Press, 2009

2. Joel Sklar, Principles of Web Design, Cengage Learning, 6th Edition, 2015.

3. B. M. Harwani, Developing Web Applications in PHP and AJAX, Tata McGraw-Hill, 2010.

4. Internet and World Wide Web How to program, Paul J. Deitel, Harvey M. Deitel, and Abbey Deitel, 5th Edition, Pearson Education, 2011.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **P10** | **P11** | **P12** |
| CO1 | 1 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 |
| CO2 | 1 | 3 | 2 | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 1 | 3 | 3 | 3 | 1 | 2 | 1 | 1 | 3 | 1 | 3 | 1 |
| CO4 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 3 | 2 | 3 | 2 | 1 |
| CO5 | 1 | 2 | 3 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 1 | 1 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|

| **21T** | Part I Tamil | **3** | **6** | **1** | **0** | **Theory** |
|---|---|---|---|---|---|---|

**Introduction:**

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**Course Outcome:**

| CO1 | : | ஆ |
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| CO2 | : | ப |
| CO3 | : | அ |
| CO4 | : | ப |
| CO5 | : | த |

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| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | General English | 4 | 0 | 0 | 4 | Theory |

**Introduction:**

To encourage students to inculcate and use effective communication skills in their day-to-day life. To develop the LSRW skills to enhance the culture and thoughts through   language

**Course Outcome:**

| CO1 | : | Learn to introduce themselves and talk about everyday activities confidently |
|---|---|---|
| CO2 | : | Be able to write short paragraphs on people, places, and events |
| CO3 | : | Identify the purpose of using various tenses and effectively employ them in speaking and writing |
| CO4 | : | Gain knowledge to write subjective and objective descriptions |
| CO5 | : | Identify and use their skills effectively in formal contexts. |

**Unit I : [12 periods]**

Very Indian Poem in Indian English -Nissim Ezekiel - If you Are Wrong Admit it-Dale Carnegie - Reading for General and Specific Information  (Charts, tables schedules, graphs, etc.) - Homonyms, Homophones, Homographs

**Unit II: [12 periods]**

Still I Rise- Maya Angelou - Kindly Adjust Please- Shashi Tharoor - Verbs and Tenses - Subject Verb Agreement

**Unit III: [12 periods]**

Alchemist-Paulo Coelho

**Unit IV: [12 periods]**

The Flower- Tennyson - The Spoon-Fed Age. W.R. Inge - Paragraph Writing - Error detection

**Unit V: [12 periods]**

On Killing a Tree- Gieve Patel - Taking and Note Making - Reading news and weather reports - Precis Writing

**Text books:**

1.  The Alchemist - Paulo Coelho Harper - 2005

**Reference Books :**

1.  Advanced English Grammar. Martin Hewings. Cambridge University Press, 2000
2.  Descriptive English. SP Bakshi, Richa Sharma · 2019, Arihant Publications (India) Ltd
3.  The Reading Book: A Complete Guide to Teaching Reading. Sheena Cameron, Louise Dempsey, S & L. Publishing, 2019
4.  Skimming and Scanning Techniques, Barbara Sherman, Liberty University Press, 2014
5.  Brilliant Speed Reading: Whatever you need to read, however ...Phil Chambers.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **P10** | **P11** | **P12** |
| CO1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 |
| CO5 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 2 |

| Subject Code | | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|---|
| | | Core Course - Object oriented programming with JAVA | 4 | 0 | 0 | 4 | Theory |

**Introduction:**

Understand the basic ideas and its usage of object oriented programming using JAVA

**Course Outcome:**

| CO1 | : | Explain the fundamental principles of object-oriented programming (OOP), including encapsulation, inheritance, and polymorphism |
|---|---|---|
| CO2 | : | To Demonstrate proficiency in Java syntax, data types, variables, operators, and control structures |
| CO3 | : | To Demonstrate an ability to design an object oriented system, AWT components or multi threaded process as per needs and specifications |
| CO4 | : | To Understand and Organize Java code into packages and manage package access effectively. |
| CO5 | : | To Understand and Perform input and output operations using Java streams for console and file handling. |

**Unit I : [12 periods]**

INTRODUCTION TO OOP AND JAVA: Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors Methods -Access specifiers – Static members- Java Doc comments

**Unit II: [12 periods]**

INHERITANCE, PACKAGES AND INTERFACES: Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding – Dynamic Method Dispatch –Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces.

**Unit III: [12 periods]**

EXCEPTION HANDLING AND MULTITHREADING: Exception Handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model–Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication- Suspending –Resuming, and Stopping Threads –Multithreading. Wrappers – Auto boxing.

**Unit IV: [12 periods]**

I/O, GENERICS, STRING HANDLING I/O : Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.

**Unit V: [12 periods]**

JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS JAVAFX: Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, ToggleButton – RadioButtons – ListView – ComboBox – ChoiceBox – Text Controls – ScrollPane. Layouts – FlowPane – HBox and VBox – BorderPane – StackPane – GridPane. Menus – Basics – Menu – Menu bars – MenuItem. provide a reference book matching these syllabus

**Text books:**

1. "Java: The Complete Reference" by Herbert Schildt

**Reference Books :**
1. "Head First Java" by Kathy Sierra and Bert Bate

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | |
|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** |
| CO1 | L | H | H | L | L | L | L | L |
| CO2 | M | H | L | L | L | L | M | L |
| CO3 | L | L | L | L | L | L | L | H |
| CO4 | M | H | M | L | L | L | L | L |
| CO5 | L | H | H | H | L | H | L | M |

1. H - High ; M- Medium ; L- Low

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Core Course – Practical : Object oriented programming with Java Lab | 4 | - | - | 6 | **Core Practical** |

**Introduction:**

Understand the basic ideas and its usage of object oriented programming using JAVA.

**Course Outcome:**

| CO1 | : | To Able to analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP. |
|---|---|---|
| CO2 | : | To Demonstrate an ability to design and develop java programs, analyze, and interpret object oriented data and report results. |
| CO3 | : | To Demonstrate an ability to design an object oriented system, AWT components or multi threaded process as per needs and specifications |
| CO4 | : | To Understand and Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications |
| CO5 | : | To Understand and Implement the concept of standalone and Applets program. |

1. Write a java program to find the Fibonacci series using recursive and non recursive functions

2. Write a java program to multiply two given matrices.

3. Write a java program for Method overloading and Constructor overloading

4. write a java program that prompts the user for an integer and then printouts all prime numbers up to that integer

5. Write a java program to display the employee details using Scanner class

6. Write a java program that checks whether a given string is palindrome or not

7. Write a java program to represent Abstract class with example

8. Write a java program to implement Interface using extends keyword.

9. Write a java program to create user defined package

10. Write a java program for creating multiple catch blocks.

11. Write a java program for handling Mouse events and Key events.

12. Write a java program that connects to a database using JDBC

13. Write a java program to connect to a database using JDBC and 30 insert values into it

14. Write a java program to connect to a database using JDBC and delete values from it.

15. Write a java program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits and for the + - * % operations. Add a text field to display the result

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | P01 | PO2 | P03 | P04 | P05 | P06 | P07 | P08 |
| CO1 | L | H | H | L | L | L | L | L |
| CO2 | M | H | L | L | L | L | M | L |
| CO3 | L | L | L | L | L | L | L | H |
| CO4 | M | H | M | L | L | L | L | L |
| CO5 | L | H | H | H | L | H | L | M |

1. H - High ; M- Medium ; L- Low

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Elective I - Entrepreneurial Development** | **4** | **6** | **-** | **-** | **Core Theory** |

**Introduction:**

To build the necessary competencies and creativity and prepare them to undertake entrepreneurship as a desirable and feasible career option.

**Course Outcome:**

| CO1 | : | To know about the role of the entrepreneur in India and around and the globe, understand the benefits and drawbacks of entrepreneurship and students has to avoid them; entrepreneurial failure. |
|---|---|---|
| CO2 | : | The course aims to develop student's ability to create, lead and coordinate projects within the textile and fashion sector. It also intends to provide tools and methods in order to make use of entrepreneurial thinking to develop a business project. |
| CO3 | : | Students will be able to define, identify and/or apply the principles of new venture financing, growth financing, and growth financing for existing businesses. |
| CO4 | : | CO4 : To understand process of women entrepreneur and how faced their problems |
| CO5 | : | CO5 : To understand difference between Micro, small and medium Enterprise |

**Unit  I : [12 periods]**
Entrepreneur – importance- qualities, nature types – difference between entrepreneur and entrepreneurship and economic development – its importance – role of entrepreneurship –entrepreneurial environment.

**Unit II:[12 periods]**

Project management: sources of business idea – project classifications – identifications – formulation and design – feasibility analysis – preparation of project report and presentation. Financial analysis – concept and scope project cost estimate – operating revenue estimate – ratio analysis – investment.

**UnitIII:      [12 periods]**
Project finance: sources of finance – institutional finance – role of IFC, IDBI, ICICI, LIC, SFC, SIPCOT, commercial bank – appraisal of bank for loans. Institutional aids for entrepreneurship development

**UnitIV:                                                                          [12  periods]**
The innovation process – the diagnosis – the consultation of group – selecting a strategy preparing the organization setting up the investment. Women entrepreneur – problems face by women entrepreneur – economic impact of women entrepreneur

**Unit V:[12 periods]**
Setting small scale industries – step in setting SSI unit – problems of entrepreneur – sickness in small industries – reason and remedies – Incentives and subsidies role of DICS, SIDCO, NSICS, IRCI, NIDC, SIDBI, SISI, SIPCOT.

**Text books:**

1. Robert D. Hisrich, Mathew J Manimala, Michael P Peters, Dean A Shepherd, "Entrepreneurship", McGraw Hill Education, 2014

**Reference Books :**

2. Bhushan Y.K, "Entrepreneurial Development" Sultan Chand & Sons, Nineteenth Edition -2013.
3. L.M. Prasad, "Entrepreneurial Development", 5th Edition, Himalaya publication, Mumbai – 2006.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| | **P01** | **P02** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| **CO1** | 3 | 3 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 3 |
| **CO2** | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 3 | 2 |
| **CO5** | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 2 | 3 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Allied II – Discrete Mathematics** | **4** | **6** | **-** | **-** | **Core Theory** |

**Introduction:**

To understand the fundamental concepts of discrete mathematics.To develop the ability to solve problems in combinatorics, propositional and predicate logic, relations and recurrence relations.Todeveloplogicalthinkingskillsandproblem-solvingskills

**Course Outcome:**

| CO1 | : | StudentswillgainanunderstandingoftheBasicdefinitionofLogicswithexamples |
|---|---|---|
| CO2 | : | StudentswillgainknowledgeofPredicateLogic |
| CO3 | : | StudentswillbeabletoimplementandevaluatetypesofLatticesandBoolean Algebra |
| CO4 | : | StudentswilllearnaboutPigeonHoleprincipleandPermutation andCombination. |
| CO5 | : | StudentswillbeabletogatherinformationaboutFormalLanguages. |

**Unit  I : [12 periods]**
**Propositional Logic**: Definition, Statements & Notation, Truth Values, Connectives, Statement Formulas &Truth Tables, Well- formedFormulas,Tautologies,EquivalenceofFormulas,DualityLaw, TautologicalImplications,Examples

**Unit II:[12 periods]**

**Predicate Logic:** Definition of Predicates; Statement functions, Variables, Quantifiers, Predicate Formulas, Free & Bound Variables; The Universe of Discourse, Examples, Valid Formulas & Equivalences,Examples.

