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| **SYLLABUS** |
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| **from the academic year**  **2023 - 2024** |
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| **TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION, CHENNAI – 600 005** |

## Introduction

**BCA(BachelorofComputerApplication)**

Education is the key to development of any society. Role of higher education is crucial for securingright kind of employment and also to pursue further studies in best available world class institutes elsewherewithin and outside India. Quality education in general and higher education in particular deserves highpriority to enable the young and future generation of students to acquire skill, training and knowledge inorder to enhance their thinking, creativity, comprehension and application abilities and prepare them tocompete, succeed and excel globally. Learning Outcomes-based Curriculum Framework (LOCF) whichmakes it student-centric, interactive and outcome-oriented with well-defined aims, objectives and goals toachieve. LOCF also aims at ensuring uniform education standard and content delivery across the state whichwillhelpthestudentstoensuresimilarqualityofeducationirrespectiveoftheinstituteandlocation.

Computer Application is the study of quantity, structure, space and change, focusing on problemsolving, application development with wider scope of application in science, engineering, technology, socialsciences etc. throughout the world in last couple of decades and it has carved out a space for itself like anyother disciplinesofbasicscienceandengineering.ComputerApplicationisadisciplinethat spanstheoryandpracticeanditrequiresthinkingbothinabstracttermsandinconcreteterms.Nowadays,practicallyeveryoneis a computer user, and many people are even computer programmers. Computer Application can be seen onahigherlevel,asascienceofproblemsolvingandproblemsolvingrequiresprecision, creativity,andcarefulreasoning.Theever-evolving disciplineof computerApplicationalsohasstrongconnections to otherdisciplines. Many problems in science, engineering, health care, business, and other areas can be solvedeffectivelywithcomputers,butfindingasolutionrequiresbothcomputerscienceexpertiseandknowledgeofthe particular application domain. Computer Application has a wide range of specialties. These includeComputer Architecture, Software Systems, Graphics, Artificial Intelligence, Computational Science, andSoftware Engineering. Drawing from a common core of computer science knowledge, each specialty areafocusesonspecificchallenges.ComputerApplicationispracticedbymathematicians,scientistsandengineers. Mathematics, the origins of Computer Science, provides reason and logic. Science provides themethodology for learning and refinement. Engineering provides the techniques for building hardware andsoftware.

ProgrammeOutcome,ProgrammeSpecificOutcomeandCourseOutcome

Computer Application is the study of quantity, structure, space and change, focusing on problemsolving, application development with wider scope of application in science, engineering, technology, socialsciences etc. The key core areas of study in Mathematics include Algebra, Analysis (Real & Complex),DifferentialEquations,Geometry,andMechanics.

The Students completing this programme will be able to present Software application clearly andprecisely, make abstract ideas precise by formulating them in the Computer languages. Completion of thisprogrammewillalsoenablethelearnerstojointeachingprofession,enhancetheiremployabilityforgovernment jobs, jobs in software industry, banking, insurance and investment sectors, data analyst jobs andjobsin variousotherpublicand privateenterprises.

1. **ProgrammeOutcomes(PO)ofBCA**
   * ScientificaptitudewillbedevelopedinStudents
   * Students will acquire basic Practical skills & Technical knowledge along with domain knowledge ofdifferentsubjectsintheComputerScience&humanitiesstream.
   * Students will become employable; Students will be eligible for career opportunities in educationfield, Industry,orwillbeabletooptforentrepreneurship.
   * Students will possess basic subject knowledge required for higher studies, professional and appliedcourses.
   * Students will be aware of and able to develop solution oriented approach towards various Social andEnvironmentalissues.
   * Ability to acquire in-depth knowledge of several branches of Computer Science and aligned areas.This Programme helps learners in building a solid foundation for higher studies in Computer Scienceandapplications.
   * Theskillsandknowledgegained leadstoproficiencyinanalyticalreasoning,whichcan beutilizedinmodellingand solving reallifeproblems.
   * Utilizecomputerprogrammingskillstosolvetheoreticalandappliedproblemsbycriticalunderstanding,analysisandsynthesis.
   * Torecognizepatternsandtoidentifyessentialandrelevantaspectsofproblems.
   * Abilitytoshareideasandinsightswhileseekingandbenefittingfromknowledgeandinsightofothers.
   * Mouldthestudentsintoresponsiblecitizensinarapidlychanginginterdependentsociety.

Theaboveexpectationsgenerallycanbepooledinto6 broadcategoriesandcan bemodifiedaccordingtoinstitutionalrequirements:

PO1:Knowledge

PO2:ProblemAnalysis

PO3:Design/DevelopmentofSolutions

PO4:ConductinvestigationsofcomplexproblemsPO5:Modern toolusage

PO6:Applyingtosociety

1. **ProgrammeSpecificOutcomesofB.Sc.DegreeProgrammeinComputerScience**

PSO1:Thinkinacriticalandlogicalbasedmanner

PSO2:Familiarizethestudents with suitable software tools of computer science andindustrialapplications to handle issues and solve problems in mathematics orstatisticsandrealtimeapplication relatedsciences.

PSO3:Knowwhen there is a need for information, to be able to identify, locate, evaluate,andeffectivelyusethatinformationfortheissueorproblemathand.

PSO4:Understand,formulate,developprogrammingmodelwith logical approaches to aAddressissuesarisinginsocialscience,businessandothercontexts.

PSO5:Acquiregoodknowledgeand understanding tosolvespecific theoretical and appliedproblemsinadvancedareasofComputerscienceandIndustrial statistics.

PO6:Providestudents/learnerssufficientknowledgeandskillsenabling them to undertakefurther studies in Computer Science or Applications or Information Technology and itsalliedareasonmultipledisciplineslinkedwithComputerScience.

PO7:EquipwithComputerscience technical ability, problem solving skills, creative talentandpowerofcommunicationnecessaryforvariousformsofemployment.

PO8:Developarange of generic skills helpful in employment, internships&societalactivities.

PO9:Getadequateexposuretoglobalandlocal concerns that provides platform for furtherexplorationintomulti-dimensionalaspectsofcomputingsciences.

MappingofCourseLearningOutcomes(CLOs)withProgrammeOutcomes(POs)andProgrammeSpeciﬁcOutcomes(PSOs)canbecarriedoutaccordingly,assigningtheappropriatelevelinthegrids: (puttickmark ineach row)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **PO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **PO1** |  |  |  |  |  |  |
| **PO2** |  |  |  |  |  |  |
| **PO3** |  |  |  |  |  |  |
| **PO4** |  |  |  |  |  |  |
| **PO5** |  |  |  |  |  |  |
| **PO6** |  |  |  |  |  |  |

1. **HighlightsoftheRevampedCurriculum**
   * Student-centric,meeting the demands of industry & society, incorporating industrial components,hands-ontraining,skill enhancement modules,industrialproject,projectwithviva-voce,exposuretoentrepreneurialskills,training forcompetitive examinations,sustaining the quality of the corecomponentsandincorporatingapplicationorientedcontentwhereverrequired.
   * TheCoresubjects include latestdevelopments intheeducation andscientificfront, advancedprogramming packages allied with the discipline topics, practical training, devising mathematicalmodelsandalgorithmsforprovidingsolutionstoindustry/real
   * lifesituations.Thecurriculumalsofacilitatespeerlearningwithadvancedmathematicaltopicsinthefinal semester, cateringtotheneedsofstakeholderswithresearchaptitude.
   * The General Studies and Computer Science based problem solving skills are included as mandatorycomponentsinthe‗TrainingforCompetitiveExaminations‘courseatthefinalsemester,afirst ofitskind.
   * The curriculum is designed so as to strengthen the Industry-Academia interface and provide morejobopportunitiesforthestudents.
   * The Industrial Statistics course is newly introduced in the fourth semester,to expose the students toreal life problems and train the students on designing a mathematical model to provide solutions totheindustrialproblems.
   * The Internship during the second year vacation will help the students gain valuable work experiencethat connects classroom knowledge to real world experience and to narrow down and focus on thecareerpath.
   * Project withviva-vocecomponentinthefifthsemesterenablesthestudent, applicationofconceptualknowledgetopracticalsituations.ThestateofarttechnologiesinconductingaExplaininascientificand systematic way and arriving at a precise solution is ensured. Such innovative provisions of theindustrial training, project and internships will give students an edge over the counterparts in the jobmarket.

State-ofArttechniquesfromthestreamsofmulti-disciplinary,crossdisciplinaryandinterdisciplinarynatureare incorporated as Elective courses, covering conventional topics to the latest – Statistics with RProgramming,DataScience,Machinelearning.InternetofThingsandArtificialIntelligenceetc..

1. **ValueadditionsintheRevampedCurriculum:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Semester** | | **Newly introduced**  **Components** | **Outcome/Benefits** |
| **I** | | **FoundationCourse**  To ease the transition oflearningfromhighersecondarytohighereducation,providinganoverviewofthepedagogyoflearningabstract Mathematics andsimulatingmathematical  conceptstorealworld. | * Instilconfidenceamongstudents * Createinterest forthesubject |
| **I,II,III,IV** | | **SkillEnhancementpapers** (Disciplinecentric/Generic/Entrepreneurial) | * Industryreadygraduates * Skilledhumanresource * Studentsareequippedwithessentialskillstomakethememployable |
| * Trainingon Computing / Computational skills   enablethestudentsgainknowledgeandexposureonlatestcomputationalaspects |
| * Dataanalytical skills will enable students gain   internships,apprenticeships,fieldworkinvolvingdatacollection,compilation,analysisetc. |
| * Entrepreneurial skill training will provide anopportunityforindependent livelihood * Generatesself–employment * Createsmallscaleentrepreneurs * Trainingtogirlsleadstowomenempowerment |
| * DisciplinecentricskillwillimprovetheTechnicalknowhowofsolvingreallifeproblemsusingICT   tools |
| **III,IV,V**  **&VI** | | Electivepapers-  An open choice of topicscategorized underGenericandDisciplineCentric | * Strengtheningthedomainknowledge * IntroducingthestakeholderstotheState-ofArttechniques from the streams of multi-disciplinary,crossdisciplinaryandinterdisciplinarynature * Students are exposed to Latest topics on ComputerScience/IT,thatrequirestrongmathematicalbackground * Emerging topics inhighereducation /industry /communicationnetwork/healthsectoretc.areintroducedwithhands-on-training,facilitatesdesigningofmathematicalmodelsintherespective   sectors |
|  | | **IV** | IndustrialStatistics | * Exposuretoindustrymouldsstudentsintosolutionproviders * GeneratesIndustryreadygraduates * Employmentopportunitiesenhanced |
| **II yearVacationactivity** | Internship /IndustrialTraining | * Practical training at the Industry/ Banking Sector /Private/ Publicsector organizations / Educationalinstitutions,enablethestudentsgainprofessional   experienceandalsobecomeresponsiblecitizens. |
| **V**  **Semester** | ProjectwithViva–voce | * Self-learningisenhanced * Applicationoftheconcepttorealsituationisconceivedresultingintangibleoutcome |
| **VI**  **Semester** | Introduction ofProfessionalCompetencycomponent | * Curriculum designaccommodates allcategoryoflearners;‗MathematicsforAdvancedExplain‘componentwillcompriseofadvancedtopicsinMathematics and allied fields, for those in the peergroup/aspiringresearchers; * ‗Training for Competitive Examinations‘ –caters tothe needs of the aspirants towards most sought-after services of the nation viz, UPSC, CDS, NDA,BankingServices,CAT,TNPSCgroupservices,   etc. |
| **ExtraCredits:**  **ForAdvancedLearners/Honorsdegree** | | * Tocatertotheneedsofpeerlearners/researchaspirants |

|  |  |
| --- | --- |
| **Skills acquired fromtheCourses** | Knowledge,ProblemSolving,Analyticalability,ProfessionalCompetency,ProfessionalCommunicationandTransferrableSkill |