**UnitIII:     [12 periods]**
**Lattices&BooleanAlgebra:**Propertiesoflattices–Lattice as Algebraic System-Sub lattices- lattice Homomorphism- Special Lattices – Boolean Algebra- sub algebra- Boolean Expression and Booleanfunctions-expressionofaBoolean functionincanonical form- logicGates-KarnaughMapMethod

**UnitIV:                                                                                                                  [12  periods]**
**Basics of Counting**: The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations, Inclusion-Exclusion Principle.

**Unit V:[12 periods]**
**Formal     Language**:                Introduction-  Phrase  –Structure Grammar- Types – BNF-Finite state Machine – Input output strings- FinitestateAutomata

**Text books:**
1. Discrete     Mathematical     Structures     with     application     to ComputerScience,TremblayandManohar–(TataMcGraw Hill, New Delhi) 1997.

**Reference Books :**

   1.Discretemathematics,Venkataraman .M.K. and others–2000 The National Publishing Company.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **P02** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| **CO1** | 3 | 3 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 3 |
| **CO2** | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 2 | 2 |
| **CO3** | 2 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 3 | 2 |
| **CO5** | 2 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 2 | 3 |

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| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| **31T** | Part I Tamil | **3** | **6** | **1** | **0** | **Theory** |

**Introduction:** மூன்றாம் பருவப் பாடத்திட்டம் சிறுகதை, வானொலி, தொலைக்காட்சி, கணிப்பொறி,
மொழிப்பெயர்ப்பு ஆகியவைகள் கொண்டு உருவாகியுள்ளது.

**Course Outcome:**

| | | |
|---|---|---|
| CO1 | : | சிறுகதை எழுதுதல்- சிறுகதையின் வடிவம் மையக்கதாபாத்திரம். பயனுள்ளதாக அமையும். சிறுகதை இலக்கணம் அறிதல், தலைப்பு, கதைக்களம் சிறுகதையின் அமைப்பு அறிந்து கொள்ள முடிகிறது. |
| CO2 | : | வானொலியில் இடம் பெறும் நிகழ்ச்சிகள் - தமிழ் சார்ந்த பேச்சு, விவாதம், மாணவர்கள் அறிந்து கொள்ள பயன் உள்ளது. |
| CO3 | : | தொலைக்காட்சியின் இயல்பு-தொலைக்காட்சியின் நன்மைகள், நிகழ்ச்சிதயாரிக்கும் முறை- நிகழ்ச்சி ஒருங்கிணைப்புகள், நிகழ்;ச்சி நடத்துதல். |
| CO4 | : | கணிப்பொறி வரலாறு- கணிப்பொறி வகைகள், கணிப்பொறி பயன்பாடுகள்ஆகியவைகள் மாணவர்களுக்கு பயனுள்ளது. |
| CO5 | : | மொழிப்பெயர்;பு வரலாறு, மொழிபெயர்ப்பு இயல்புகள் மற்றும் முக்கியத்துவம்பற்றித் தெளிவாக புரிந்து கொள்ள முடியும். |

**அலகு** I :                                                                                    [12 **பாடவகுப்புகள்**]

சிறுகதை எழுதுதல் - சிறுகதையின் வடிவம். மையக்கதாபாத்திரம், எதிர் கதாபாத்திரங்கள். சிறுகதை இலக்கணம் அறிதல், தலைப்பு கதைக்களம் சிறுகதையின் அமைப்பு சிறுகதை பயன்பாடு, சிறுகதையின் தொடக்கம் தெளிவுரையுடன் விளக்கம் கொடுத்து கற்பிக்கப்படும்.

**அலகு** II :                                                                                   [12 **பாடவகுப்புகள்**]

வானொலி வரலாறு. வானொலி பயன்பாடு, வானொலியில் இடம் பெறும் நிகழ்ச்சிகள் - தமிழ் சார்ந்த பேச்சு, விவாதம், பட்டிமன்றம். வானொலியில் கல்வி ஒலிபரப்பு, வேலைவாய்ப்பு, வேளாண்மை நிகழ்ச்சிகள், மருத்துவக் குறிப்புகள் ஆகியவைகள் பற்றி விளக்கம் மற்றும் பேச்சுக்கலைகள் வளர்க்க கற்றுக்கொடுக்கப்படும்.

**அலகு** III:                                                                                  [12 **பாடவகுப்புகள்**]

தொலைக்காட்சியின் வரலாறு-தொலைக்காட்சி தன்மைகள், இயல்பு, நன்மைகள், நிகழ்ச்சி தயாரிக்கும் முறை-நிகழ்ச்சி ஒருங்கிணைப்புகள், நிகழ்ச்சி நடத்துதல். தொலைக்காட்சி வர்ணனைகள் விருதுகள், நிகழ்ச்சிகள் ஆகியவைகள் பற்றி விளக்கம் தருதல்.

**அலகு** IV:                                                                                 [12 **பாடவகுப்புகள்**]

கணிப்பொறி வரலாறு- கணிப்பொறி வகைகள், கணிப்பொறி பயன்பாடுகள், மாத. நாட்காட்டி தயாரித்தல் விளம்பரம் உருவாக்கம், மதிப்பெண் பட்டியல் தயாரித்தல், கணினி கலைச்சொல்லாக்கம் விளக்கம் கொடுத்து கற்பிக்கப்படும்.

**அலகு** V :                                                                                   [12 **பாடவகுப்புகள்**]

மொழிப்பெயர்ப்பு வரலாறு, இயல்புகள் பயன் ஆகியவைகள் அறிந்து கொள்ள பயிற்சிகள் கொடுத்து கற்பிக்கப்படும்.

**பாடநூல்கள்:**

1. எழுதுவது எப்படி- மகரம் வாசகர் வட்டம், 2. தமிழ் இணைய இதழ்கள் - அண்ணா கண்ணன்

3. .மொழிபெயர்ப்புக்கலை : மு.வளர்மதி,4. மொழிபெயர்ப்பியல் : சு.சண்முக வேலாயுதம்,

5. மொழி பெயர்ப்பும், சொல்லாக்கமும் தென்புலோலியூர், மு.கணபதிப்பிள்ளை

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | General English | 4 | 0 | 0 | 4 | Theory |

**Introduction:**

To encourage students to inculcate and use effective communication skills in their day-to-day lives. To develop the LSRW skills to enhance the culture and thoughts through language

**Course Outcome:**

| CO1 | : | Broaden their outlook and sensibility and be acquainted with cultural diversity and divergence in perspectives |
|---|---|---|
| CO2 | : | Be updated with basic informatics skills and attitudes relevant to the emerging knowledge society |
| CO3 | : | Produce grammatically and idiomatically correct language |
| CO4 | : | Gain knowledge in writing techniques to meet academic and professional needs |
| CO5 | : | Be equipped with sufficient practice in Vocabulary, Grammar, Comprehension and Remedial English from the perspective of career-oriented tests. |

**Unit I : [12 periods]**

The Voice of the Mountains -Mamang Dai - Romeo & Juliet- The Balcony Scene - Writing Letters and E.mails - Data Interpretation and Reporting

**Unit II: [12 periods]**

Sita- Toru Dutt - Macbeth-Banquet Scene - Writing and messaging on Social Media Platforms (blogs, Twitter, Instagram,  Facebook) - Data Presentation and Analysis

**Unit III: [12 periods]**

A Song of Hope- Oodgeroo Noonuccal - Julius Caesar- Murder Scene - Tryst with Destiny-Jawaharlal Nehru - Learning netiquette, email etiquette

**Unit IV:[12 periods]**

In an Artist's Studio- Christina Rossetti - Yes, We Can Barack Obama - Meeting Etiquettes- Language, dress code, voice modulation - Online Meetings- Terms and expressions used - Framing Questions

**Unit V: [12 periods]**

You've Got to Find What You Love- Steve Jobs -  Group Discussion -  Conducting and participating in meetings–Voices

**Text books:**

> 1. Arden Shakespeare Complete works by Shakespeare (Author), William (Author), Bloomsbury, 2011

**Reference Books :**

> 1 The Shakespeare Book. Big Ideas Simply Explained, Stanley Wells et al. DK Publishing, 2015
> 2 Famous Speeches by Mahatma Gandhi, Creatingspace Independent Publishing Platform,2016 How to Build a Professional Digital Profile Kindle Edition
>
> 3 by Jeanne Kelly Bernish, Bernish Communications Associates, LLC; 1st edition (May 29, 2012)
> 4 Keys to Teaching Grammar to English Language Learners, Second Ed.: A Practical Handbook by Keith S Folse, Michigan Teacher Training, 2016
> 5. Role Play-Theory and Practice. Krysia M Yardley-Matwiejczuk, SAGE PublicationsLtd, 1997

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **P10** | **P11** | **P12** |
| CO1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 |
| CO5 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 2 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Core Course – Relational Database Management System | 4 | 6 | - | - | Core Theory |

**Introduction:**

This paper will help an entry-level programmer learn the foundational concepts of Relational Database Management Systems and to apply these in practice and learn how to use the Structured Query Language to work with databases.

**Course Outcome:**

| CO1 | : | Demonstrate an understanding of the elementary & advanced features of DBMS & RDBMS |
|---|---|---|
| CO2 | : | Attain a good practical understanding of the SQL. Develop clear concepts about Relational Model. |
| CO3 | : | Prepare various database tables and joins them using SQL commands |
| CO4 | : | Able to design and documents data structures incorporating integrity constraints to satisfy business rules by applying the relational model |
| CO5 | : | Able to develop structured query language (SQL) queries to create, read, update, and delete relational database data |

**Unit I : INTRODUCTION TO RDBMS**                                                          **[12 periods]**

Database system applications – purpose of Database systems – View of Data – Database languages – Relational Databases – Database Design – Data storage and Querying – Transaction Management – Database Architecture. Relational Model – Structure of Relational Databases – Database Schema – Keys – Schema Diagrams – Relational Query Language – Relational Operations.

**Unit II: INTRODUCTION TO SQL:[12 periods]**

SQL Query Language – SQL Data Definition – Basic Structure – Additional Basic Operations – Set Operations – Null Values – Aggregate Functions – Nested Sub queries – Modification of Database – Join Expressions – Views – Integrity Constraints – SQL Data types and Schemas – Accessing SQL from a Programming Language – Functions and Procedures – Triggers.

**Unit III: RDBMS MODELS[12 periods]**

Unit – III: Database Design – Design Process – ER Model – Constraints – ER Diagrams – Reduction to relational Schemas – ER design Issues – Extended ER Features – Alternative Notations for Modelling data.

**Unit IV:[12 periods]**

Relational Database Design – Atomic Domains and First Normal Form – Decomposition using Functional Dependencies – Functional Dependency Theory – Algorithms for Decomposition – Decomposition using Multi valued Dependencies.

**Unit V: Storage and File Structure [12 periods]**

Overview of Physical Storage Media – Magnetic disk and Flash Storage – RAID – Tertiary Storage – File Organization – Organization of Records in Files – Data-Dictionary Storage – Database Buffer.

**Text books:**

1. Abraham Silberschatz, Henry F Korth, S. Sudarshan, "Database System Concepts", 6th Edition, McGraw Hill, 2011.

**Reference Books :**

1. 1. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Pearson Education.

## Mapping of Course Outcomes with Program Outcomes:

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | PS01 | PS02 | PS03 | PS04 |
| CO1 | 3 | 3 | 3 | | 2 | | 3 | | 2 | | 3 | 3 | |
| CO2 | | | | 3 | | | | 1 | | 3 | | | 3 |
| CO3 | 3 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 1 | | 2 | |
| CO4 | 3 | 3 | 1 | | | 3 | | | 3 | | 3 | 3 | |
| CO5 | 3 | | | 1 | | 2 | | | 3 | 2 | | | 3 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Core Course Practical – RDBMS WITH ORACLE LAB** | **4** | **6** | **-** | **-** | **Core Practical** |

**Introduction:**

Relational Database Management Systems (RDBMS) form the backbone of data storage, organization, and retrieval in modern information systems. Understanding RDBMS is crucial for database administrators, developers, and anyone involved in managing data. This course covers fundamental concepts and practical skills in RDBMS, including database design, SQL querying, relational models, normalization, and data storage techniques.

**Course Outcome:**

| CO1 | : | Understand the Fundamentals of RDBMS |
|---|---|---|
| CO2 | : | Develop Proficiency in SQL |
| CO3 | : | Design and Model Databases |
| CO4 | : | Normalize Database Structures |
| CO5 | : | Understand Data Storage and File Structures |

1. Write a SQL script to create a database and tables, insert data into the tables, and perform basic data retrieval operations.

2. Write a SQL script to demonstrate data definition and manipulation operations, including creating tables, modifying table structures, inserting, updating, and deleting records

3. Write a SQL script to demonstrate the use of set operations (UNION, INTERSECT) and aggregate functions (SUM, AVG, COUNT) in queries.

4. Write a SQL script to demonstrate nested subqueries and various types of joins (INNER JOIN, LEFT JOIN, RIGHT JOIN).

5.  Write a SQL script to create views and demonstrate how to query data using these views.

6.  Write a SQL script to create triggers that automatically perform actions in response to specific events on a table.

7.  Design an ER diagram for a given scenario and write a script to create the corresponding relational schema.

8.  Write SQL scripts to normalize a given unnormalized table to 1NF, 2NF, and 3NF.

9.  Write a Python script to simulate the organization of records in files and demonstrate basic file operations.

10. Write a Python script to demonstrate basic buffer management techniques in databases, such as page replacement algorithms.

**Text books:**

1. "Database System Concepts" by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan

**Reference Books :**

2.  "Fundamentals of Database Systems" by Ramez Elmasri and Shamkant B. Navathe

2.  "SQL and Relational Theory: How to Write Accurate SQL Code" by C.J. Date

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **P10** | **P11** | **P12** |
| CO1 | 1 | 3 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 1 | 3 |
| CO2 | 1 | 3 | 2 | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 1 | 3 | 3 | 3 | 1 | 2 | 1 | 3 | 3 | 1 | 3 | 1 |
| CO4 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 3 | 2 | 3 | 2 | 1 |
| CO5 | 1 | 2 | 3 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 1 | 1 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Allied III – Optimization Techniques** | **4** | **6** | - | - | **Core Theory** |

**Introduction:**

Thispaper enablesthestudentstolearn thebasicskillsofoptimally solving thecommonproblemswhichwecome a invarious fields of game theory,queuing theory, network analysis and inventory problems.

**Course Outcome:**

| CO1 | : | Toapplyand extendthegametheoryproblemstoanalyzerealworld systems. |
|---|---|---|
| CO2 | : | Tofindsolutionstonetworkflowproblemsusingstandardalgorithms. |
| CO3 | : | Toanalyzeaprojectwithdeterministicaswellas probabilisticactivitytimes |
| CO4 | : | Tounderstandanddeveloptheinventorymodelsandsettingsafetystocks |
| CO5 | : | Todealtheproblemswithsimulationtodetermining howtomanagetheresourcesefficientlyundervarious types ofsimulation. |

**Unit I : [12 periods]**

Game Theory: Introduction- Two person zero sum game – MAXIMIN – MINIMAX Principle – Saddle Point – Games without Saddle Point – Graphical solutions of 2 x n and m x 2 games – Dominance Property – General solution of m x n games by LPP.

**Unit II:[12 periods]**

PERT and CPM – Basic components – logical sequencing - Rules of network construction- Critical path analysis - Probability considerations in PERT-Distinction between PERT and CPM.

**Unit III :**                                                                                    **[12 periods]**

Inventory control – Types of inventories – Inventory costs – EOQ Problem with no shortages – Production problem with no shortages – EOQ with shortages – Production problem with shortages – EOQ with price breaks.

| **Unit IV:** | **[12 periods]** |
| --- | --- |

Queueing Theory – Introduction – Queueing system – Characteristics of Queueing system – symbols and Notation – Classifications of queues – Problems in (M/M/1) : (∞/FIFO)(Derivation also); (M/M/1) : (N/FIFO); (M/M/C) : (∞/FIFO); (M/M/C) : (N/FIFO) Models- Simple Problems.

**Unit V:[12 periods]**

Simulation – Introduction – simulation models – Event – Types of simulation – Generation of Random Numbers – Mante - carlo simulation – simulation of queueing system.

**Text books:**

1. OperationsResearchbyKantiSwarup,P.K.Guptaand ManMohan,S.Chand&SonsEducationPublications,NewDelhi (2008).

**Reference Books :**

1. Sundaresan.V,GanapathySubramanian.K.S.andGanesan.K,ResourceManagementTechniques, A.R.Publications,2002.

2. PremKumarGuptaD.S.Hira,"OperationsResearch",S.Chand&CompanyLtd,RamNagar,NewDelhi.

3. S.DharaniVenkataKrishnan,                    "OperationsResearchPrinciplesandProblems", KeerthipublishinghousePVTLtd.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | **P01** | **P02** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| **CO1** | 3 | 3 | 3 | 1 | 2 | 1 | 1 | 1 | 3 | 3 | 2 | 1 | 3 |
| **CO2** | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 2 | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 2 | 3 | 1 | 2 | 1 | 2 | 1 | 3 | 3 | 2 | 3 | 2 |
| **CO5** | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 2 | 3 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Skill - Computer Networks** | **4** | **6** | **-** | **-** | **Core Theory** |

**Introduction:**

To understand the concept of Data communication and Computer network. To get a knowledge on routing algorithms. To impart knowledge about networking and inter networking devices. To gain the knowledge on Security over Network communication.

**Course Outcome:**

| CO1 | : | To Understand the basics of Computer Network architecture, OSI and TCP/IP reference models |
|---|---|---|
| CO2 | : | To gain knowledge on Telephone systems and Satellite communications |
| CO3 | : | To impart the concept of Elementary data link protocols |
| CO4 | : | To analyse the characteristics of Routing and Congestion control algorithms |
| CO5 | : | To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS |

**Unit I : [12 periods]**

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media

**Unit II:[12 periods]**

Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.

**Unit III :**                                                          **[12 periods]**

Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth

**Unit IV:**                                                                                         **[12  periods]**

Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.

**Unit V:[12 periods]**

Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP) - Network Security: Cryptography

**Text books:**

1.  A. S. Tanenbaum, "Computer Networks", 4th   Edition, Prentice-Hall of India, 2008.

**Reference Books :**

2.  B. A. Forouzan, "Data Communications and Networking", Tata McGraw Hill, 4th Edition, 2017.
3.  F. Halsall, "Data Communications,    Computer Networks and Open Systems", Pearson Education, 2008.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **P02** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| **CO1** | 3 | 3 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 3 |
| **CO2** | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 2 | 2 |
| **CO3** | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 3 | 2 |
| **CO5** | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 2 | 3 |

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| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| **41T** | **Part I Tamil** | **3** | **6** | **1** | **0** | **Theory** |

**Introduction:**

**Course Outcome:**

| CO1 | : | ☐ |
|---|---|---|
| CO2 | : | த |
| CO3 | : | ☐ |
| CO4 | : | க |
| CO5 | : | ☐ |

☐
☐
☐
☐

| அ லு | |
|---|---|
| அ ஞ | |
| அ ஐ | |
| அ இ | |
| அ ல ☐ | 1. நூல்மதிப்புரை - திறனாய்வுசெய்தல் - 2.கடிதம்மற்றும்விண்ணப்பம்எழுதுதல் - கட்டுரைதிறனைவளர்த்தல்- கட்டுரைதலைப்பு, கட்டுரைஅமைப்புமுறைகள் |

| | Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|---|

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | English for Communication-I1 | 4 | 0 | 0 | 4 | Theory |

**Introduction:**

To encourage students to inculcate and use effective communication skills in their day-to-day lives. To develop the LSRW skills to enhance the culture and thoughts through language and Literature

**Course Outcome:**

| CO1 | : | Learn to communicate effectively and appropriately in real-life situation |
|---|---|---|
| CO2 | : | Use English effectively for study purposes across the curriculum |
| CO3 | : | Develop interest in and appreciation of Literature |
| CO4 | : | Develop and integrate the use of the four language skills |
| CO5 | : | Enhance their language skills, especially in the areas of grammar and pronunciation . |

**Unit I :**                                                                                   **[12 periods]**

I am Malala -Malala Yousafzai- Chapter1 - Nelson Mandela's Interview with Larry King - Job Applications: Cover Letters, CV/Resume - Refuting, Discussion & Debating

**Unit II:**                                                                                  **[12 periods]**

The Zoo Story- Edward Albee - Rakesh Sharma's Interview with Indira Gandhi from Space - Making Suggestions& Responding to Suggestions, Asking for and Giving Advice or Help - Creating a digital profile-LinkedIn

**Unit III:**                                                                                 **[12 periods]**

My Inventions-Nikola Tesla- Chapter 2 - Lionel Messi with Sid Love-(Print) - Body Language-Practical Skills for Interviews - Interviews (face-to-face, telephone, and video conferencing)