**Credit Distribution for UG Programmes**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sem I** | **Credit** | **H** | **Sem II** | **Credit** | **H** | **Sem III** | **Credit** | **H** | **Sem IV** | **Credit** | **H** | **Sem V** | **Credit** | **H** | **Sem VI** | **Credit** | **H** |
| Part 1. Language – Tamil | 3 | 6 | Part..1. Language – Tamil | 3 | 6 | Part..1. Language – Tamil | 3 | 6 | Part..1. Language – Tamil | 3 | 6 | 5.1 Core Course –\CC IX | 4 | 5 | 6.1 Core Course –  CC XIII | 4 | 6 |
| Part.2 English | 3 | 6 | Part..2 English | 3 | 6 | Part..2 English | 3 | 6 | Part..2 English | 3 | 6 | 5.2 Core Course – CC X | 4 | 5 | 6.2 Core Course –  CC XIV | 4 | 6 |
| 1.3 Core Course – CC I | 5 | 5 | 2..3 Core Course – CC III | 5 | 5 | 3.3 Core Course – CC V | 5 | 5 | 4.3 Core Course – CC VII  Core Industry Module | 5 | 5 | 5. 3.Core Course CC -XI | 4 | 5 | 6.3 Core Course –  CC XV | 4 | 6 |
| 1.4 Core Course – CC II | 5 | 5 | 2.4 Core Course – CC IV | 5 | 5 | 3.4 Core Course – CC VI | 5 | 5 | 4.4 Core Course –  CC VIII | 5 | 5 | 5. 4.Core Course –/ Project with viva- voce  CC -XII | 4 | 5 | 6.4 Elective -VII Generic/ Discipline Specific | 3 | 5 |
| 1.5 Elective I Generic/ Discipline Specific | 3 | 4 | 2.5 Elective II Generic/ Discipline Specific | 3 | 4 | 3.5 Elective III Generic/ Discipline Specific | 3 | 4 | 4.5 Elective IV Generic/ Discipline Specific | 3 | 3 | 5.5 Elective V Generic/ Discipline Specific | 3 | 4 | 6.5 Elective VIII  Generic/ Discipline Specific | 3 | 5 |
| 1.6 Skill Enhancement Course SEC-1 | 2 | 2 | 2.6 Skill Enhancement Course SEC-2 | 2 | 2 | 3.6 Skill Enhancement Course SEC-4,  (Entrepreneurial Skill) | 1 | 1 | 4.6 Skill Enhancement Course SEC-6 | 2 | 2 | 5.6 Elective VI Generic/ Discipline Specific | 3 | 4 | 6.6 Extension Activity | 1 | - |
| 1.7 Skill Enhancement -(Foundation Course) | 2 | 2 | 2.7 Skill Enhancement Course –SEC-3 | 2 | 2 | 3.7 Skill Enhancement Course SEC-5 | 2 | 2 | 4.7 Skill Enhancement Course SEC-7 | 2 | 2 | 5.7 Value Education | 2 | 2 | 6.7 Professional Competency Skill | 2 | 2 |
|  |  |  |  |  |  | 3.8 E.V.S. | - | 1 | 4.8 E.V.S | 2 | 1 | 5.8 Summer Internship /Industrial Training | 2 |  |  |  |  |
|  | **23** | **30** |  | **23** | **30** |  | **22** | **30** |  | **25** | **30** |  | **26** | **30** |  | **21** | **30** |
| **Total – 140 Credits** | | | | | | | | | | | | | | | | | |

**Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credit and Hours Distribution System**

**for all UG courses including Lab Hours**

**First Year – Semester-I**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| Part-1 | Language – Tamil | 3 | 6 |
| Part-2 | English | 3 | 6 |
| Part-3 | Core Courses & Elective Courses [in Total] | 13 | 14 |
| Part-4 | Skill Enhancement Course SEC-1 | 2 | 2 |
| Foundation Course | 2 | 2 |
|  |  | **23** | **30** |

**Semester-II**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| Part-1 | Language – Tamil | 3 | 6 |
| Part-2 | English | 3 | 6 |
| Part-3 | Core Courses & Elective Courses including laboratory [in Total] | 13 | 14 |
| Part-4 | Skill Enhancement Course -SEC-2 | 2 | 2 |
| Skill Enhancement Course -SEC-3 (Discipline / Subject Specific) | 2 | 2 |
|  |  | **23** | **30** |

**Second Year – Semester-III**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| Part-1 | Language - Tamil | 3 | 6 |
| Part-2 | English | 3 | 6 |
| Part-3 | Core Courses & Elective Courses including laboratory [in Total] | 13 | 14 |
| Part-4 | Skill Enhancement Course -SEC-4 (Entrepreneurial Based) | 1 | 1 |
| Skill Enhancement Course -SEC-5 (Discipline / Subject Specific) | 2 | 2 |
| E.V.S | - | 1 |
|  |  | **22** | **30** |

**Semester-IV**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| Part-1 | Language - Tamil | 3 | 6 |
| Part-2 | English | 3 | 6 |
| Part-3 | Core Courses & Elective Courses including laboratory [in Total] | 13 | 13 |
| Part-4 | Skill Enhancement Course -SEC-6 (Discipline / Subject Specific) | 2 | 2 |
| Skill Enhancement Course -SEC-7 (Discipline / Subject Specific) | 2 | 2 |
| E.V.S | 2 | 1 |
|  |  | **25** | **30** |

**Third Year**

**Semester-V**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| **Part-3** | Core Courses including Project / Elective Based | 22 | 26 |
| **Part-4** | Value Education | 2 | 2 |
| Internship / Industrial Visit / Field Visit | 2 | 2 |
|  |  | **26** | **30** |

**Semester-VI**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **List of Courses** | **Credit** | **No. of Hours** |
| **Part-3** | Core Courses including Project / Elective Based & LAB | 18 | 28 |
| **Part-4** | Extension Activity | 1 | - |
| Professional Competency Skill | 2 | 2 |
|  |  | **21** | **30** |

**Consolidated Semester wise and Component wise Credit distribution**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **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** | 13 | 13 | 13 | 13 | 22 | 18 | 92 |
| **Part IV** | 4 | 4 | 3 | 6 | 4 | 1 | 22 |
| **Part V** | - | - | - | - | - | 2 | 2 |
| **Total** | 23 | 23 | 22 | 25 | 26 | 21 | **140** |

**\*Part I. II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

**Illustration for B.C.A..Curriculum Design 1st Year**

**Semester-I**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **ListofCourses** | **Credit** | **Hours perweek**  **(L/T/P)** |
| Part-I | Language | 3 | 6 |
| Part-II | English | 3 | 6 |
| Part-III | CC1–PythonProgramming | 5 | 5 |
| CC2-Practical:PythonProgrammingLab | 5 | 5 |
| ElectiveCourse1(Generic/DisciplineSpecific)–EC1**Choosefrom**  **Annexure–I** | 3 | 4 |
| Part-IV | SkillEnhancementCourse-SEC-1–**ChoosefromAnnexure-II** | 2 | 2 |
| FoundationCourseFC–StructuredprogramminginC | 2 | 2 |
|  |  | **23** | **30** |

**Semester-II**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **ListofCourses** | **Credit** | **Hours per**  **week(L/T/P)** |
| Part-I | Language | 3 | 6 |
| Part-II | English | 3 | 6 |
| Part-III | CC3–ObjectOrientedProgrammingConceptsusingC++ | 5 | 5 |
| CC4 -Practical:C++ProgrammingLab | 5 | 5 |
| ElectiveCourse2(Generic/DisciplineSpecific)–EC2  **ChoosefromAnnexure-I** | 3 | 4 |
| Part-IV | SkillEnhancementCourse-SEC-2**-ChoosefromAnnexure-II** | 2 | 2 |
| SkillEnhancementCourse–SEC-3(Discipline/Subject  Specific)–**ChoosefromAnnexure-II** | 2 | 2 |
|  |  | **23** | **30** |

## SecondYear

**Semester-III**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **ListofCourses** | **Credit** | **Hours per**  **week(L/T/P)** |
| Part-I | Language | 3 | 6 |
| Part-II | English | 3 | 6 |
| Part-III | CC5-DataStructuresandAlgorithms | 5 | 5 |
| CC6-Practical:DataStructuresandAlgorithmsLab | 5 | 5 |
| ElectiveCourse3(Generic/DisciplineSpecific)-EC3-**Choose**  **fromAnnexure-I** | 3 | 4 |
| Part-IV | SkillEnhancementCourse-SEC-4(EntrepreneurialBased)–  **-ChoosefromAnnexure-II** | 1 | 1 |
| SkillEnhancementCourse-SEC-5(DisciplineSpecific/Generic)  –**ChoosefromAnnexure-II** | 2 | 2 |
| EnvironmentalStudies | - | 1 |
|  |  | **22** | **30** |

**Semester-IV**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **ListofCourses** | **Credit** | **Hours perweek**  **(L/T/P)** |
| Part-I | Language | 3 | 6 |
| Part-II | English | 3 | 6 |
| Part-III | CC7-ProgramminginJava | 5 | 5 |
| CC8 -Practical:ProgramminginJavaLab | 5 | 5 |
| ElectiveCourse-EC4(Generic/DisciplineSpecific)–  **ChoosefromAnnexure-I** | 3 | 3 |
| Part-IV | SkillEnhancementCourse–SEC-6-**ChoosefromAnnexure-II** | 2 | 2 |
| SkillEnhancementCourse-SEC-7 -**ChoosefromAnnexure-II** | 2 | 2 |
| EnvironmentalStudies | 2 | 1 |
|  |  | **25** | **30** |

**Third YearSemester-V**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **ListofCourses** | **Credit** | **Hoursper**  **week(L/T/P)** |
| Part-III | CC9–OperatingSystem | 4 | 5 |
| CC10-ASP.NetProgramming | 4 | 5 |
| CC11-Practical:ASP.NetProgrammingLab | 4 | 5 |
| ElectiveCourse–EC5(DisciplineSpecific)–  **ChoosefromAnnexure-I** | 3 | 4 |
| ElectiveCourse–EC6(DisciplineSpecific)–  **ChoosefromAnnexure-I** | 3 | 4 |
| CC12-ProjectwithVivavoce(Individual) | 4 | 5 |
| Part-IV | ValueEducation | 2 | 2 |
| Internship/IndustrialTraining  (SummervacationattheendofIVsemesteractivity) | 2 |  |
|  |  | **26** | **30** |

**Semester-VI**

|  |  |  |  |
| --- | --- | --- | --- |
| **Part** | **ListofCourses** | **Credit** | **Hours perweek(L/T/P)** |
| Part-III | CC13-ComputerNetworks |  | 6 |
| CC14–DataAnalyticsusingRProgramming | 4 | 6 |
| CC15- Practical:RProgrammingLab | 4 | 6 |
| ElectiveCourse–EC7(DisciplineSpecific)–  **ChoosefromAnnexure-I** | 3 | 5 |
| ElectiveCourse–EC8(DisciplineSpecific)**–**  **ChoosefromAnnexure-I** | 3 | 5 |
| Part-IV | ProfessionalCompetencySkillEnhancementCourse-SEC8 | 2 | 2 |
| Part-V | ExtensionActivity | 1 |  |
|  |  | **21** | **30** |

**TotalCredits: 140**

## AnnexureISuggestedtopicsinCorecomponent

1. MicroprocessorandMicrocontroller
2. MicroprocessorandMicrocontrollerLab
3. RDBMSwithPL/SQL
4. PL/SQLLab
5. SoftwareEngineering
6. MachineLearning
7. MachineLearningLab
8. NetworkSecurity
9. DataMiningandWarehousing
10. MobileApplicationDevelopment
11. MobileApplicationDevelopmentLab
12. IntroductiontoDataScienceandmore..