**Unit IV:**                                                                                  **[12 periods]**

The Proposal- Anton Chekhov - Filling forms(Online & Manual) creation of account, railway reservation, ATM, Credit/ Debit card - Speaking in a Formal  situation (welcome address, Vote of the thanks

**Unit V:**                                                                                   **[12 periods]**

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Public Speaking - Chicago Address-Swami Vivekananda - SWOT Analysis

**Text books:**

1. Am Malala The Girl Who Stood Up for Education and Was Shot by the Taliban by Malala Yousafzai, Christina Lamb, Little Brown, 2013

2. My Inventions by Nikola Tesla Ingram Short title, 2011 Edition

**Reference Books :**

1. Writing Your Life**:** A guide to writing Autobiographies, Mary Borg Taylor Francis,2021.

2. One-act Plays for Acting Students: An Anthology of Short Norman A. Bert · 1987

3. The One-Act Play Companion: A Guide to plays, playwrights. Colin Dolley, Rex Walford · 2015

4. How to Build a Professional Digital Profile Kindle Edition by Jeanne Kelly Bernish,Bernish Communications Associates, LLC; 1st edition (May)

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **P10** | **P11** | **P12** |
| CO1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 |
| CO2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 |
| CO5 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 3 | 2 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Core Course - PHP & MySQL** | **4** | **6** | **-** | **-** | **Core Theory** |

**Introduction:**

Learning Php and Mysql is designed to equip you with the essential skills to build dynamic and interactive web applications. This course covers the fundamentals of PHP, a popular server-side scripting language, and MySQL, a robust relational database management system. You'll learn how to create and manage databases, write efficient SQL queries, and integrate them with PHP to develop functional web applications. Through hands-on projects and practical examples, you'll gain a comprehensive understanding of back-end web development, enabling you to create, manage, and deploy dynamic websites with ease.

**Course Outcome:**

| CO1 | : | To provide an insight of PHP basics |
|---|---|---|
| CO2 | : | Understand and practice the function and array handling in PHP |
| CO3 | : | Understand and practice the the file handling and date functions |
| CO4 | : | To provide an insight of MYSQL basics |
| CO5 | : | Strategies of file handling and Cookies in MYSQL |

**Unit I:**                                                                                          **[ 12 periods ]**

Introduction to PHP - The structure of PHP-Using comments, Basic syntax -The structure of PHP - Variable, operators, Variable assignment, Multiple line commands -Variable typing- Constants- Predefined constants- The Difference Between the echo and print Commands -Functions-Variable Scope Expressions and Control Flow in PHP - Expression, Operators – Conditionals –Looping -Implicit and Explicit Casting.

**Unit II :**                                                                                         **[ 12 periods ]**

PHP Functions and Objects -PHP Functions- Defining a Function- -Returning a Value- Returning an Array - PHP Functions - Do Not Pass Arguments by Reference- Returning Global Variables-Recap of Variable Scope -Including and Requiring Files -PHP Version Compatibility - PHP Objects- PHP Arrays- Basic Access- Numerically Indexed Arrays - Associative Arrays - Assignment Using the array Keyword.

| Unit III: | [ 12 periods ] |
|---|---|

PHP Arrays- Basic Access- Numerically Indexed Arrays - Associative Arrays - Assignment Using the array Keyword - The foreach...as Loop - Multidimensional Arrays -Using Array Functions. Practical PHP-Using printf - Date and Time Functions -Date Constants - Using checkdate -File handling - System Calls - XHTML or HTML5?.

| Unit IV: | [ 12 periods ] |
|---|---|

Introduction to MySQL- Basics -Accessing MySQL via the Command Line –Indexes -MySQL Functions -Accessing MySQL via phpMyAdmin - Mastering MySQL -Database Design- Normalization – Relationships –Transactions -Using EXPLAIN - Backing Up and Restoring -Querying a MySQL - Database with PHP - A Practical Example - Practical MySQL - Practical MySQL - Preventing Hacking Attempts..

| Unit V: | [ 12 periods ] |
|---|---|

Form Handling- Building Forms -Retrieving Submitted Data -An Example Program- What's New in HTML5? - Features Awaiting Full Implementation -Cookies, Sessions, and Authentication- Using Sessions. Learning PHP, MySQL & JavaScript , 4th edition, Robin Nixon

**Text books:**
1. Robin Nixon, "Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5", 4th edition, O'Reilly, 2014.

**Reference Books :**
1. Luke welling, Laura Thomson, " PHP and MySQL Web Development", 4th edition, Developer's Library , 2015
2. Joel Murach,"Murach's PHP and MySQL",3rd Edition,Mike Murach & Associates,2017

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **P02** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| **CO1** | 3 | | | 3 | | 3 | | 3 | | | 3 | | 3 |
| **CO2** | 2 | 3 | | 2 | 3 | 2 | | 3 | | | | 3 | |
| **CO3** | 3 | 2 | 3 | | | 3 | 2 | | 2 | 1 | 3 | | 1 |
| **CO4** | | | 2 | 3 | 3 | | | | | 1 | | 2 | 2 |
| **CO5** | 1 | 3 | | 1 | | 2 | 2 | | 3 | | 1 | | |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Core Course – Practical : Php and MySQL Lab** | **4** | **6** | **-** | **-** | **Core Practical** |

**Introduction:**

To understand the functionality of web pages and to develop a website.

**Course Outcome:**

| CO1 | : | To understanding the basics of the PHP. |
|---|---|---|
| CO2 | : | To apply PHP programming to generate static pages and dynamic. |
| CO3 | : | To evaluate the integration of PHP with HTML and MySQL. |
| CO4 | : | To create a model website using PHP and MySQL.. |

1. Creating web pages using different XHTML elements like lists ,images, tables, frames

2. Formatting web pages using cascading style sheets

3. Creating dynamic web pages using form elements

4. Implementing various control structures using PHP script

5. OOP exercises using PHP

6. PHP application to handle forms

7. Database connectivity using PHP

8. CRUD operations on database using PHP

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | PS01 | PS02 | PS03 | PS04 |
| CO1 | 2 | | | | 3 | | 3 | | 3 | | 3 | | 3 |
| CO2 | 2 | 3 | | 2 | 3 | 2 | | 3 | | | | 3 | |
| CO3 | 3 | 1 | 3 | | | 3 | 2 | | 2 | 1 | 3 | | 1 |
| CO4 | | | 2 | 3 | 3 | | | | | 1 | | 2 | 2 |
| CO5 | 1 | 3 | | 1 | | 3 | 2 | | 3 | | 1 | | |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Allied IV – Mathematics for Computer Science** | **4** | **6** | **0** | **0** | **Theory** |

**Introduction:**

**T**his paper focuses on the Mathematical logic, Relations& Functions, Formal languages and Graph Theories**.**To understand the basic concepts of set theory.To understand the various statements in light of mathematical logic.To study various relations and funtions.To understand graph theory in the course's context.To understand the deeper concepts of graph theory.

**Course Outcome:**

| CO1 | : | To demonstrate a working knowledge of set notation and elementary set theory with its corresponding set operations and also Venn diagram. |
|---|---|---|
| CO2 | : | To apply the fundamental concepts of Mathematical Logic and Tautologies. |
| CO3 | : | To apply and understand the fundamental concepts of Relations and Functions. |
| CO4 | : | To demonstrate different traversal methods for graphs. |
| CO5 | : | To demonstrate different methods for trees and its properties. |

**Unit I :** (12 Periods)

Set theory – Introduction-Basic definition – Types of sets – Operations on sets –Euler-Venn diagrams – Laws of set theory – Power sets and products – Inclusion and exclusion principle.

**Unit II:**(12 Periods)

Mathematical logic – Introduction to propositional logic – Basic logical operations-Tautologies – Contradiction – Predicates and Quantification.

**Unit III:** (12 Periods)

Relations – Binary Relations – Set operation on relations – Types of Relations – Partial order relation – Equivalence relation – Composition of relations – Functions – Types of functions – Invertible functions – Composition of functions

**Unit IV:**(12 Periods)

Graph theory – Basic terminology – Paths, cycle and connectivity – sub graphs – Types of graphs – Representation of graphs in computer memory.

**Unit V:** (12 Periods)

Trees – Properties of Trees – Binary trees –Traversing Binary Trees – Computer Representation of general trees.

**Text books:**

1.Discrete Mathematics for Computer Science by Gary Haggard,JohnSchlipf and Sue Whitesides

**Reference Books :**

1. Discrete Mathematics by J.K.Sharma second edition – 2005. Macmillan India Ltd.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| CO1 | 3 | | | | | 3 | 2 | | | 3 | | 2 | 3 |
| CO2 | 1 | 1 | 3 | 1 | 3 | 3 | | 2 | 3 | 1 | 3 | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO3 | | 2 | 1 | | | 2 | 3 | 3 | | | | | 2 |
| CO4 | 3 | 3 | 2 | 3 | | | | 2 | 2 | 1 | | 3 | |
| CO5 | | | 2 | | 3 | | 1 | | 3 | | 2 | | |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Elective II - Software Testing** | **4** | **6** | **0** | **0** | **Theory** |

**Introduction:**

This Subject gives the knowledge about software development Life Cycle Models and various testing Concept

**Course Outcome:**

| CO1 | : | To explain the core concepts of the software testing Basics. How and why this testing shift came about, the characteristics, advantages and challenges brought about by the various Testing and services in Software Testing |
|---|---|---|
| CO2 | : | To discuss various types of Testing and its features. |
| CO3 | : | To analyze various Testing Technique which is directly implemented into real time application software |
| CO4 | : | To Analyze Performance and Functional of Real time Application Software. |
| CO5 | : | To Plan Overall Software Development Process |

**Unit I :** (12 Periods)

A Perspective on Testing- Basic Definitions - Insights from a Venn Diagram- Identifying Test Cases-Levels of Testing-. The Triangle Problem- The NextDate Function - The Commission Problem- The SATM System

**Unit II:** (12 Periods)

Testing Overview - What is testing- Who does testing? - Difference between Verification & Validation- Difference between Testing, Quality Assurance and Quality Control- Difference between Audit and Inspection- Difference between Testing and Debugging- Testing Myths

**Unit III:** (12 Periods)

Testing Types- Manual Testing - Automation Testing - Testing Methods - Black Box Testing - White Box Testing - Grey Box - Levels of Testing Functional Testing- Unit Testing - Limitations of Unit Testing - Integration Testing - System Testing - Regression Testing - Acceptance Testing

**Unit IV:** (12 Periods)

Non-Functional Testing Performance Testing- Usability Testing- Security Testing - Portability Testing - Path Testing- Data Flow Testing- Retrospective on Unit Testing- Life Cycle–Based Testing- Agile Testing- Agile Model–Driven Development- Model-Based Testing