## SuggestedtopicsinElectiveCourse

**GenericSpecific**

1. DiscreteMathematics–I
2. DiscreteMathematics-II
3. StatisticalMethodsanditsApplication-I
4. StatisticalMethodsanditsApplication-II
5. OptimizationTechniques
6. NanoTechnology
7. IntroductiontoLinearAlgebra
8. GraphTheoryanditsApplication
9. FinancialAccounting
10. CostandManagementAccounting
11. DigitalLogicFundamentals
12. NumericalMethods
13. ResourceManagementTechniquesandmore..

**Electivecourse–(EC1-EC8)-DisciplineSpecific**

1. SoftwareMetrics
2. NaturalLanguageProcessing
3. AnalyticsforServiceIndustry
4. Cryptography
5. DatabaseManagementSystem
6. BigDataAnalytics
7. IOTanditsApplications
8. SoftwareProjectManagement
9. ImageProcessing
10. InformationSecurity
11. HumanComputerInteraction
12. Fuzzy Logic
13. ArtificialIntelligence
14. MobileAdhocNetwork
15. ComputationalIntelligence
16. GridComputing
17. CloudComputing
18. ArtificialNeuralNetwork
19. AgileProjectManagementandmore..

[Pl.Note:InSemester-VI-ForEC7andEC8subjects Instructionalhoursmaybeusedas:5per cycle]

## AnnexureII

**SuggestedtopicsinSkillEnhancement(SEC1-SEC8)Course**

**SkillEnhancementCourse**

1. FundamentalsofInformationTechnology
2. IntroductiontoHTML
3. WebDesigning
4. PHPProgramming
5. Software Testing
6. ProblemSolvingTechniques
7. UnderstandingInternet
8. OfficeAutomation
9. Quantitative Aptitude
10. OpenSourceTechnologies
11. MultimediaSystems
12. AdvancedExcel
13. Biometrics
14. CyberForensics
15. PatternRecognition
16. EnterpriseResourcePlanning
17. RoboticsandApplications
18. Simulationand Modelling
19. OrganizationBehaviorandmore..

**COREPAPER**

# FIRSTYEARSEMESTER-I

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | | |
| **CIA** | **External** | **Total** | |
| **CC1** | | PYTHONPROGRAMMING |  | 5 | - | - | - | 4 | 25 | 75 | 100 | |
| **LearningObjectives** | | | | | | | | | | | |  |
| **LO1** | To makestudents understandthe concepts of Python programming. | | | | | | | | | | | |
| **LO2** | ToapplytheOOPsconceptinPYTHONprogramming. | | | | | | | | | | | |
| **LO3** | Toimpartknowledgeondemandandsupplyconcepts | | | | | | | | | | | |
| **LO4** | TomakethestudentslearnbestpracticesinPYTHONprogramming | | | | | | | | | | | |
| **LO5** | Toknowthecostsandprofit maximization | | | | | | | | | | | |
| **UNIT** | **Contents** | | | | | | | | | | | **No. ofHours** |
| I | **BasicsofPythonProgramming:**HistoryofPython-FeaturesofPython-Literal-Constants-Variables - Identifiers–Keywords-Built-inDataTypes-OutputStatements –Input Statements-Comments –Indentation- Operators-Expressions-Type conversions. **PythonArrays:**DefiningandProcessingArrays–Arraymethods. | | | | | | | | | | | **15** |
| II | **ControlStatements:**Selection/Conditional Branchingstatements: if,if-else,nestedifand if-elif-else statements. Iterative Statements: whileloop,forloop,elsesuiteinloopand nested loops. **Jump Statements:**break,continueandpassstatements**.** | | | | | | | | | | | **15** |
| III | **Functions:** Function Definition – Function Call – Variable Scope and itsLifetime-ReturnStatement.**FunctionArguments**:RequiredArguments,Keyword Arguments, Default Arguments and Variable LengthArguments-Recursion.**PythonStrings:**Stringoperations- ImmutableStrings - Built-in String Methods and Functions - String Comparison.  **Modules**: import statement- The Python module – dir() function – | | | | | | | | | | | **15** |

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| --- | --- | --- | --- | --- |
|  | ModulesandNamespace–Definingourownmodules. | | |  |
| IV | **Lists:**Creatingalist-Accessvaluesin List-Updating values in Lists-Nestedlists-Basiclistoperations-List Methods. Tuples: Creating,Accessing,UpdatingandDeletingElementsin atuple–Nestedtuples–Differencebetweenlistsandtuples.**Dictionaries:**Creating,Accessing,UpdatingandDeletingElementsinaDictionary–DictionaryFunctions  andMethods-DifferencebetweenListsandDictionaries. | | | **15** |
| V | **PythonFileHandling:**Typesof files in Python -Opening and Closingfiles-Reading and Writing files: write() and writelines() methods- append()method–read()andreadlines()methods–withkeyword–Splittingwords  –Filemethods-FilePositions-Renaminganddeletingfiles. | | | **15** |
| **TOTALHOURS** | | | | **75** |
| **CourseOutcomes** | | | **ProgrammeOutcomes** | |
| CO | | Oncompletionofthiscourse, studentswill | | |
| CO1 | | Learnthebasicsofpython,Dosimpleprogramsonpython,  Learnhowtouseanarray. | PO1,PO2,PO3,PO4,PO5,PO6 | |
| CO2 | | Developprogramusingselectionstatement,WorkwithLoopingandjumpstatements,DoprogramsonLoopsandjumpstatements. | PO1,PO2,PO3,PO4,PO5,PO6 | |
| CO3 | | Concept of function, function arguments, Implementing theconceptstringsinvariousapplication,SignificanceofModules,  Work withfunctions,Stringsandmodules. | PO1,PO2,PO3,PO4,PO5,PO6 | |
| CO4 | | WorkwithList,tuplesanddictionary,Writeprogramusinglist,  tuplesanddictionary. | PO1,PO2,PO3,PO4,PO5,PO6 | |
| CO5 | | UsageofFilehandlingsinpython,Conceptofreadingandwritingfiles,Doprogramsusingfiles. | PO1,PO2,PO3,  PO4,PO5,PO6 | |
| **Textbooks** | | | | |
| 1 | | ReemaThareja,―PythonProgrammingusingproblemsolvingapproach‖,FirstEdition, 2017,Oxford UniversityPress. | | |
| 2 | | Dr.R.NageswaraRao,―CorePythonProgramming‖,FirstEdition,2017,Dreamtech Publishers. | | |
| **ReferenceBooks** | | | | |
| 1. | | VamsiKurama,―PythonProgramming:AModernApproach‖,PearsonEducation. | | |
| 2. | | MarkLutz,‖LearningPython‖,Orielly. | | |
| 3. | | AdamStewarts,―PythonProgramming‖,Online. | | |
| 4. | | FabioNelli,―PythonDataAnalytics‖,APress. | | |

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| 5. | KennethA.Lambert,―FundamentalsofPython–FirstPrograms‖,CENGAGE  Publication. |
| **WebResources** | |
| 1. | <https://www.programiz.com/python-programming> |
| 2. | https://[www.guru99.com/python-tutorials.html](http://www.guru99.com/python-tutorials.html) |
| 3. | https://[www.w3schools.com/python/python\_intro.asp](http://www.w3schools.com/python/python_intro.asp) |
| 4. | https://[www.geeksforgeeks.org/python-programming-language/](http://www.geeksforgeeks.org/python-programming-language/) |
| 5. | https://en.wikipedia.org/wiki/Python\_(programming\_language) |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **2** | **3** | **3** | **3** |
| **CO2** | **3** | **2** | **2** | **3** | **2** | **3** |
| **CO3** | **3** | **2** | **2** | **3** | **2** | **2** |
| **CO4** | **3** | **2** | **2** | **3** | **2** | **3** |
| **CO5** | **3** | **2** | **2** | **3** | **3** | **3** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 15 | 10 | 10 | 15 | 13 | 14 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | | |
| **CIA** | | **External** | **Total** |
| CC2 | PYTHONLAB |  | - | - | 4 | - | 4 | 25 | | 75 | 100 |
| **CourseObjectives**:   1. BeabletodesignandprogramPythonapplications. 2. BeabletocreateloopsanddecisionstatementsinPython. 3. BeabletoworkwithfunctionsandpassargumentsinPython. 4. BeabletobuildandpackagePythonmodulesfor reusability. 5. BeabletoreadandwritefilesinPython. | | | | | | | | | | | |
| **LABEXERCISES** | | | | | | | | | **RequiredHours** | | |
| 1. Programusingvariables,constants,I/OstatementsinPython. 2. ProgramusingOperatorsinPython. 3. ProgramusingConditionalStatements. 4. ProgramusingLoops. 5. ProgramusingJumpStatements. 6. ProgramusingFunctions. 7. ProgramusingRecursion. 8. ProgramusingArrays. 9. ProgramusingStrings. 10. ProgramusingModules. 11. ProgramusingLists. 12. ProgramusingTuples. 13. ProgramusingDictionaries. 14. ProgramforFileHandling. | | | | | | | | | **60** | | |
| **CourseOutcomes** | | | | | | | | | | | |
| Oncompletionofthiscourse, studentswill | | | | | | | | | | | |
| CO1 | Demonstratetheunderstandingofsyntaxandsemanticsof | | | | | | | | | | |
| CO2 | IdentifytheproblemandsolveusingPYTHONprogrammingtechniques. | | | | | | | | | | |
| CO3 | Identifysuitableprogrammingconstructsforproblemsolving. | | | | | | | | | | |
| CO4 | AnalyzevariousconceptsofPYTHONlanguagetosolvetheprobleminanefficient  way. | | | | | | | | | | |
| CO5 | DevelopaPYTHONprogramforagivenproblemandtestforitscorrectness. | | | | | | | | | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **2** | **2** | **2** | **3** | **2** |
| **CO2** | **2** | **1** | **3** | **2** | **-** | **2** |
| **CO3** | **3** | **3** | **1** | **1** | **1** | **2** |
| **CO4** | **2** | **3** | **3** | **1** | **-** | **1** |
| **CO5** | **3** | **2** | **3** | **1** | **1** | **-** |
| **Weightageofcoursecontributed to eachPSO** | 12 | 11 | 12 | 7 | 5 | 7 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | | **Marks** | | |
| **CIA** | **External** | **Total** |
| **FC** | **StructuredProgrammingLanguageinC** | FC | 2 | - | - | - | 2 | 2 | | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | TofamiliarizethestudentswiththeProgrammingbasicsandthefundamentalsofC,  DatatypesinC,Mathematicalandlogicaloperations. | | | | | | | | | | | |
| LO2 | Tounderstandtheconceptusingifstatementsandloops | | | | | | | | | | | |
| LO3 | ThisunitcoverstheconceptofArrays | | | | | | | | | | | |
| LO4 | ThisunitcoverstheconceptofFunctions | | | | | | | | | | | |
| LO5 | Tounderstandtheconceptofimplementingpointers. | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | **No. ofHours** | | **CourseObjectives** | |
| I | **OverviewofC**:ImportanceofC,sampleCprogram,Cprogramstructure,executingCprogram.  Constants, Variables, and Data Types: Character set, C tokens,keywordsandidentifiers,constants,variables,datatypes,declarationofvariables,Assigningvaluestovariables---Assignmentstatement,declaringavariableasconstant,as  volatile.OperatorsandExpression. | | | | | | | | 6 | | CO1 | |
| II | **Decision Making and Branching**:Decision making with If,simpleIF,IFELSE,nestedIFELSE,ELSEIFladder,switch,GOTOstatement.**DecisionMakingand Looping**:While, Do-While,For,Jumpsinloops. | | | | | | | | 6 | | CO2 | |
| III | **Arrays**:Declarationandaccessingofone&two-dimensionalarrays,initializingtwo-dimensionalarrays,multidimensional  arrays. | | | | | | | | 6 | | CO3 | |
| IV | **Functions**: The form of C functions, Return values and types,calling a function, categories of functions, Nested functions,Recursion,functionswitharrays,callbyvalue,callbyreference,storageclasses-characterarraysandstringfunctions | | | | | | | | 6 | | CO4 | |
| V | **Pointers:**definition,declaringandinitializingpointers,accessingavariablethroughaddressandthroughpointer,pointer expressions, pointer increments and scale factor,  pointers and arrays, pointers and functions, pointers and | | | | | | | | 6 | | CO5 | |