**Unit V:** (12 Periods)

Integration Testing- System Testing- Object-Oriented Testing- Software Complexity- Model-Based Testing for Systems of Systems - Exploratory Testing- Test-Driven Development- Evaluating Test Cases - Software Technical Reviews

**Text books:**

1. Paul C. Jorgensen, "Software Testing", A Craftsman's Approach, Fourth Edition

**Reference Books :**

1. C.Kaner,J.Bach and Pettichord, "Lessons Learned in Software Testing" Willey Publishers , First Edition, 2002.

2. Boris Beizer, "Lessons Learned in Software Testing Technique", Wiley Publishers, Second Edition, 2008

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| CO1 | 3 | | | | | 3 | 2 | | | 3 | | 2 | 3 |

| CO2 | 1 | 1 | 3 | 1 | 3 | 3 |   | 2 | 3 | 1 | 3 |   |   |
| CO3 |   | 2 | 1 |   |   | 2 | 3 | 3 |   |   |   |   | 2 |
| CO4 | 3 | 3 | 2 | 3 |   |   |   | 2 | 2 | 1 |   | 3 |   |
| CO5 |   |   | 2 |   | 3 |   | 1 |   | 3 |   | 2 |   |   |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | **Elective II - Grid Computing** | **4** | **6** | **0** | **0** | **Theory** |

**Introduction:**

This course provides a comprehensive introduction to the principles and practices of grid computing, a powerful paradigm for distributed computing. Students will explore the fundamental concepts, architecture, and key technologies that enable grid computing

**Course Outcome:**

| CO1 | : | Understanding Grid Computing Concepts |
| CO2 | : | To explain the differences between grid computing and other distributed computing paradigms such as cloud computing and cluster computing. |
| CO3 | : | To develop the ability to install, configure, and manage grid computing environments. |
| CO4 | : | To understand the role of grid middleware and its importance in enabling resource sharing across multiple locations. |
| CO5 | : | To explore various resource management techniques and scheduling algorithms used in grid computing. |

**Unit I :** (12 Periods)

Introduction: Grid Computing & Key Issues –Applications –Other Approaches –Grid Computing Standards –Pragmatic Course of Investigation Grid Computing Software Interface-Grid Computing Infrastructure Development.

**Unit II:**(12 Periods)

Grid Benefits & Status of Technology: Motivations –History of Computing, Communications and Grid Computing –Grid Computing Prime Time– Suppliers and Vendors – Economic Value –Challenges

**Unit III:** (12 Periods)

Components of Grid Computing Systems and Architectures: Basic Constituent Elements-A Functional View –A Physical View –Service View Grid Environment-Grid Security Infrastructure- Delegation-Higher Level Authorization Tools

**Unit IV:**(12 Periods)

Grid Computing Standards - OGSI: Standardization –Architectural Constructs –Practical View-OGSA/OGSI Service Elements and Layered Model –More Detailed View.

**Unit V:** (12 Periods)

Standards Supporting Grid Computing-OGSA: Functionality Requirements –OGSA Service Taxonomy –Service Relationships –OGSA Services –Security Considerations.

**Text books:**

1. Grid Computing Making the Global Infrastructure a Reality .  John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex
2. A NETWORKING APPROACH TO GRID COMPUTING DANIEL MINOLI Managing Director Leading-Edge Networks Incorporated

**Reference Books :**

1. "The Grid: Blueprint for a New Computing Infrastructure" Editors: Ian Foster, Carl Kesselman

2. "Grid Computing for Developers" Vladimir Silva

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **P02** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| **CO1** | 3 | | 3 | | | | | 3 | 3 | | 2 | | |
| **CO2** | | 3 | | | 2 | | 3 | 2 | 3 | 3 | | 2 | 1 |
| **CO3** | 3 | 2 | | 3 | | 1 | 3 | | 2 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 1 | | | 3 | | 3 |
| **CO5** | | | 3 | 2 | | 2 | | | | 2 | | | |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Elective II – Operating System** | **4** | **6** | **0** | **0** | **Theory** |

**Introduction:**

The operating system is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers. This course covers the concept of operating system and its applications

**Course Outcome:**

| CO1 | : | After learning the fundamental concepts in Operating system including how OS has evolved over the years and different components of OS |
|---|---|---|
| CO2 | : | Students will continue to more significant functions of OS like Process management, storage and memory management etc. |
| CO3 | : | This will provide the necessary information for students to extract maximum benefits out of the OS while developing programs, working with applications |
| CO4 | : | OOP concepts like inheritance, Interface & package in real time situations. |
| CO5 | : | Develop Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access applet, multithreading) |

**Unit I :** (12 Periods)

Introduction- Objectives and Functions of OS- Evolution of OS- OS Structures- OS Components- OS Services- System calls- System programs- Virtual Machines.History of UNIX- Features & Benefits- Versions of UNIX- Features of UNIX File System- Commonly Used Commands and getting Started (Login/Logout) . Creating and viewing files using cat- file comparisons- View files- disk related commands- checking disk free spaces.

**Unit II:**(12 Periods)

**Processes:** Process concept- Process scheduling- Co-operating processes- Inter process Communication Threads: Introduction to Threads- Single and Multi-threaded processes CPU Scheduling: Basic concepts- Scheduling criteria- Scheduling Algorithms- Multiple Processor Scheduling- Real-time Scheduling.

UNIX Process Management:The Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on a Shell. Structure of Processes: Process States and Transitions - Layout of system memory - Context of a process.

**Unit III:**  (12 Periods)

**Process Management – Synchronization and Deadlocks :** Process Synchronization: Mutual Exclusion, Critical – section problem - Synchronization Hardware-Semaphores- Classic problems of synchronization- Critical Regions- Monitors- OS Synchronization- Atomic Transactions. Deadlocks: System Model- Deadlock characterization- Methods for handling Deadlocks- Deadlock prevention- Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock

**Unit IV:**(12 Periods)

**Storage Management:** Management: Logical and physical Address Space- Swapping- Contiguous Memory Allocation- Paging- Segmentation with Paging. Virtual Memory Management: Demand paging- Process creation- Page Replacement Algorithms- Allocation of Frames- Thrashing- File-System Interface: File concept- Access Methods- Directory structure- File- system Mounting- File sharing- Protection and consistency semantics.      File-System Implementation: File-System structure. Directory Implementation- Allocation Methods- Free-space Management- Efficiency and Performance- Recovery. Disk Management: Disk Structure- Disk Scheduling- Disk Management- Swap-Space Management- Disk Attachment- stable-storage Implementation.

**The Unix File System**

Inodes - Structure of a regular file – Directories - Conversion of a path name to an inode - Super block - Inode assignment to a new file - Allocation of disk blocks. System calls for the file System: Open – Read - Write - Lseek – Close - File creation - Creation of special files - Changing directory and root - changing owner and mode – stat and fstat - pipes - Dup - Mounting and Un mounting file systems - Link and Un link

**Unit V:** (12 Periods)

**Protection and Security**

Protection: Goals of Protection- Domain of Protection-Security: Security Problem- User Authentication- One – Time Password- Program Threats- System Threats.

**UNIX System Administration**

Common administrative tasks- identifying administrative files configuration and log files- Role of system administrator- Managing user accounts-adding & deleting users- changing permissions and ownerships- Creating and managing groups- modifying group attributes- Temporary disabling of user's accounts- creating and mounting file system- checking and monitoring system performance - file security & Permissions- becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removing packages with rpm command search.

**Text books:**

1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.

**Reference Books :**

1. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
2. Silberschatz / Galvin / Gagne, Operating System,6thEdition,WSE (WILEY Publication)
3. William Stallings,Operating System, 4th Edition, Pearson Education.
4. H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education
5. Nutt: Operating Systems, 3/e Pearson Education 2004
6. Operating System by H.M.Deitel , 2nd Edition,Pearson Education

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **P02** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| **CO1** | 3 | | 3 | | | | | 3 | 3 | | 2 | | |
| **CO2** | | 3 | | | 2 | | 3 | 2 | 3 | 3 | | 2 | 1 |
| **CO3** | 3 | 2 | | 3 | | 1 | 3 | | 2 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 1 | | | 3 | | 3 |
| **CO5** | | | 3 | 2 | | 2 | | | | 2 | | | |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Core Course : Ethical Hacking** | **4** | **6** | **-** | **-** | **Core Theory** |

**Introduction:**

To help students understand how ethical hacking is used as a method to prevent hacking. To facilitate students, appreciate the need for understanding non-technology aspects of ethical hacking such as legal frameworks, documentation and report writing.

**Course Outcome:**

| CO1 | : | Explain the importance of numerous methods of real-world information intelligence. |
|---|---|---|
| CO2 | : | Differentiate the processes of vulnerability assessment and ethical hacking from penetration testing. |
| CO3 | : | Comprehend the importance of appropriate countermeasures for managing vulnerabilities. |
| CO4 | : | To familiarize with the methodologies that can be used to hack into a target. |
| CO5 | : | To appreciate the wide variety of attacks that can be performed against a wireless network. |

**Unit I : INTRODUCTION TO Ethical Hacking[12 periods]**

Introduction To Hacking: Terminologies, Categories of Penetration Test, Writing Reports, Structure of a Penetration Testing Report, Vulnerability Assessment Summary, Risk Assessment, Methodology, Linux Basics: File Structure, Cron Job, Users, Common Applications , BackTrack, Services.

**Unit II: Ethical Hacking  Tools and Techniques: [12 periods]**

Information Gathering, Target Enumeration  And Port Scanning   Techniques: Active, Passive and Sources of information gathering, Copying Websites Locally, NeoTrace, Cheops-ng, Intercepting a Response, What Web, Net craft, Basic Parameters, Code Exploit Scanner, Interacting with DNS Servers, Fierce, Zone Transfer with Host

Command and Automation, DNS Cache Snooping- Attack Scenario, Automating Attacks, SNMP - Problem, Sniffing Passwords, SolarWinds Toolset, sweep, Brute Force and Dictionary- Tools , Attack, Enumeration, Intelligence Gathering Using Shodan, Target enumeration and Port Scanning Techniques.

### Unit III: [12 periods]

Vulnerability Assessment & Network Sniffing: Introduction to Vulnerability Assessment - Pros and Cons, NMap, Updation of database, Testing SCADA Environments with Nmap, Nessus, Sniffing: Types, Hubs versus Switches, Modes, MITM Attacks, ARP Protocol Basics- working, Attacks, DoS Attacks, Dsniff tool, Using ARP Spoof to Perform MITM Attacks, Sniffing the Traffic with Dsniff, Sniffing Pictures with Drifnet, Urlsnarf and Webspy, Sniffing with Wireshark, Ettercap- ARP Poisoning, Hijacking Session with MITM Attack, ARP Poisoning with Cain and Abel, Sniffing Session Cookies with Wireshark, Hijacking the Session, SSL Strip: Stripping HTTPS Traffic, Requirements, Automating Man in the Middle Attacks, DNS Spoofing, DHCP Spoofing.