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| --- | --- | --- | --- | --- |
|  | structures. | |  |  |
|  | **Total** | | **30** | |
| **CourseOutcomes** | | **ProgrammeOutcome** | | |
| CO | Oncompletionofthiscourse, studentswill |  | | |
| 1 | RemembertheprogramstructureofCwithitssyntaxandsemantics | PO1,PO3,PO5 | | |
| 2 | UnderstandtheprogrammingprinciplesinC(datatypes, operators, branching and looping, arrays,functions,structures, pointersandfiles) | PO2,PO3,PO6,PO7 | | |
| 3 | Applytheprogrammingprincipleslearntinreal-timeproblems | PO3,PO4,PO7 | | |
| 4 | Analyzethevariousmethodsofsolvingaproblemandchoosethebestmethod | PO4,PO5,PO6 | | |
| 5 | Code,debugandtesttheprogramswithappropriate  testcases | PO7,PO8 | | |
| **TextBook** | | | | |
| 1 | E.Balagurusamy,ProgramminginANSIC,FifthEdition,TataMcGraw-Hill,2010. | | | |
| **ReferenceBooks** | | | | |
| 1. | ByronGottfried,Schaum‘sOutlineProgrammingwithC,FourthEdition,TataMcGraw-Hill,2018. | | | |
| 2. | KernighanandRitchie,TheCProgrammingLanguage,SecondEdition,PrenticeHall,  1998 | | | |
| 3. | YashavantKanetkar,LetUsC,EighteenthEdition,BPBPublications,2021 | | | |
| **WebResources** | | | | |
| 1. | <https://codeforwin.org/> | | | |
| 2. | <https://www.geeksforgeeks.org/c-programming-language/> | | | |
| 3. | <http://en.cppreference.com/w/c> | | | |
| 4. | <http://learn-c.org/> | | | |
| 5. | <https://www.cprogramming.com/> | | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **1** | **2** | **2** | **2** | **2** | **-** |
| **CO2** | **2** | **2** | **2** | **2** | **-** | **2** |
| **CO3** | **3** | **2** | **2** | **1** | **1** | **-** |
| **CO4** | **3** | **2** | **2** | **1** | **-** | **1** |
| **CO5** | **1** | **2** | **2** | **2** | **2** | **3** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 7 | 10 | 10 | 18 | 15 | 6 |

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

**SEMESTERII**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TitleoftheCourse/Paper** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
| **CC3** | **OBJECTORIENTEDPROGRAMMING**  **CONCEPTSUSINGC++** | Core | 5 | - | - | - | 4 | 5 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | Describe theproceduralandobjectorientedparadigmwithconceptsofstreams, classes,functions,dataandobjects | | | | | | | | | | |
| LO2 | Understanddynamicmemory managementtechniquesusingpointers,constructors,destructors,etc | | | | | | | | | | |
| LO3 | Describetheconceptoffunctionoverloading,operatoroverloading,virtualfunctionsandpolymorphism | | | | | | | | | | |
| LO4 | Classifyinheritancewiththeunderstandingofearlyandlatebinding,usageofexceptionhandling,genericprogramming | | | | | | | | | | |
| LO5 | DemonstratetheuseofvariousOOPsconceptswiththehelpofprograms | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | **No. ofHours** | |
| I | Introduction to C++ - key concepts of Object-Oriented Programming –Advantages–ObjectOrientedLanguages–I/OinC++-C++Declarations.ControlStructures:- DecisionMakingandStatements:If  ..else, jump, goto, break, continue, Switch case statements - Loops inC++ :for, while, do - functions in C++ - inline functions – FunctionOverloading. | | | | | | | | | 15 | |
| II | Classes and Objects: Declaring Objects – Defining Member Functions –StaticMembervariablesandfunctions–arrayofobjects–friendfunctions – Overloading member functions – Bit fields and classes –Constructoranddestructorwithstaticmembers. | | | | | | | | | 15 | |
| III | OperatorOverloading:Overloadingunary,binaryoperators–Overloading Friend functions –type conversion – Inheritance: Types ofInheritance – Single, Multilevel, Multiple, Hierarchal,Hybrid, Multi pathinheritance–Virtual baseClasses–AbstractClasses. | | | | | | | | | 15 | |
| IV | Pointers–Declaration–PointertoClass,Object–thispointer–Pointers | | | | | | | | | 15 | |

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|  | to derived classes andBase classes – Arrays – Characteristics – array ofclasses – Memory models – new and deleteoperators – dynamic object –Binding, PolymorphismandVirtualFunctions. | |  |
| V | Files –Filestreamclasses –filemodes–Sequential Read /Writeoperations–BinaryandASCIIFiles–RandomAccessOperation–Templates –Exception Handling- String –Declaring andInitializingstringobjects–StringAttributes–Miscellaneousfunctions. | | 15 |
|  | **Total** | | **75** |
| **CourseOutcomes** | | **ProgrammeOutcome** | |
| CO | Uponcompletionofthecoursethe studentswouldbe  ableto: |  | |
| 1 | RemembertheprogramstructureofCwithitssyntaxandsemantics | PO1,PO6 | |
| 2 | UnderstandtheprogrammingprinciplesinC(datatypes,operators, branchingandlooping, arrays,functions,  structures,pointersandfiles) | PO2 | |
| 3 | Applytheprogrammingprincipleslearntinreal-  timeproblems | PO4,PO7 | |
| 4 | Analyzethevariousmethodsofsolvingaproblem  andchoosethebestmethod | PO6 | |
| 5 | Code,debugandtesttheprogramswithappropriatetest  cases | PO7,PO8 | |
| **TextBook** | | | |
| 1 | E.Balagurusamy,―Object-OrientedProgrammingwithC++‖,TMH2013,7thEdition. | | |
| **ReferenceBooks** | | | |
| 1. | AshokNKamthane,―Object-OrientedProgrammingwithANSIandTurboC++‖,  PearsonEducation2003. | | |
| 2. | MariaLitvin&GrayLitvin,―C++foryou‖,Vikaspublication2002. | | |
| **WebResources** | | | |
| 1. | <https://alison.com/course/introduction-to-c-plus-plus-programming> | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **1** | **-** | **-** | **1** |
| **CO2** | **2** | **2** | **2** | **1** | **-** | **-** |
| **CO3** | **3** | **1** | **1** | **-** | **1** | **-** |
| **CO4** | **1** | **2** | **1** | **2** | **2** | **1** |
| **CO5** | **3** | **2** | **1** | **2** | **3** | **2** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 12 | 9 | 6 | 5 | 6 | 4 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TitleoftheCourse/Paper** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
| **CC4** | **C++PROGRAMMINGLAB** | Core | - | - | 4 | - | 4 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | Describetheproceduralandobjectorientedparadigmwithconceptsofstreams, classes,functions,dataandobjects | | | | | | | | | | |
| LO2 | Understand dynamicmemory managementtechniquesusingpointers,constructors,destructors,etc | | | | | | | | | | |
| LO3 | Describetheconceptoffunctionoverloading,operator overloading,virtualfunctionsandpolymorphism | | | | | | | | | | |
| LO4 | Classifyinheritancewiththeunderstandingofearlyandlatebinding,usageofexceptionhandling,genericprogramming | | | | | | | | | | |
| LO5 | DemonstratetheuseofvariousOOPsconceptswiththehelpofprograms | | | | | | | | | | |
| **S.No** | **Details** | | | | | | | | | **No. ofHours** | |
| 1 | Writea C++ program to demonstrate function overloading, Default  ArgumentsandInlinefunction. | | | | | | | | |  | |
| 2 | WriteaC++programtodemonstrateClassandObjects | | | | | | | | |  | |
| 3 | WriteaC++programtodemonstratetheconceptofPassingObjectstoFunctions | | | | | | | | |  | |
| 4 | WriteaC++programtodemonstratetheFriendFunctions. | | | | | | | | |  | |
| 5 | WriteaC++programtodemonstratetheconceptofPassingObjectsto  Functions | | | | | | | | |  | |
| 6 | Writea C++programtodemonstrateConstructorandDestructor | | | | | | | | |  | |
| 7 | WriteaC++programtodemonstrateUnaryOperatorOverloading | | | | | | | | |  | |
| 8 | WriteaC++programtodemonstrateBinaryOperatorOverloading | | | | | | | | |  | |

|  |  |  |  |
| --- | --- | --- | --- |
| 9 | WriteaC++programtodemonstrate:   * SingleInheritance * MultilevelInheritance * MultipleInheritance * HierarchicalInheritance * HybridInheritance | |  |
| 10 | WriteaC++programtodemonstrateVirtualFunctions. | |  |
| 11 | WriteaC++programtomanipulateaTextFile. | |  |
| 12 | WriteaC++programtoperformSequentialI/O Operationsonafile. | |  |
| 13 | WriteaC++programtofindtheBiggestNumberusingCommandLineArguments | |  |
| 14 | WriteaC++programtodemonstrateClassTemplate | |  |
| 15 | WriteaC++programtodemonstrateFunctionTemplate. | |  |
| 16 | WriteaC++programtodemonstrateExceptionHandling. | |  |
| **CourseOutcomes** | | **ProgrammeOutcome** | |
| CO | Uponcompletionofthecourse the studentswouldbeableto: |  | |
| 1 | RemembertheprogramstructureofCwithitssyntaxandsemantics | PO1,PO6 | |
| 2 | UnderstandtheprogrammingprinciplesinC(datatypes,operators, branching and looping, arrays, functions,structures,pointersandfiles) | PO2 | |
| 3 | Applytheprogrammingprincipleslearntinreal-timeproblems | PO4,PO7 | |
| 4 | Analyzethevariousmethodsofsolvingaproblemandchoosethebestmethod | PO6 | |
| 5 | Code, debug and test the programs with appropriate testcases | PO7,PO8 | |
| **TextBook** | | | |
| 1 | E.Balagurusamy,―Object-OrientedProgrammingwithC++‖,TMH2013,7thEdition. | | |
| **ReferenceBooks** | | | |

|  |  |
| --- | --- |
| 1. | AshokNKamthane,―Object-OrientedProgrammingwithANSIandTurboC++‖,  PearsonEducation2003. |
| 2. | MariaLitvin&GrayLitvin,―C++foryou‖,Vikaspublication2002. |
| **WebResources** | |
| 1. | <https://alison.com/course/introduction-to-c-plus-plus-programming> |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **3** | **3** | **1** | **2** |
| **CO2** | **2** | **3** | **3** | **3** | **1** | **2** |
| **CO3** | **2** | **3** | **3** | **3** | **1** | **2** |
| **CO4** | **2** | **3** | **3** | **3** | **1** | **2** |
| **CO5** | **2** | **3** | **3** | **3** | **1** | **2** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 11 | 15 | 15 | 15 | 5 | 10 |

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

**SECONDYEAR**

**SemesterIII**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TitleoftheCourse/Paper** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **M**  **arks** | | |
| **CIA** | **External** | **Total** |
| **CC5** | **DATASTRUCTURESAND**  **ALGORITHMS** | Core | 5 | - | - | - | 4 | 5 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | TounderstandtheconceptsofADTs | | | | | | | | | | |
| LO2 | Tolearnlineardatastructures-lists,stacks,queues | | | | | | | | | | |
| LO3 | TolearnTreestructuresandapplicationoftrees | | | | | | | | | | |
| LO4 | Tolearngraphstruturesandandapplicationofgraphs | | | | | | | | | | |
| LO5 | Tounderstandvarioussortingandsearching | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | **No.of**  **Hours** | |
| I | Abstract Data Types (ADTs)- List ADT-array-based implementation-linked list implementationsingly linked lists-circular linked lists-doubly-linkedlists-applicationsoflists-PolynomialManipulation-Alloperations-Insertion-Deletion-Merge-Traversal | | | | | | | | | 15 | |
| II | StackADT-Operations-Applications-Evaluatingarithmeticexpressions  –Conversionofinfixtopostfixexpression-QueueADT-Operations-CircularQueue-PriorityQueue-deQueueapplicationsofqueues. | | | | | | | | | 15 | |
| III | TreeADT-treetraversals-BinaryTreeADT-expressiontrees-applications of trees-binary search tree ADT- Threaded Binary Trees-AVL Trees-B-Tree-B+Tree –Heap-Applicationsofheap. | | | | | | | | | 15 | |
| IV | Definition-RepresentationofGraph-Typesofgraph-Breadthfirsttraversal – Depth first traversal-Topological sort- Bi-connectivity – Cutvertex-Eulercircuits-Applicationsofgraphs. | | | | | | | | | 15 | |
| V | Searching- Linear search-Binary search-Sorting-Bubble sort-Selectionsort-Insertionsort-Shellsort-Radixsort-Hashing-Hashfunctions-Separatechaining-OpenAddressing-RehashingExtendibleHashing | | | | | | | | | 15 | |
|  | **Total** | | | | | | | | | **75** | |

|  |  |  |
| --- | --- | --- |
| **CourseOutcomes** | | **ProgrammemeOutcome** |
| CO | Oncompletionofthiscourse, studentswill |  |
| 1 | Understand the concept of Dynamic memorymanagement,datatypes, algorithms,BigOnotation | PO1,PO6 |
| 2 | Understandbasicdatastructuressuchasarrays,linked  lists,stacksandqueues | PO2 |
| 3 | Describethehashfunctionandconceptsofcollisionand  itsresolutionmethods | PO2,PO4 |
| 4 | Solveprobleminvolvinggraphs,treesandheaps | PO6,PO8 |
| 5 | Apply Algorithm for solving problems like sorting,searching,insertionanddeletionof data | PO7 |
| **TextBook** | | |
| 1 | 1.MarkAllenWeiss,―DataStructuresandAlgorithmAnalysisinC++‖,Pearson  Education2014,4thEdition. | |
| 2 | ReemaThareja,―DataStructuresUsingC‖,OxfordUniversitiesPress2014,2nd  Edition | |
| **ReferenceBooks** | | |
| 1. | ThomasH.Cormen,ChalesE.Leiserson,RonaldL.Rivest,CliffordStein,―Introduction to Algorithms‖,McGrawHill2009,3rdEdition. | |
| 2. | Aho,HopcroftandUllman,―DataStructuresandAlgorithms‖,PearsonEducation2003 | |
| **WebResources** | | |
| 1. | NPTEL&MOOCcoursestitledDataStructures | |
| 2. | https://nptel.ac.in/courses/106106127/ | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **3** | **-** | **1** | **-** |
| **CO2** | **1** | **2** | **1** | **-** | **-** | **-** |
| **CO3** | **3** | **1** | **2** | **1** | **-** | **-** |
| **CO4** | **2** | **2** | **1** | **-** | **-** | **1** |
| **CO5** | **3** | **1** | **1** | **-** | **-** | **-** |
| **Weightageofcourse**  **contributedtoeachPSO** | 12 | 9 | 8 | 1 | 1 | 1 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TitleoftheCourse/Paper** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **M**  **arks** | | |
| **CIA** | **External** | **Total** |
| **CC6** | **DATASTRUCTURESANDALGORITHMS**  **LABusingC++** | Core | - | - | 4 | - | 4 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | TounderstandtheconceptsofADTs | | | | | | | | | | |
| LO2 | Tolearnlineardatastructures-lists,stacks,queues | | | | | | | | | | |
| LO3 | TolearnTreestructuresandapplicationoftrees | | | | | | | | | | |
| LO4 | Tolearngraphstruturesandandapplicationofgraphs | | | | | | | | | | |
| LO5 | Tounderstandvarioussortingandsearching | | | | | | | | | | |
| **Sl.No** | **Details** | | | | | | | | | **No.of**  **Hours** | |
| 1. | Write aprogramtoimplementtheListADTusingarraysandlinked  lists. | | | | | | | | |  | |
| 2. | Writeaprogramstoimplementthefollowingusingasinglylinkedlist.   * StackADT * QueueADT | | | | | | | | |  | |
| 3. | Writeaprogramthatreadsaninfixexpression,convertstheexpression topostfixform andthenevaluatesthepostfixexpression  (usestackADT). | | | | | | | | |  | |
| 4. | WriteaprogramtoimplementpriorityqueueADT. | | | | | | | | |  | |
| 5. | Writeaprogramtoperformthefollowingoperations:   * Insertanelementintoa binary searchtree. * Deleteanelementfromabinarysearchtree. * Searchforakeyelementina binarysearchtree. | | | | | | | | |  | |
| 6. | Writeaprogramtoperformthefollowingoperations   * InsertionintoanAVL-tree * DeletionfromanAVL-tree | | | | | | | | |  | |

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| --- | --- | --- | --- |
| 7. | WriteaprogramsfortheimplementationofBFSandDFSforagivengraph. | |  |
| 8 | Writeaprogramsforimplementingthefollowingsearchingmethods:   * Linearsearch * Binarysearch. | |  |
| 9. | Writeaprogramsforimplementingthefollowingsortingmethods:   * Bubblesort * Selectionsort * Insertionsort * Radixsort. | |  |
|  | **Total** | |  |
| **CourseOutcomes** | | **ProgrammemOutcome** | |
| CO | Oncompletionofthiscourse, studentswill |  | |
| 1 | Understandtheconcept ofDynamicmemory  management,datatypes, algorithms, BigOnotation | PO1,PO4,PO5 | |
| 2 | Understand basic data structures such as arrays, linkedlists,stacksandqueues | PO1,PO4,PO8 | |
| 3 | Describethehashfunctionandconceptsofcollisionand  itsresolutionmethods | PO1,PO3,PO6 | |
| 4 | Solveprobleminvolvinggraphs,treesandheaps | PO3,PO4 | |
| 5 | Apply Algorithm for solving problems like sorting,searching,insertionanddeletionof data | PO1,PO5,PO6 | |
| **TextBook** | | | |
| 1 | MarkAllenWeiss,―DataStructuresandAlgorithmAnalysisinC++‖,Pearson Education2014,4th Edition. | | |
| 2 | ReemaThareja,―DataStructuresUsingC‖,OxfordUniversitiesPress2014,2nd  Edition | | |
| **ReferenceBooks** | | | |
| 1 | ThomasH.Cormen,ChalesE.Leiserson,RonaldL.Rivest,CliffordStein,―Introduction  to Algorithms‖,McGrawHill2009,3rdEdition | | |
| 2. | Aho,HopcroftandUllman,―DataStructuresandAlgorithms‖,PearsonEducation2003 | | |
| **WebResources** | | | |
| 1. | NPTEL&MOOCcoursestitledDataStructures | | |
| 2. | https://nptel.ac.in/courses/106106127/ | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **3** | **2** | **1** | **-** |
| **CO2** | **1** | **2** | **1** | **-** | **-** | **2** |
| **CO3** | **3** | **1** | **2** | **1** | **-** | **-** |
| **CO4** | **2** | **2** | **1** | **2** | **3** | **1** |
| **CO5** | **3** | **2** | **1** | **-** | **-** | **-** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 12 | 10 | 8 | 5 | 4 | 4 |

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

## SEMESTERIV

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
| **CC7** | **ProgrammingINJAVA** | Core | 5 | - | - | - | 4 | 5 | 25 | 75 | 100 |
| **CourseObjectives** | | | | | | | | | | | |
| LO1 | Toprovidefundamentalknowledgeofobject-orientedprogramming | | | | | | | | | | |
| LO2 | ToequipthestudentwithprogrammingknowledgeinCoreJavafromthebasicsup. | | | | | | | | | | |
| LO3 | ToenablethestudentstouseAWTcontrols,EventHandlingandSwingforGUI. | | | | | | | | | | |
| LO4 | Toprovidefundamentalknowledgeofobject-orientedprogramming. | | | | | | | | | | |
| LO5 | ToequipthestudentwithprogrammingknowledgeinCoreJavafromthebasicsup. | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No. ofHours** | | | | | |
| I | **Introduction:**ReviewofObjectOrientedconcepts-HistoryofJava-Javabuzzwords-JVMarchitecture-Datatypes-Variables-Scopeandlifetimeofvariables  -arrays-operators-controlstatements-typeconversionandcasting-simplejavaprogram-constructors-methods-Staticblock-StaticData-StaticMethodStringandStringBufferClasses. | | | | | | 15 | | | | | |
| II | **Inheritance**:Basic concepts - Types of inheritance -Member access rules- Usage of this and Super keyword-MethodOverloading-Methodoverriding-Abstract classes - Dynamic method dispatch - Usage offinalkeyword.  **Packages**:Definition-AccessProtection -ImportingPackages.  **Interfaces**:Definition–Implementation–Extending | | | | | | 15 | | | | | |

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| --- | --- | --- | --- |
|  | Interfaces.  **Exception Handling**: *try*–*catch*- *throw* - *throws*–*finally*–Built-inexceptions- Creatingown Exceptionclasses. |  | |
| III | **MultithreadedProgramming**:ThreadClass-Runnableinterface–Synchronization–Usingsynchronizedmethods– Using synchronized statement-InterthreadCommunication–Deadlock.  **I/OStreams:**Conceptsofstreams-Streamclasses-ByteandCharacterstream-ReadingconsoleInputandWritingConsoleoutput-FileHandling. | 15 | |
| IV | **AWTControls:**TheAWTclasshierarchy-userinterfacecomponents-Labels-Button-TextComponents - Check Box - Check Box Group - Choice -List Box - Panels – Scroll Pane - Menu - Scroll Bar.Working with Frame class - Colour - Fonts and layoutmanagers.  **EventHandling:**Events-Eventsources-EventListeners - Event Delegation Model (EDM) - HandlingMouse and Keyboard Events - Adapter classes - Innerclasses | 15 | |
| V | **Swing:**IntroductiontoSwing-Hierarchyofswingcomponents.Containers-Toplevelcontainers-JFrame-JWindow - JDialog - JPanel - JButton - JToggleButton -JCheckBox-JRadioButton-JLabel,JTextField-JTextArea-JList-JComboBox-JScrollPane. | 15 | |
|  | **Total** | **75** | |
| **CourseOutcomes** | | |
| **CourseOutcomes** | Oncompletionofthiscourse, studentswill; | |
| **CO1** | Understand the basic Object-orientedconcepts.ImplementthebasicconstructsofCoreJava. | PO1,PO2,PO6 |
| **CO2** | Implement inheritance, packages, interfaces and  exceptionhandlingofCoreJava. | PO2,PO3,PO8 |