### Unit IV:: [12 periods]

Remote Exploitation : Understanding Network Protocols, Attacking Network Remote Services, Common Target Protocols, tools for cracking network remote services, Attacking SMTP, Attacking SQL Servers, Client Side Exploitation Methods: E-Mails Leading to Malicious Attachments & Malicious Links, Compromising Client Side Update, Malware Loaded on USB Sticks, Post exploitation: Acquiring Situation Awareness, Privilege Escalation, Maintaining Access, Data Mining, Identifying and Exploiting Further Targets, Windows  Exploit Development Basics.

### Unit V: [12 periods]

Wireless Hacking : Requirements , Aircracking , Hidden SSIDs , Monitor Mode , Monitoring Tool- Beacon Frames on Wireshark ,Airodump-ng , Wireless Adapter in Monitor Mode , Determining the Target , Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng , Capturing Packets and Four-Way Handshake , Web Hacking : Attacking the Authentication , Brute Force and Dictionary Attacks , Types of Authentication , Crawling Restricted Links , Testing for the Vulnerability , Authentication Bypass with Insecure Cookie Handling , SQL injection, XSS – DOM based,BeEF,CSRF, Bypassing CSRF and BeEF with XSS, Vulnerability in FCKeditor, efront.

### Text books:

1. Rafay Baloch ,-Ethical Hacking and Penetration Testing Guide, CRC Press, 2015.

### Reference Books :

1. Patrick Engebretson, —The Basics of Hacking and Penetration Testing :  Ethical Hacking and Penetration Testing Made Easy, Syngress Media, Second Revised Edition, 2013.
2. Michael T. Simpson, Kent Backman, James E. Corley, —Hands  On Ethical Hacking  and Network Defense, Cengage Learning, 2012.

**Mapping of Course Outcomes with Program Outcomes:**

| | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **P02** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |

| Course Outcomes | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | 2 | | | 3 | 3 | | | 3 | | 3 | |
| CO2 | 3 | 1 | | 1 | 3 | 2 | | 2 | | | 2 | | 2 |
| CO3 | 3 | | 3 | 3 | | | | 1 | 3 | 2 | | 1 | |
| CO4 | | 3 | 3 | | 2 | 3 | 3 | 3 | | | 3 | | 3 |
| CO5 | | | 3 | 1 | | | 3 | | 3 | 1 | | 3 | |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Core Course Practical– Ethical Hacking Lab | 4 | 6 | - | - | Core Practical |

**Introduction:**

Ethical hacking is the practice of testing and evaluating the security of information systems by deliberately probing them to identify vulnerabilities. This process involves a variety of techniques and tools to simulate potential cyber attacks and understand how malicious hackers might exploit system weaknesses. The aim is to strengthen the security of these systems by addressing any discovered vulnerabilities.

**Course Outcome:**

| CO1 | : | Understand and Execute Basic System Administration Tasks in Linux |
|---|---|---|
| CO2 | : | Identify and Enumerate System Services and Open Ports |
| CO3 | : | Perform Network Scanning and Vulnerability Assessment: |
| CO4 | : | Capture and Analyze Network Traffic |
| CO5 | : | Execute and Mitigate Web Application and Network Attacks |

1. Write a Python script that demonstrates basic file and user management operations in Linux.

2. Write a Python script that uses the os module to list all running services on a Linux machine and saves the list to a file. The script should also provide details such as service status and ports in use.

3. Write a Python program that performs a simple port scan on a given IP address.

4. Write a Python script that interacts with DNS servers to perform a zone transfer and gather DNS records.

5. Write a Python script that automates Nmap scans and parses the output.

6. Write a Python program using the Scapy library to create a simple packet sniffer.

7. Write a Ruby script that automates a basic exploitation using the Metasploit Framework.

8. Write a Python script that performs a brute-force attack on a web login form.

9. Write a Bash script that uses aircrack-ng tools to capture WPA/WPA2 handshakes.

10. Write a Python script to detect SQL injection vulnerabilities in web applications

**Text books:**

1. "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" by Dafydd Stuttard and Marcus Pinto

**Reference Books :**

2. "Hacking: The Art of Exploitation" by Jon Erickson

3."Metasploit: The Penetration Tester's Guide" by David Kennedy, Jim O'Gorman, Devon Kearns, and Mati Aharoni

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **P10** | **P11** | **P12** |
| CO1 | 1 | 3 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 1 | 3 |
| CO2 | 1 | 3 | 2 | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 1 | 3 | 3 | 3 | 1 | 2 | 1 | 3 | 3 | 1 | 3 | 1 |
| CO4 | 1 | 2 | 3 | 3 | 1 | 1 | 1 | 3 | 2 | 3 | 2 | 1 |
| CO5 | 1 | 2 | 3 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 1 | 1 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Elective III – Data Communication and Computer Networks** | **4** | **6** | **-** | **-** | **Core Theory** |

**Introduction:**

Data Communication & Networks covers fundamental concepts in communication protocols, transmission methods, network topologies, and the OSI model. Students will gain insights into essential technologies for effective data transmission and network management, preparing them for practical applications in computer networks.

**Course Outcome:**

| CO1 | : | Understand the basics of communications and networking. |
|---|---|---|
| CO2 | : | Understand and remember the analog and digital transmission methods, mode of transmissions, parallel and serial communications, etc. |
| CO3 | : | Understand and analyse the transmission media, network topology and switching techniques. |
| CO4 | : | Remember, understand the network protocols and the functions of OSI model. |
| CO5 | : | Understand the ISDN architecture, interfaces, protocols, ATM cells and layers. |

**Unit I : [12 periods]**
Introduction to communications and Networking : Introduction – Fundamental concepts - Data communications – Protocols- standards - Standards organizations – Signal propagations- Analog and Digital

signals- Bandwidth of a signal and a medium – Fourier analysis and the concept of bandwidth of a signal - The data transmission rate and the bandwidth. Information encoding: Introduction – Representing different symbols Minimizing errors- Multimedia – Multimedia and Data compression.

**Unit II: [12 periods]**

Analog and digital transmission methods: Introduction - Analog signal, Analog transmission - Digital signal, Digital transmission - Digital signal , Analog transmission - Baud rate and bits per second - Analog signal, Digital (Storage and) transmission – Nyquist Theorem. Modes of data transmission and Multiplexing: Introduction – Parallel and Serial communication - Asynchronous, Synchronous and Isochronous communication - Simplex, Half-duplex and Full-duplex communication – Multiplexing - Types of Multiplexing – FDM versus TDM. Transmission Errors: Detection and correction : Introduction – Error classification – Types of Errors – Error detection.

**Unit III: [12 periods]**

Transmission media: Introduction - Guided media - Un Guided media – Shannon capacity. Network topologies, switching and routing algorithms: Introduction – Mesh topology - Star topology - Tree topology - Ring topology - Bus topology - Hybrid topology - Switching Circuit switching – Packet switching - Message switching - Router and Routing – Factors affecting routing algorithms - Routing algorithm -Approaches to routing.

**Unit IV:: [12 periods]**

Networking protocols and OSI model: Introduction – Protocols in computer communications - The OSI model - OSI layer functions.

**Unit V: [12 periods]**

Integrated services digital networking (ISDN): Introduction – Background of ISDN - ISDN architecture – ISDN interfaces - Functional grouping – Reference points - ISDN protocol architecture – Broadband ISDN (B-ISDN). of ATM – Packet size – Virtual circuits in ATM – ATM cells – Switching – ATM layers – Miscellaneous Topics.

**Text books:**

1.Data Communications and Networks, Achyut. S. Godbole, Tata McGraw-Hill Publishing Company, 2007.

**Reference Books :**

1. Introduction to Data communications and Networking. W.Tomasi. Pearson education.
2 .Computer Networks, L.L.Peterson and B.S.Davie;4th Edition, HEVIBK

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | PS01 | PS02 | PS03 | PS04 |

| CO1 | 3 | 3 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 3 |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO2 | 3 |   |   |   | 3 | 1 | 2 | 1 |   |   |   |   |   |
| CO3 | 3 | 3 | 3 |   |   |   | 2 | 1 | 3 | 3 | 3 |   |   |
| CO4 | 3 |   | 3 | 1 |   |   |   |   |   |   | 2 |   |   |
| CO5 | 3 | 3 | 3 | 1 | 3 | 1 | 2 |   |   |   | 3 | 2 | 3 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | **Elective III – Computing Intelligence** | **4** | **6** | **-** | **-** | **Core Theory** |

**Introduction:**

After learning the Syntax and Semantics and create Functions, Handle Strings and Files, Understand Lists, Dictionaries and Regular expressions, Implement Object Oriented Programming concepts, Build Web Services and introduction to Network and Database Programming students are able to develop rich dynamic websites in Python.

**Course Outcome:**

| CO1 | : | To provide a strong foundation on fundamental concepts in Computational Intelligence. |
|---|---|---|
| CO2 | : | ToenableProblem-solvingthroughvarioussearchingtechniques. |
| CO3 | : | Toapply thesetechniquesinapplicationswhichinvolveperception,reasoningandlearning. |
| CO4 | : | To apply Computational Intelligencetechniquesfor information retrieval |
| CO5 | : | ToapplyComputationalIntelligencetechniquesprimarilyformachinelearning. |

**Unit I : [12 periods]**

Introduction: Introduction to Artificial Intelligence-Search-Heuristic Search-A* algorithm- Game Playing-Alpha-Beta Pruning- Expert Systems-Inference-Rules-Forward Chaining and Backward Chaining- Genetic Algorithms.

**Unit II: [12 periods]**

Knowledge Representation and Reasoning: Proposition Logic - First Order Predicate Logic – Unification – Forward Chaining -Backward Chaining - Resolution – Knowledge Representation - Ontological Engineering - Categories and Objects – Events – Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information - Prolog Programming.

**Unit III: [12 periods]**

Uncertainty: Non monotonic reasoning-Fuzzy Logic-Fuzzy rules-fuzzy inference-Temporal Logic-Temporal Reasoning-Neural Networks-Neuro-fuzzy Inference.

**Unit IV:: [12 periods]**

Learning: Probability basics - Bayes Rule and its Applications - Bayesian Networks – Exact and Approximate Inference in Bayesian Networks - Hidden Markov Models - Forms of Learning - Supervised Learning - Learning Decision Trees – Regression and Classification with Linear Models - Artificial Neural Networks – Nonparametric Models - Support Vector Machines - Statistical Learning - Learning with Complete Data - Learning with Hidden Variables - The EM Algorithm – Reinforcement Learning

**Unit V: [12 periods]**

Intelligence and Applications : Natural language processing-Morphological Analysis-Syntax analysis-Semantic Analysis-AIl applications Language Models - Information Retrieval – Information Extraction - Machine Translation – Machine Learning Symbol-Based – Machine Learning: Connectionist – Machine Learning.