|  |  |  |
| --- | --- | --- |
| **CO3** | Implement multi-threadingandI/OStreamsofCoreJava | PO1,PO3,PO7 |
| **CO4** | ImplementAWTandEventhandling. | PO2,PO6 |
| **CO5** | UseSwingtocreateGUI. | PO1,PO3,PO8 |
| **TextBooks:** | | |
| 1. | HerbertSchildt,The CompleteReference,TataMcGraw Hill,New Delhi,7thEdition,2010 | |
| 2. | GaryCornell,*CoreJava2VolumeI–Fundamentals,*AddisonWesley,1999 | |
| **References:** | | |
| 1. | HeadFirstJava,O‘RiellyPublications, | |
| 2. | Y.DanielLiang,*IntroductiontoJavaProgramming*,7thEdition,PearsonEducationIndia,2010 | |
| **WebResources** | | |
| 1. | https://javabeginnerstutorial.com/core-java-tutorial | |
| 2. | <http://docs.oracle.com/javase/tutorial/> | |
| 3. | https://[www.coursera.org/](http://www.coursera.org/) | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **-** | **2** | **2** | **2** |
| **CO2** | **3** | **1** | **2** | **1** | **2** | **2** |
| **CO3** | **1** | **-** | **2** | **2** | **2** | **2** |
| **CO4** | **2** | **2** | **2** | **2** | **2** | **2** |
| **CO5** | **1** | **2** | **-** | **2** | **2** | **2** |
| **Weightageofcourse**  **contributedtoeachPSO** | 10 | 7 | 6 | 9 | 10 | 10 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
| **CC8** | **Programminginjavalab** | Core | - | - | 4 | - | 4 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | Toprovidefundamentalknowledgeofobject-orientedprogramming. | | | | | | | | | | |
| LO2 | ToequipthestudentwithprogrammingknowledgeinCoreJavafromthebasicsup. | | | | | | | | | | |
| LO3 | ToenablethestudentstoknowaboutEventHandling. | | | | | | | | | | |
| LO4 | Toenablethe studentstouseStringConcepts. | | | | | | | | | | |
| LO5 | ToequipthestudentwithprogrammingknowledgeintocreatGUIusingAWTcontrols. | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | | |
| 1 | Writea Javaprogramthatpromptstheuserforanintegerandthen prints  outalltheprimenumbersuptothatInteger | | | | | | | | |  | |
| 2 | WriteaJavaprogramtomultiplytwogivenmatrices. | | | | | | | | |  | |
| 3 | WriteaJavaprogramthatdisplaysthenumberofcharacters,linesandwordsinatext | | | | | | | | |  | |
| 4 | GeneraterandomnumbersbetweentwogivenlimitsusingRandomclassandprintmessagesaccordingtotherangeofthevaluegenerated. | | | | | | | | |  | |
| 5 | WriteaprogramtodoStringManipulationusingCharacterArrayandperformthefollowingstringoperations:   1. Stringlength 2. Findingacharacterataparticularposition 3. Concatenatingtwostrings | | | | | | | | |  | |
| 6 | WriteaprogramtoperformthefollowingstringoperationsusingStringclass: | | | | | | | | |  | |

|  |  |  |
| --- | --- | --- |
|  | 1. StringConcatenation 2. Searchasubstring 3. Toextractsubstringfromgivenstring |  |
| 7 | WriteaprogramtoperformstringoperationsusingStringBufferclass:   1. Lengthofa string 2. Reverseastring 3. Deleteasubstringfromthegivenstring |  |
| 8 | Write a java program that implements a multi-thread application thathasthreethreads.Firstthreadgeneratesrandomintegerevery1 secondand if the value is even, second thread computes the square of thenumber and prints. If the value is odd, the third thread will print thevalueofcubeofthenumber. |  |
| 9 | Write a threading program which uses the same methodasynchronouslytoprintthenumbers1to10usingThread1andtoprint90to100 usingThread2. |  |
| 10 | Writeaprogramtodemonstratetheuseoffollowingexceptions.   1. ArithmeticException 2. NumberFormatException 3. ArrayIndexOutofBoundException 4. NegativeArraySizeException |  |
| 11 | Write a Java program that reads on file name from the user, thendisplays information about whether the file exists, whether the file isreadable,whetherthefileiswritable,thetypeoffileandthelengthofthefilein bytes |  |
| 12 | Writea programtoaccepta textandchangeitssizeandfont.Includebolditalicoptions.Useframesandcontrols. |  |

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| --- | --- | --- | --- |
| 13 | Write a Java program that handles all mouse events and shows theeventnameatthecenterofthewindowwhenamouseeventisfired.(Useadapterclasses). | |  |
| 14 | Write a Java program that works as a simple calculator. Use a gridlayouttoarrangebuttonsforthedigitsandforthe+,-,\*,%operations.Add a text field to display the result. Handle any possible exceptionslikedivideby zero. | |  |
| 15 | WriteaJavaprogramthatsimulatesatrafficlight.Theprogramletstheuser select one of three lights: red, yellow, or green with radio buttons.Onselectingabutton,anappropriatemessagewith―stop‖or―ready‖or  ―go‖shouldappearabovethebuttonsinaselectedcolor.Initiallythere isno messageshown. | |  |
|  | **Total** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcome** | |
| CO | Oncompletionofthiscourse,studentswill |  | |
| 1 | Understand the basic Object-orientedconcepts.Implementthebasicconstructs of CoreJava. | PO1 | |
| 2 | Implement inheritance, packages, interfaces and  exceptionhandlingofCoreJava. | PO1,PO2 | |
| 3 | Implementmulti-threadingandI/OStreamsofCore  Java | PO4,PO6 | |
| 4 | ImplementAWTandEventhandling. | PO4,PO5,PO6 | |
| 5 | UseSwingtocreateGUI. | PO3,PO8 | |
| **TextBook** | | | |
| 1 | HerbertSchildt,The Complete Reference,TataMcGrawHill,NewDelhi,7thEdition,2010. | | |
| 2. | GaryCornell,*CoreJava2VolumeI– Fundamentals,*AddisonWesley,1999. | | |
| **ReferenceBooks** | | | |
| 1. | HeadFirstJava,O‘RiellyPublications, | | |

|  |  |
| --- | --- |
| 2. | Y.DanielLiang,*IntroductiontoJavaProgramming*,7thEdition,PearsonEducationIndia,2010. |
| **WebResources** | |
| 1. | https://[www.w3schools.com/java/](http://www.w3schools.com/java/) |
| 2. | [http://java.sun.com](http://java.sun.com/) |
| 3. | <http://www.afu.com/javafaq.html> |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **1** | **3** | **2** | **3** |
| **CO2** | **3** | **2** | **1** | **3** | **1** | **3** |
| **CO3** | **3** | **2** | **1** | **3** | **2** | **3** |
| **CO4** | **3** | **2** | **1** | **3** | **2** | **3** |
| **CO5** | **3** | **2** | **1** | **3** | **2** | **3** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 15 | 10 | 5 | 15 | 9 | 15 |

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

**THIRDYEARSEMESTERV**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
| **CC9** | **OperatingSystems** | Core | 5 | - | - | - | | 4 | 5 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | UnderstandingthedesignoftheOperatingSystem | | | | | | | | | | | |
| LO2 | ImpartingknowledgeonCPUscheduling,ProcessandMemoryManagement. | | | | | | | | | | | |
| LO3 | Tocodespecializedprogramsformanagingoverallresourcesandoperationsofthecomputer. | | | | | | | | | | | |
| LO4 | TostudyabouttheconceptofJobandprocessorscheduling | | | | | | | | | | | |
| LO5 | Tolearnaboutteconceptofmemoryorganizationandmultiprogramming | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No.of**  **Hours** | | | | | |
|  | **Introduction**:operatingsystem,history(1990sto2000andbeyond),distributedcomputing,parallelcomputation.**Processconcepts:**definitionofprocess,processstates-Lifecycleofaprocess,processmanagement-processstatetransitions,processcontrol block(PCB), process operations , suspend andresume,contextswitching,Interrupts-Interruptprocessing,interruptclasses,Interprocesscommunication-signals,messagepassing. | | | | | | 15 | | | | | |
| II | **Asynchronousconcurrentprocesses:**mutualexclusion- critical section, mutual exclusion primitives,implementing mutual exclusion primitives, Peterson‘salgorithm,software solutions to the mutual ExclusionProblem-,n-threadmutualexclusion-LamportsBakery  Algorithm.Semaphores–MutualexclusionwithSemaphores,threadsynchronizationwithsemaphores, | | | | | | 15 | | | | | |

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| --- | --- | --- | --- |
|  | countingsemaphores,implementingsemaphores.  **Concurrent programming:** monitors, messagepassing | |  |
| III | **Deadlockandindefinitepostponement:**Resourceconcepts,fournecessaryconditionsfordeadlock,deadlockprevention,deadlockavoidanceandDijkstra‘sBanker‘salgorithm,deadlockdetection,deadlockrecovery. | | 15 |
| IV | **Jobandprocessorscheduling:**schedulinglevels,scheduling objectives, scheduling criteria, preemptivevsnon-preemptivescheduling,intervaltimerorinterruptingclock,priorities,schedulingalgorithms-FIFO scheduling, RR scheduling, quantum size, SJFscheduling,SRTscheduling,HRNscheduling,multilevelfeedbackqueues,Fairsharescheduling. | | 15 |
| V | **RealMemoryorganizationandManagement**:**:**Memory organization, Memory management, Memoryhierarchy, Memory management strategies, contiguousvsnon-contiguousmemoryallocation,singleusercontiguousmemoryallocation,fixedpartitionmultiprogramming, variable partitionmultiprogramming, Memoryswapping  **Virtual Memory organization:** virtual memory basicconcepts,multilevelstorageorganization,  block mapping, paging basic concepts, segmentation,paging/segmentationsystems.  **VirtualMemoryManagement:**Demand Paging,Pagereplacementstrategies | | 15 |
|  | **Total** | | **75** |
| **CourseOutcomes** | | **ProgrammeOutcomes** | | |
| CO | Oncompletionofthiscourse, studentswill |  | | |
| 1 | Define the fundamentals of OS and identifytheconceptsrelevanttoprocess,processlifecycle,Scheduling Algorithms, Deadlock and Memorymanagement | PO1 | | |
| 2 | knowthecriticalanalysisofprocessinvolvingvarious algorithms, an exposure to threads andsemaphores | PO1,PO2 | | |
| 3 | Have a complete study about Deadlock and itsimpact over OS. Knowledge of handling Deadlockwithrespective algorithms andmeasuresto retrievefromdeadlock.. | PO4,PO6 | | |
| 4 | HavecompleteknowledgeofSchedulingAlgorithmsanditstypes. | PO4,PO5,PO6 | | |
| 5 | understandmemoryorganizationandmanagement | PO3,PO8 | | |
| **TextBook** | | | | |
| 1 | H.M.Deitel,OperatingSystems*,*ThirdEdition,PearsonEducationAsia,2011 | | | |
| **ReferenceBooks** | | | | |
| 1. | WilliamStallings,OperatingSystem:InternalsandDesign Principles*,*SeventhEdition,  Prentice-HallofIndia,2012. | | | |
| 2. | A.Silberschatz, and P.B. Galvin.,OperatingSystems Concepts, Nineth Edition, JohnWiley&Sons(ASIA)PteLtd.,2012 | | | |
| **WebResources** | | | | |
| 1. |  | | | |
| 2. |  | | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **-** | **1** | **2** | **-** | **1** |
| **CO2** | **2** | **3** | **1** | **2** | **-** | **1** |
| **CO3** | **3** | **2** | **-** | **3** | **-** | **1** |
| **CO4** | **1** | **3** | **1** | **1** | **3** | **2** |
| **CO5** | **3** | **-** | **1** | **3** | **2** | **1** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 12 | 8 | 4 | 11 | 5 | 6 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | | |
| **CIA** | **External** | **Total** | |
| **CC10** | **ASP.Net**  **Programming** | Core | 5 | - | - | - | 4 | 5 | 25 | 75 | 100 | |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | To identify andunderstandthe goals andobjectives of the .NETframeworkandASP.NETwithC#language. | | | | | | | | | | | |
| LO2 | TodevelopASP.NETWebapplicationusingstandardcontrols. | | | | | | | | | | | |
| LO3 | Toimplementfilehandlingoperations. | | | | | | | | | | | |
| LO4 | TohandlesSQLServerDatabaseusingADO.NET. | | | | | | | | | | | |
| LO5 | UnderstandtheGridviewcontrolandXMLclasses. | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | **No. ofHours** | | | |
| I | Overviewof.NETframework:CommonLanguageRuntime(CLR),FrameworkClassLibrary-C#Fundamentals: Primitive types and Variables – Operators -Conditionalstatements-Loopingstatements –Creatingand  usingObjects–Arrays–Stringoperations. | | | | | | | 15 | | | |
| II | IntroductiontoASP.NET-IDE-LanguagessupportedComponents-WorkingwithWebForms–Webformstandardcontrols:Propertiesanditsevents–HTML  controls-ListControls:Propertiesanditsevents. | | | | | | | 15 | | | |
| III | RichControls:Propertiesanditsevents–validationcontrols: Properties and its events– File Stream classes -File Modes – File Share – Reading and Writing to files –Creating, Moving,Copying andDeletingfiles –Fileuploading. | | | | | | | 15 | | | |
| IV | ADO.NETOverview–DatabaseConnections–Commands  –DataReader-DataAdapter-DataSets-DataControlsand | | | | | | | 15 | | | |

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| --- | --- | --- | --- |
|  | itsProperties–DataBinding | |  |
| V | Grid View control: Deleting, editing, Sorting and Paging.XMLclasses–WebformtomanipulateXMLfiles-WebsiteSecurity-Authentication-Authorization–  CreatingaWebapplication. | | 15 |
|  | **Total** | | **75** |
| **CourseOutcomes** | | **ProgrammeOutcome** | |
| CO | Oncompletionofthiscourse, studentswill |  | |
| 1 | DevelopworkingknowledgeofC#programmingconstructsandthe.NETFramework | PO1,PO2,PO6 | |
| 2 | Todevelopa softwaretosolvereal-worldproblemsusingASP.NET | PO2,PO3,PO8 | |
| 3 | ToWorkOn VariousControlsFiles | PO1,PO3,PO7 | |
| 4 | TocreateawebapplicationusingMicrosoftADO.NET. | PO2,PO6 | |
| 5 | TodevelopwebapplicationsusingXML | PO1,PO3,PO8 | |
| **TextBook** | | | |
| 1 | SvetlinNakov,VeselinKolev&Co,FundamentalsofComputerProgrammingwithC#,Faberpublication,2019. | | |
| 2 | Mathew,MacDonald,TheCompleteReferenceASP.NET,TataMcGraw-Hill,2015. | | |
| **ReferenceBooks** | | | |
| 1. | HerbertSchildt,TheCompleteReferenceC#.NET,TataMcGraw-Hill,2017. | | |
| 2. | KogentLearningSolutions,C#2012ProgrammingCovers .NET4.5BlackBook,Dreamtechpres,2013. | | |
| 3. | AnneBoehm,JoelMurach,Murach‘sC#2015,MikeMurach&AssociatesInc.2016. | | |
| 4. | DenielleOtey,MichaelOtey,ADO.NET:TheCompletereference,McGrawHill,2008. | | |
| 5. | MatthewMacDonald,BeginningASP.NET4inC#2010,APRESS,2010. | | |
| **WebResources** | | | |
| 1. | https://[www.geeksforgeeks.org/introduction-to-net-framework/](http://www.geeksforgeeks.org/introduction-to-net-framework/) | | |
| 2. | https://[www.javatpoint.com/net-framework](http://www.javatpoint.com/net-framework) | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **1** | **2** | **2** | **1** | 3 |
| **CO2** | **3** | **2** | **2** | **2** | **2** | 3 |
| **CO3** | **3** | **3** | **2** | **2** | **3** | 3 |
| **CO4** | **3** | **1** | **2** | **2** | **1** | 3 |
| **CO5** | **3** | **1** | **2** | **2** | **1** | 2 |
| **Weightageofcoursecontributedtoeach**  **PSO** | 15 | 8 | 10 | 10 | 8 | 14 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
| **CC11** | **ASP.NetProgrammingLAB** | Core | - | - | 5 | - | | 4 | 5 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | TodevelopASP.NETWebapplicationusingstandardcontrols. | | | | | | | | | | | |
| LO2 | TocreaterichdatabaseapplicationsusingADO.NET. | | | | | | | | | | | |
| LO3 | Toimplementfilehandlingoperations. | | | | | | | | | | | |
| LO4 | ToimplementXMLclasses. | | | | | | | | | | | |
| LO5 | ToutilizeASP.NETsecurityfeaturesforauthenticatingthewebsite | | | | | | | | | | | |
| **Sl.No** | **Programs** | | | | | | | | | | | |
| 1. | CreateanexposureofWebapplicationsandtools | | | | | |  | | | | | |
| 2. | ImplementtheHtmlControls | | | | | |  | | | | | |
| 3. | ImplementtheServerControls | | | | | |  | | | | | |
| 4. | WebapplicationusingWebcontrols. | | | | | |  | | | | | |
| 5. | WebapplicationusingListcontrols. | | | | | |  | | | | | |
| 6. | Web Page design using Rich control. Validate userinputusingValidationcontrols.WorkingwithFileconcepts. | | | | | |  | | | | | |
| 7. | WebapplicationusingDataControls. | | | | | |  | | | | | |
| 8. | DatabindingwithWebcontrols | | | | | |  | | | | | |
| 9. | DatabindingwithDataControls. | | | | | |  | | | | | |
| 10. | Databaseapplicationtoperforminsert,updateanddeleteoperations. | | | | | |  | | | | | |
| 11. | Database application using Data Controls to  performinsert,delete,edit,pagingandsortingoperation. | | | | | |  | | | | | |

|  |  |  |
| --- | --- | --- |
| 12. | ImplementtheXmlclasses. |  |
| 13. | ImplementAuthentication–Authorization. |  |
| 14. | TicketreservationusingASP.NET controls. |  |
| 15. | OnlineexaminationusingASP.NETcontrols |  |
|  | **Total** |  |
| **CourseOutcomes** | | **ProgrammeOutcome** | |
| CO | Oncompletionofthiscourse, studentswill |  | |
| 1 | Tocreatewebapplicationsandimplementvariouscontrols | PO1,PO2,PO6 | |
| 2 | CreateawebpagesinRichcontrol. | PO3,PO8 | |
| 3 | Developknowledgeaboutfilehandlingoperations | PO1,PO4,PO8 | |
| 4 | AnabilitytodesignXMLclasses | PO2,PO6,PO7 | |
| 5 | Todevelopasoftwaretosolvereal-worldproblemsusingASP.NET | PO1,PO3,PO5,PO8 | |
| **TextBook** | | | |
| 1 | SvetlinNakov,VeselinKolev&Co,Fundamentalsof ComputerProgrammingwithC#,Faberpublication,2019. | | |
| 2 | Mathew,MacDonald,TheCompleteReferenceASP.NET,TataMcGraw-Hill,2015. | | |
| **ReferenceBooks** | | | |
| 1. | HerbertSchildt,TheCompleteReferenceC#.NET,TataMcGraw-Hill,2017. | | |
| 2. | KogentLearningSolutions,C#2012ProgrammingCovers.NET4.5BlackBook,  Dreamtechpres,2013. | | |
| 3. | AnneBoehm,JoelMurach,Murach‘sC#2015,MikeMurach&AssociatesInc.2016. | | |
| 4. | DenielleOtey,MichaelOtey,ADO.NET:TheCompletereference,McGrawHill,2008. | | |
| 5. | MatthewMacDonald,BeginningASP.NET4inC#2010,APRESS,2010. | | |
| **WebResources** | | | |
| 1. | https://[www.geeksforgeeks.org/introduction-to-net-framework/](http://www.geeksforgeeks.org/introduction-to-net-framework/) | | |
| 2. | https://[www.javatpoint.com/net-framework](http://www.javatpoint.com/net-framework) | | |

**MappingwithProgrammeOutcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **2** | **2** | **1** | 1 |
| **CO2** | **3** | **2** | **3** | **2** | **2** | 2 |
| **CO3** | **3** | **3** | **2** | **2** | **1** | 1 |
| **CO4** | **3** | **2** | **3** | **2** | **1** | 1 |
| **CO5** | **3** | **2** | **2** | **2** | **1** | 2 |
| **Weightageofcoursecontributedtoeach**  **PSO** | **15** | 11 | 12 | 10 | 6 | 7 |

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

**SEMESTERVI**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
| **CC13** | **ComputerNetworks** | CORE/  Elective | 5 | - | - | - | | 4 | 5 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | TounderstandtheconceptofDatacommunicationandComputernetwork | | | | | | | | | | | |
| LO2 | Togetaknowledge onroutingalgorithms. | | | | | | | | | | | |
| LO3 | Toimpart knowledge about networkingandinter networking devices | | | | | | | | | | | |
| LO4 | Tostudy aboutNetwork communication. | | | | | | | | | | | |
| LO5 | TolearntheconceptofTransportlayer | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | | **No.of**  **Hours** | |
| I | Introduction–NetworkHardware–Software–ReferenceModels–OSIand TCP/IP Models – Example Networks: Internet, ATM, Ethernet andWirelessLANs-PhysicalLayer–TheoreticalBasisforData  Communication-GuidedTransmissionMedia | | | | | | | | | | 15 | |
| II | WirelessTransmission-CommunicationSatellites–TelephoneSystem:Structure,LocalLoop,TrunksandMultiplexingandSwitching.Data  LinkLayer:DesignIssues–ErrorDetectionandCorrection. | | | | | | | | | | 15 | |
| III | Elementary Data Link Protocols - Sliding Window Protocols – DataLink Layer in the Internet - Medium Access Layer – Channel AllocationProblem–MultipleAccessProtocols–Bluetooth | | | | | | | | | | 15 | |
| IV | NetworkLayer-DesignIssues-RoutingAlgorithms-CongestionControlAlgorithms–IPProtocol–IPAddresses–InternetControl  Protocols. | | | | | | | | | | 15 | |
| V | TransportLayer-Services-ConnectionManagement-Addressing,  EstablishingandReleasingaConnection–SimpleTransportProtocol–InternetTransporetProtocols(ITP)-NetworkSecurity:Cryptography. | | | | | | | | | | 15 | |
|  | **Total** | | | | | | | | | | **75** | |
| **CourseOutcomes** | | | | | | | **ProgrammeOutcome** | | | | | |
| CO | Oncompletionofthiscourse,studentswill | | | | | |  | | | | | |
| 1 | ToUnderstand the basics of Computer Network  architecture,OSIandTCP/IPreference model | | | | | | PO1 | | | | | |