**Text books:**

   1. Stuart Russell, Peter Norvig, ―Artificial Intelligence: A Modern Approach‖, Third Edition, Pearson Education / Prentice Hall of India, 2010.
   2. Elaine Rich and Kevin Knight, ―Artificial Intelligence‖, Third Edition, Tata McGraw-Hill, 2010

**Reference Books :**

   1. Patrick H. Winston. "Artificial Intelligence", Third edition, Pearson Edition, 2006.
   2. Dan W.Patterson, ―Introduction to Artificial Intelligence and Expert Systems‖, PHI, 2006.
   3. Nils J. Nilsson, ―Artificial Intelligence: A new Synthesis‖, Harcourt Asia Pvt. Ltd.,

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **P02** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| **CO1** | 3 | 3 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 3 |
| **CO2** | 3 | | | | 3 | 1 | 2 | 1 | | | | | |
| **CO3** | 3 | 3 | 3 | | | | 2 | 1 | 3 | 3 | 3 | | |

| CO4 | 3 | | 3 | 1 | | | | | | | 2 | | |
| CO5 | 3 | 3 | 3 | 1 | 3 | 1 | 2 | | | | 3 | 2 | 3 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Elective III – Information Technology | 4 | 6 | - | - | Core Theory |

**Introduction:**

The course aims to provide participants with a foundational understanding of key concepts and principles in the field of information technology. This course is designed to equip students with essential knowledge and skills to effectively navigate and utilize technology in various personal and professional contexts. The course covers a wide range of topics to foster digital literacy, critical thinking, and ethical considerations related to technology use.

**Course Outcome:**

| CO1 | : | Understand the fundamental concepts and components of information technology |
|---|---|---|
| CO2 | : | Identify the various types of information systems and their applications |
| CO3 | : | Explain the impact of information technology on society, business, and ethics. |

**Unit I : [12 periods]**
Introduction to Information Technology : Definition and scope of Information Technology (IT), Evolution of IT and its impact on society, Components of an IT system: hardware, software, data, network

**Unit II: [12 periods]**
Overview of computer organization and architecture, Introduction to computer software: system software and application software

**Unit III: [12 periods]**
Basics of computer operations: input, processing, output, storage, Overview of computer memory and storage devices, Understanding data representation: binary, decimal, hexadecimal, Introduction to operating systems and their functions, Introduction to computer networks and the internet.

**Unit IV:: [12 periods]**
Software categories: system software and application software, Basics of programming languages: high-level, low-level, and scripting languages, Introduction to algorithms and flowcharts

**Unit V: [12 periods]**
Ethical and legal issues in IT: privacy, copyright, cyber laws, IT in business and management: Enterprise Resource Planning (ERP), IT in education, healthcare, and government sectors, Emerging trends in information technology, Future prospects and challenges in IT.

**Text books:**
1. "Information Technology: Principles and Applications" by A. S. Godbole, Year 2002.

**Reference Books :**
1. "Information Technology Essentials: An Introduction to Information Technology" by O'Brien and Marakas,Year 2005.
2. "IT Strategy: Issues and Practices" by James D. McKeen and Heather A. Smith, Year 2018.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **P02** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| **CO1** | 2 | | | | 3 | | 2 | | 3 | | 1 | | 3 |
| **CO2** | 1 | 3 | | 2 | 3 | 2 | | 3 | | | | 3 | |
| **CO3** | 3 | 2 | 3 | | | 3 | 2 | | 2 | 1 | 3 | | 1 |
| **CO4** | | | 2 | 2 | 3 | | | | | 1 | | 2 | 2 |
| **CO5** | 1 | 3 | | 1 | | 2 | 2 | | 3 | | 1 | | |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Skill – Vue JS** | **4** | **6** | **-** | **-** | **Core Theory** |

**Introduction:**

The integration of AI with cloud computing revolutionizes data processing and decision-making by enhancing scalability, efficiency, and intelligence. This synergy enables businesses to leverage advanced analytics and automation, driving innovation and operational transformation across various sectors.

**Course Outcome:**

| CO1 | : | Understand basic intelligent agent frameworks |
|---|---|---|
| CO2 | : | Use decision-making and Apply problem solving techniques |
| CO3 | : | Apply game playing and CSP techniques |
| CO4 | : | Perform logical reasoning. |
| CO5 | : | Perform probabilistic reasoning under uncertainty. |

**Unit I : [12 periods]**
**Introduction to JavaScript and Fundamental Concepts:** Why learn JavaScript - Setting up environment – Variables - Data types – Operators – Arrays –Objects - Logic Statements (if, else, switch) - Loops (while, for, do-while).

**Unit II: [12 periods]**

**Functions and Object-Oriented Programming :** Functions (basic, parameters, arguments) - Function scope and closures - Function expressions and arrow functions - Callback functions - Classes and constructors - Prototypes and inheritance Encapsulation, polymorphism, and abstraction - The DOM (Document Object Model) - DOM manipulation techniques - Event handling and event listeners.

**Unit III: [12 periods]**

**Advanced JavaScript Topics and Practical Applications :** Regular expressions - Debugging techniques - Concurrency (callbacks, promises, async/await) - HTML5 features - Canvas basics - Integrating JavaScript with HTML5 - Next steps in web development (libraries, frameworks, backend).

**Unit IV:: [12 periods]**

Advanced Vue.js Concepts and Techniques: Form Handling: Input fields – validation and async actions; Vue Router: Client-side routing - navigation and route guarding; Vuex State Management: Store setup - data management and communication; Custom Events: Component communication techniques.

**Unit V: [12 periods]**

Testing and Full-Stack Development with Vue.js : Unit Testing: Setting up Jest, writing tests. - Server Communication: HTTP requests, handling responses. Full-Stack Development: Backend integration, deployment.

**Text books:**

1. Fullstack Vue, The Complete Guide to Vue.js and Friends, Written by Hassan Djirdeh, Nate Murray, and Ari Lerner, Published in San Francisco, California, 2018.

**Reference Books :**
1. Erik Hanchett, Benjamin Listwon, Vue.js in Action, Published: Shelter Island, New York, 2018
2. Olga Filipova. Learning Vue.js 2, Published: Birmingham, UK, 2017
3. John Au-Yeung, Vue.js 3 By Example, Published: Birmingham, UK, 2021
4. Hassan Djirdeh, Nate Murray, Ari Lerner, Fullstack Vue: The Complete Guide to Vue.js and Friends, Published: San Francisco, California, 2018

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | PS01 | PS02 | PS03 | PS04 |
| CO1 | 2 | | | | 3 | | 2 | | 3 | | 1 | | 3 |
| CO2 | 1 | 3 | | 2 | 3 | 2 | | 3 | | | | 3 | |
| CO3 | 3 | 2 | 3 | | | 3 | 2 | | 2 | 1 | 3 | | 1 |

| CO4 | | | 2 | 2 | 3 | | | | | 1 | | 2 | 2 |
| CO5 | 1 | 3 | | 1 | | 2 | 2 | | 3 | | 1 | | |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Core Course - Tools and Techniques for Cyber Security** | **4** | **6** | **-** | **-** | **Core Theory** |

**Introduction:**

Cyber security tools and techniques aims to provide the knowledge and skills necessary to identify and mitigate cyber threats, secure networks and endpoints, and protect information assets.

**Course Outcome:**

| CO1 | : | To understand the field of digital security and concepts of data encryption. |
|---|---|---|
| CO2 | : | To introduce keywords and jargons involved in operating system security. |
| CO3 | : | To get a firm knowledge on network basics and familiarize on security countermeasures |
| CO4 | : | To create awareness and understanding on cyber-attacks and data privacy |

**Unit I : [12 periods]**
Security Posture – Current threat landscape – Cyber security challenges – Enhancing your security posture – The Red and Blue team

**Unit II: [12 periods]**
Incident Response Process – Handling an incident – Post incident activity – Incident response in the cloud. Vulnerability Management – Creating a vulnerability management strategy.

**Unit III: [12 periods]**

Understanding Cyber Security Skill Chain – External Reconnaissance – Access and privilege escalation – Thread life cycle management

**Unit IV:: [12 periods]**

Reconnaissance – External Reconnaissance, Dumpster driven, Social Media. Internal Reconnaissance – Sniffing and Scanning, Prismdump, TCP dump, NMap.

**Unit V: [12 periods]**

Compromising the system – Analyzing current trends , Extortion Attack, Data Manipulation Attack, IOT Device attack, Backdoor, Mobile device attack, Phishing, Exploiting a vulnerability

**Text books:**

1. Yuri Diogenes, Erdal Ozkaya, Cyber security - Attack and Defense Strategies, Packt Publishers, 2018.

**Reference Books :**

1. Charles J. Brooks, Christopher Grow, Philip A. Craig, Donald Short, Cybersecurity Essentials, Wiley Publisher, 2018

2. William Stallings, Effective Cybersecurity: A Guide to Using Best Practices and Standards, 1st edition, 2019.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **P02** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **PS01** | **PS02** | **PS03** | **PS04** |
| **CO1** | 2 | | | | 3 | | 2 | | 3 | | 1 | | 3 |
| **CO2** | 1 | 3 | | 2 | 3 | 2 | | 3 | | | | 3 | |
| **CO3** | 3 | 2 | 3 | | | 3 | 2 | | 2 | 1 | 3 | | 1 |
| **CO4** | | | 2 | 2 | 3 | | | | | 1 | | 2 | 2 |
| **CO5** | 1 | 3 | | 1 | | 2 | 2 | | 3 | | 1 | | |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Core Course Practical - Cyber Security Lab** | **4** | **6** | **-** | **-** | **Core Practical** |

**Introduction:**

Students will gain hands-on experience with industry-standard cybersecurity tools and techniques, such as firewalls, intrusion detection systems, and vulnerability scanners.

**Course Outcome:**

| | | |
|---|---|---|
| CO1 | : | Understand the implementation of various techniques and security algorithms |
| CO2 | : | Apply different tools used for secure data transmission and for creating digital signature. |
| CO3 | : | Identify and analyze various types of cybersecurity threats, including malware, phishing, and network attacks. |
| CO4 | : | Develop the skills to conduct thorough risk assessments and implement appropriate mitigation strategies to protect information assets. |

1. Implement the following substitution and transposition techniques concept:

   a) Caesar Cipher    b) Rail Fence Row & Column Transformation

2. Implement the Diffie-Hellman key mechanism using HTML and Javascript. Consider the enduser as one of the parties (Alice) and the JavaScript application as other parties (Bob)

3. Implement the following attack: a) Dictionary Attack    b) Brute Force Attack

4. Installation of wire shark, tcpdump etc and observe data transferred in client server communication using UDP/TCP and identify the UDP/TCP datagram.

5. Installation of rootkits and study about the variety of options

6. Perform an experiment to Sniff Traffic using ARP poisoning.

7. Demonstrate intrusion detection system using any tool (snort or any other s/w)

8. Demonstrate how to secure data storage, secure data transmission and for creating digital signature.

**Text books:**
     1. Hacking: The Art of Exploitation (2nd Ed.) by Jon Erickson

**Reference Books :**
     1. The Science of Secrecy from Ancient Egypt to Quantum Cryptography by Simon Singh

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **P01** | **PO2** | **P03** | **P04** | **P05** | **P06** | **P07** | **P08** | **P09** | **P10** | **P11** | **P12** |
| CO1 | 1 | 3 | 1 | 1 | 3 | 1 | 3 | 1 | 2 | 1 | 1 | 3 |
| CO2 | 1 | 3 | 2 | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 1 | 1 |
| CO3 | 1 | 3 | 3 | 3 | 1 | 2 | 1 | 3 | 3 | 1 | 3 | 1 |
| CO4 | 1 | 2 | 3 | 2 | 1 | 1 | 1 | 3 | 2 | 3 | 2 | 1 |
| CO5 | 1 | 2 | 3 | 3 | 1 | 3 | 1 | 3 | 2 | 3 | 2 | 1 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
|  | **Elective IV – Mobile Computing** | **4** | **6** | **-** | **-** | **Core Theory** |

**Introduction:**

This course aims to provide foundational knowledge of mobile device architecture, operating systems, and software development for mobile platforms. Students will explore various mobile communication protocols, network architectures, and the intricacies of wireless transmission. Emphasis is placed on the design and development of mobile applications, including user interface considerations, performance optimization, and security issues. By the end of the course, students should be proficient in developing robust, efficient, and secure mobile applications, understanding the constraints and opportunities presented by mobile environments, and staying informed about the latest trends and innovations in mobile technology.

**Course Outcome:**

| | | |
|---|---|---|
| CO1 | : | Understand the history of mobile computing, applications, standards and mobile computing architecture. |
| CO2 | : | Understand the mobile computing techniques related to telephone, access procedures, IVR applications and Voice XML. |

| | | |
|---|---|---|
| CO3 | : | Understand and analyse the emerging technologies Bluetooth, RFID, WiMAX, etc. also GSM. |
| CO4 | : | Knowledge on GPRS, GPRS network architecture, Data services, applications for GPRS and limitations. |
| CO5 | : | Knowledge on CDMA and 3G, CDMA Vs GSM, applications of 3G wireless LAN, Architecture, Adhoc and sensor networks and security features. |

**Unit I : [12 periods]**

Introduction: 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 COMPUTTING 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: [12 periods]**

MOBILE COMPUTING THROUGH TELEPHONY: Evaluation of telephony – Multiple access procedures – Mobile computing through telephone – IVR Application –Voice XML – TAPI

**Unit III: [12 periods]**

EMERGING TECHNOLOGIES: 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:: [12 periods]**

GPRS – GPRS and packet data network – GPRS network architecture – GPRS network operations – Data services in GPRS – Application for GPRS- Limitations – Billing and Charging. WAP : MMS – GPRS Applications .

**Unit V: [12 periods]**

CDMA and 3G: 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

**Text books:**

1. MOBILE COMPUTING, Asoke K Talukder , Roopa R Yavagal, TMH, 2005

**Reference Books :**

1. Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2007.

2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.

3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | PS01 | PS02 | PS03 | PS04 |
| CO1 | 3 | 3 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 3 |
| CO2 | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 1 | 3 |
| CO4 | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 3 | 2 |
| CO5 | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 2 | 3 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | Elective IV – Wireless Network | 4 | 6 | - | - | Core Theory |

**Introduction:**

Communication systems, Digital Communication, Telecommunication switching system, Computer Networks, Mobile and Wireless Communication

**Course Outcome:**

| | | |
|---|---|---|
| CO1 | : | Review the concepts of wireless and mobilecommunication |
| CO2 | : | Understand LTE and OFDM technologies for mobile telephony |
| CO3 | : | Understand the basic concepts of wireless sensor network |
| CO4 | : | Understand mobile networking and compare transport layer protocols for mobile and traditionalnetworks |
| CO5 | : | Understand the technology and standards of IoT, ZigBee |

**Unit I : [12 periods]**

Review of Cellular Networks : Mobile telephony, GSM, CDMA/CD, Universal Mobile Telecommunication System (UMTS). Advancement and migrations. WLAN- PHY Layer and MAC Layer-IEEE
802.11 (a, b, g, ac), HIPERLAN, Wireless ATM, WiMAX- PHY Layer and MAC Layer-
IEEE 802.16 (fixed and mobile).

**Unit II: [12 periods]**

LTE Systems : Introduction to 3GPP, LTE & LTE-A standards, LTE uplink/downlink, E-UTRAN architecture-Mobility and resource management, services, UTRAN- Architecture ,HSDPA,HSUPA,OFDM, OFDMA, SISO system,  MIMO system, OFDM-MIMO

**Unit III: [12 periods]**

Wireless Sensor Network : Introduction to wireless sensor network (WSN), WSN-Architecture, Coverage  and placement, Topology management in WSN, Applications, Mobile WSN, Technologies for sensor nodes & networks, operating environment, Under water WSN, Security of WSN,
MAC, Routing and Transport protocols for WSN

**Unit IV:[12 periods]**

Wireless Routing Protocol : Medium access problems in wireless networks, Traditional routing, Mobile network layer-Mobile IP, Introduction to IPv4 and IPv6, Data forwarding procedure in Mobile IP (IPv4 and IPv6), Mobility management, Protocol trade-offs, Congestion window management,
Mobile transport layer- Traditional TCP, mobile TCP, Indirect TCP, Reno, New-Reno,
Tahoe, Vegas. UDP

**Unit V: [12 periods]**

IOT and GPS Systems : IoT architecture, Main design principles and needed capabilities, IoT Devices and gateways, Case studies: Sensor  body area network, Control of a smart home, Smart vehicles, Smart manufacturing and smart factory. Emerging IoT standards, IoT-protocols,
IoT Local  and wide area networking, IEEE 802.15 WPAN, Bluetooth-pico net, scatter net,
Protocol stack, Interface between 802.11 and Bluetooth. Geolocation service techniques
and standards. Introduction to GPS-aided GEO augmented navigation (GAGAN), E.911,
ZigBee, UWB and RFID

**Text books:**

1. Kaveh Pahlavan, Prashant Krishnamoorthy – Principle of wireless networks- A unitedapproach-Pearson Education,2002

2.Vijay K. Garg – Wireless communication and networking – Morgan-Kaufmann series in networking-Elsevierpublication
3.Feng Zhao and Leonidas Guibas – Wireless Sensor Networks, An informationprocessing approach - Morgan Kaufmannpublication

**Reference Books :**

1. Kazem Sohraby, Daniel Minoli and TaiebZnati- Wireless Sensor Networks: Technology, Protocols and Applications -Wileypublication

2. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, 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.

3.Ramji Prasad "OFDM for wirelesscommunication"
4.Steve Rackley "Wireless NetworkingTechnology.

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | PS01 | PS02 | PS03 | PS04 |
| CO1 | 3 | 3 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 3 |
| CO2 | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 1 | 3 |
| CO4 | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 3 | 2 |
| CO5 | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 2 | 3 |

| Subject Code | Subject Title | Credit | Lecture | Tutorial | Practical | Type |
|---|---|---|---|---|---|---|
| | **Elective IV – Cyber Crime and Law** | **4** | **6** | - | - | **Core Theory** |

**Introduction:**

Understand and describe the major types of cybercrime. Identify cybercrime vulnerabilities and exploitations of the Internet. Understand the law with regards to the investigation and prosecution of cyber criminals. Apply appropriate law enforcement strategies to both, prevent and control cybercrime.

**Course Outcome:**

| CO1 | : | Understand and describe the major types of cybercrime |
|---|---|---|
| CO2 | : | Identify cybercrime vulnerabilities and exploitations of the Internet |
| CO3 | : | Understand the law with regards to the investigation and prosecution of cyber criminals |
| CO4 | : | Apply appropriate law enforcement strategies to both, prevent and control cybercrime. |

**Unit I : [12 periods]**

Cyber Crime : Definition and Origin of the Word, Cyber Crime and Information Security, who are Cyber Criminals, Classification of Cybercrimes, E-mail Spoofing, Spamming, Cyber Defamation, Internet Time Theft, Salami Attack, Salami technique Data Diddling, Forgery, Web Jacking, Newsgroup Spam, Industrial Spying, Hacking, Online Frauds, Pornographic Offenders, Software Piracy, Computer Sabotage Email Bombing, Computer Network Intrusion, Password Sniffing, Credit Card Frauds, Identity Theft

**Unit II: [12 periods]**

Cyber Offenses : How Criminals plan them, Categories of Cyber Crimes, How Criminal Plans the Attack: Active Attacks, Passive Attacks, Social Engineering, Classification of Social Engineering, Cyber Stalking: types of Stalkers, Cyber Cafe and Cyber Crimes, Botnets, Attack Vectors, Cyber Crime and Cloud Computing

**Unit III: [12 periods]**

Tools and Methods used in Cyber Crime : Proxy server and Anonymizers, phishing: How Phishing works? How password cracking works? Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Dos and DDOS Attacks, SQL Injection, Buffer Overflow, An Attacks on Wireless Networks

**Unit IV:[12 periods]**

Phishing and Identity Threads : Phishing: Methods of Phishing, Phishing Techniques, Types of Phishing Scams, Phishing countermeasures, Identity theft, Types and Techniques of identity thefts and its counter measures

**Unit V: [12 periods]**

IT ACT, Offenses and Penalties : Offences under the Information and Technology Act 2000 - Penalty and adjudication - Punishments for contraventions under the Information Technology Act 2000 (Case Laws, Rules and recent judicial pronouncements to be discussed) - Limitations of Cyber Law

**Text books:**

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives By Nina Godbole, Sunit Belapur, Wiley

**Reference Books :**

*Rathinam College of Arts and Science (Autonomous), Coimbatore-21.*
*For candidates admitted in B.Sc. CS with Cyber Security in the academic year 2024-2025 and Onwards*

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1. Understanding Cybercrime: Phenomena, and Legal Challenges Response, ITU 2012

**Mapping of Course Outcomes with Program Outcomes:**

| Course Outcomes | Program Outcomes | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P01 | P02 | P03 | P04 | P05 | P06 | P07 | P08 | P09 | PS01 | PS02 | PS03 | PS04 |
| CO1 | 2 | 3 | 3 | 1 | 3 | 1 | 1 | 1 | 3 | 3 | 2 | 1 | 3 |
| CO2 | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 2 | 2 |
| CO3 | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 3 | 1 | 3 |
| CO4 | 3 | 2 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 3 | 2 | 3 | 2 |
| CO5 | 3 | 3 | 3 | 1 | 3 | 1 | 2 | 1 | 3 | 2 | 3 | 2 | 3 |