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| --- | --- | --- |
| 2 | Togain knowledge on Telephone systems using  wirelessnetwork | PO1,PO2 |
| 3 | TounderstandtheconceptofMAC | PO4,PO6 |
| 4 | Toanalyze the characteristics of Routing and  Congestioncontrolalgorithms | PO4,PO5,PO6 |
| 5 | Tounderstandnetworksecurityanddefinevarious  protocolssuchasFTP,HTTP,Telnet,DNS | PO3,PO8 |
| **TextBook** | | |
| 1 | A.S.Tanenbaum,―ComputerNetworks‖,4th Edition,Prentice-HallofIndia,2008. | |
| **ReferenceBooks** | | |
| 1. | B.A.Forouzan,―DataCommunicationsandNetworking‖,TataMcGrawHill,4th  Edition,2017 | |
| 2. | F. Halsall, ―DataCommunications, ComputerNetworksandOpen  Systems‖,PearsonEducation,2008 | |
| 3. | D.BertsekasandR.Gallagher,―DataNetworks‖,2ndEdition,PHI,2008. | |
| 4. | Lamarca,―CommunicationNetworks‖,TataMcGraw-Hill,2002 | |
| **WebResources** | | |
| 1. | <https://en.wikipedia.org/wiki/Computer_network> | |
| 2. | https://citationsy.com/styles/computer-networks | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **-** | **2** | **1** | **-** |
| **CO2** | **3** | **2** | **1** | **2** | **2** | **-** |
| **CO3** | **3** | **-** | **-** | **2** | **-** | **2** |
| **CO4** | **3** | **1** | **-** | **2** | **1** | **-** |
| **CO5** | **3** | **3** | **-** | **2** | **1** | **-** |
| **Weightageofcourse**  **contributedtoeachPSO** | 15 | 8 | 1 | 10 | 5 | 2 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
| **CC14** | **DATAANALYTICS**  **USINGRProgramming** | Core | 6 | - | - | - | | 4 | 6 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | Tounderstandtheproblemsolvingapproaches | | | | | | | | | | | |
| LO2 | TolearnthebasicprogrammingconstructsinRProgramming | | | | | | | | | | | |
| LO3 | TolearnthebasicprogrammingconstructsinRProgramming | | | | | | | | | | | |
| LO4 | TouseRProgrammingdata structures-lists,tuples,anddictionaries. | | | | | | | | | | | |
| LO5 | Todoinput/outputwithfilesinRProgramming. | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No.of**  **Hours** | | | | | |
| I | Evolution of Big data — Best Practices for Big dataAnalytics — Big data characteristics — Validating —The Promotion of the Value of Big Data — Big DataUse Cases- Characteristics of Big Data Applications —Perception and Quantification of Value -UnderstandingBig Data Storage —A General Overview of High-PerformanceArchitecture—HDFS— MapReduceandYARN— MapReduceProgrammingModel | | | | | | 18 | | | | | |
| II | CONTROLSTRUCTURESANDVECTORS-Control  structures,functions, scoping rules, dates and times,Introduction to Functions, preview of Some ImportantRDataStructures,Vectors,CharacterStrings,Matrices,Lists,DataFrames,ClassesVectors:Generatingsequences,Vectorsandsubscripts,Extractingelementsofavectorusingsubscripts,Workingwithlogicalsubscripts,Scalars,Vectors,Arrays,andMatrices,AddingandDeletingVectorElements,ObtainingtheLengthofaVector,Matrices  andArraysasVectorsVectorArithmeticandLogical | | | | | | 18 | | | | | |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Operations, Vector Indexing, Common VectorOperations | |  |
| III | LISTS- Lists: Creating Lists, General List Operations,ListIndexingAddingandDeletingListElements,Getting the Size of a List, Extended Example: TextConcordance Accessing List Components and ValuesApplyingFunctions to Lists, DataFrames, CreatingData Frames, Accessing Data Frames, Other Matrix-LikeOperations | | 18 |
| IV | FACTORSANDTABLES-FactorsandLevels,Common Functions Used with Factors, Working withTables,Matrix/Array-LikeOperationsonTables,Extracting a Sub table, Finding the Largest Cells in aTable,MathFunctions,CalculatingaProbability,Cumulative Sums and Products, Minima and Maxima,Calculus,FunctionsforStatisticalDistributionsRPROGRAMMING. | | 18 |
| V | OBJECT-ORIENTEDPROGRAMMINGSClasses,S  GenericFunctions,WritingSClasses,UsingInheritance,SClasses,WritingSClasses,ImplementingaGenericFunctiononanSClass,visualization,Simulation,codeprofiling,StatisticalAnalysiswithR,datamanipulation | | 18 |
|  | **Total** | | **90** |
| **CourseOutcomes** | | **ProgrammeOutcomes** | | |
| CO | Oncompletionofthiscourse, studentswill |  | | |
| 1 | Work withbigdatatoolsanditsanalysistechniques. | PO1 | | |
| 2 | Analyzedatabyutilizingclusteringandclassificationalgorithms. | PO1,PO2 | | |

|  |  |  |
| --- | --- | --- |
| 3 | Learnandapplydifferentminingalgorithmsandrecommendationsystemsforlargevolumesofdata. | PO4,PO6 |
| 4 | Performanalyticsondatastreams. | PO4,PO5,PO6 |
| 5 | LearnNoSQLdatabasesandmanagement. | PO3,PO8 |
| **TextBook** | | |
| 1 | RogerD.Peng,‖RProgrammingforDataScience―,2012 | |
| 2 | NormanMatloff,‖TheArtofRProgramming-ATourofStatisticalSoftware Design‖,  2011 | |
| **ReferenceBooks** | | |
| 1. | 1.GarrettGrolemund,HadleyWickham,‖Hands-OnProgrammingwithR:WriteYourOwnFunctionsand Simulations‖, 1stEdition,2014 | |
| 2. | Venables,W.N.,andRipley,‖Sprogramming―,Springer,2000. | |
| **WebResources** | | |
| 1. | [https://www.simplilearn.com](https://www.simplilearn.com/) | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **-** | **3** | **1** | **-** |
| **CO2** | **3** | **3** | **2** | **2** | **-** | **2** |
| **CO3** | **1** | **2** | **3** | **1** | **2** | **1** |
| **CO4** | **2** | **2** | **1** | **-** | **2** | **1** |
| **CO5** | **2** | **2** | **2** | **1** | **3** | **1** |
| **Weightageofcourse**  **contributedtoeachPSO** | 11 | 11 | 8 | 7 | 8 | 5 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **M**  **arks** | | |
| **CIA** | **External** | **Total** |
| **CC15** | **RProgramming-LAB** | Core | - | - | 5 | - | 4 | 5 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | Tounderstandtheproblemsolvingapproaches | | | | | | | | | | |
| LO2 | TolearnthebasicprogrammingconstructsinRProgramming | | | | | | | | | | |
| LO3 | TopracticevariouscomputingstrategiesforRProgramming-basedsolutionstorealworldproblems | | | | | | | | | | |
| LO4 | TouseRProgrammingdata structures-lists,tuples,anddictionaries. | | | | | | | | | | |
| LO5 | Todoinput/outputwithfilesinRProgramming. | | | | | | | | | | |
| **Sl.No** | **Details** | | | | | | | | | | |
| 1. | ProgramtoconvertthegiventemperaturefromFahrenheittoCelsiusandviceversadepending  uponuser‘schoice. | | | | | | | | |  | |
| 2. | Program,to find the areaof rectangle,square,circle and triangle byacceptingsuitableinput  parametersfromuser. | | | | | | | | |  | |
| 3. | Writeaprogramtofindlist ofevennumbersfrom1tonusingR-Loops. | | | | | | | | |  | |
| 4. | Createa functiontoprintsquaresofnumbersinsequence. | | | | | | | | |  | |
| 5. | Writeaprogramtojoincolumnsandrowsinadata frameusingcbind()andrbind()in R. | | | | | | | | |  | |
| 6. | ImplementdifferentStringManipulationfunctionsinR. | | | | | | | | |  | |
| 7. | ImplementdifferentdatastructuresinR(Vectors,Lists,DataFrames) | | | | | | | | |  | |

|  |  |  |  |
| --- | --- | --- | --- |
| 8 | WriteaprogramtoreadacsvfileandanalyzethedatainthefileinR. | |  |
| 9 | CreatepiechartandbarchartusingR. | |  |
| 10 | 10.Createadata setanddostatisticalanalysisonthedatausingR. | |  |
| 11 | Programtofindfactorialofthegivennumberusingrecursivefunction | |  |
| 12 | **WriteaRprogramtocountthenumberofevenandoddnumbersfromarray ofNnumbers.** | |  |
|  | **Total** | |  |
| **CourseOutcomes** | | **ProgrameOutcome** | |
| CO | Oncompletionofthiscourse, studentswill |  | |
| 1 | AcquireprogrammingskillsincoreR  Programming | PO1,PO4,PO5 | |
| 2 | AcquireObject-orientedprogrammingskills  inRProgramming. | PO1,PO4,PO8 | |
| 3 | Developtheskillofdesigninggraphical-user  interfaces(GUI)inRProgramming | PO1,PO3,PO6 | |
| 4 | AcquireRProgrammingskillstomoveinto  specificbranches | PO3,PO4 | |
| 5 |  | PO1,PO5,PO6 | |
| **TextBook** | | | |
| 1 | RogerD.Peng,‖RProgrammingforDataScience―,2012 | | |
| 2 | NormanMatloff,‖TheArtofRProgramming-A TourofStatisticalSoftwareDesign‖,  2011 | | |
| **ReferenceBooks** | | | |
| 1 | GarrettGrolemund,Hadley Wickham,‖Hands-OnProgrammingwith R:Write YourOwn Functionsand Simulations‖,1stEdition,2014 | | |
| 2. | Venables,W.N.,andRipley,‖Sprogramming―,Springer,2000. | | |
| **WebResources** | | | |
| 1. | [https://www.simplilearn.com](https://www.simplilearn.com/) | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **3** | **3** | **1** | **2** |
| **CO2** | **2** | **3** | **3** | **3** | **1** | **2** |
| **CO3** | **2** | **3** | **3** | **3** | **1** | **2** |
| **CO4** | **2** | **3** | **3** | **3** | **1** | **2** |
| **CO5** | **2** | **3** | **3** | **3** | **1** | **2** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 11 | 15 | 15 | 15 | 5 | 10 |

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

# Annexure - I

# SuggestedtopicsinCorecomponent

* 1. MicroprocessorandMicrocontroller
  2. MicroprocessorandMicrocontrollerLab
  3. RDBMSwithPL/SQL
  4. PL/SQLLab
  5. SoftwareEngineering
  6. MachineLearning
  7. MachineLearningLab
  8. NetworkSecurity
  9. DataMiningandWarehousing
  10. MobileApplicationDevelopment
  11. MobileApplicationDevelopmentLab
  12. IntroductiontoDataScienceandmore..

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | | **Inst.Hours** | **Marks** | | | |
| **CIA** | **External** | **Total** | |
|  | | **MicroprocessorandMicrocontroller** |  | 5 | - | - | - | 4 | | 5 | 25 | 75 | 100 | |
| **CourseObjective** | | | | | | | | | | | | | | |
| LO1 | | TointroducetheinternalorganizationofIntel8085Microprocessor. | | | | | | | | | | | | |
| LO2 | | Toknowaboutvariousinstructionsetsandclassifictions | | | | | | | | | | | | |
| LO3 | | Toenablethe studentstowriteassemblylanguageprogramsusing8085. | | | | | | | | | | | | |
| LO4 | | Tointerfacetheperipheraldevicesto8085usingInterrruptcontrollerandDMAinterface. | | | | | | | | | | | | |
| LO5 | | Toprovidereal-lifeapplicationsusingmicrocontroller. | | | | | | | | | | | | |
| **UNIT** | | **Details** | | | | | | | | | | **No.of**  **Hours** | |
| I | | DigitalComputers-MicrocomputerOrganization-Computerlanguages  –MicroprocessorArchitectureanditsoperations–Microprocessorinitiated operations and 8085 Bus organization – Internal Data  operations and 8085 registers - Peripheral or External initiated | | | | | | | | | | 15 | |
|  | | operations. | | | | | | | | | |  | |
| II | | 8085Microprocessor–PinoutandSignals–Functionalblockdiagram  -8085InstructionSetandClassifications. | | | | | | | | | | 15 | |
| III | | BCD to Binary and Binary to BCD conversions - ASCII to BCD andBCD to ASCII conversions - Binary to ASCII and ASCII to Binaryconversions.BCDArithmetic-BCDadditionandSubtraction-  MultibyteAdditionandSubtraction-MultiplicationandDivision. | | | | | | | | | | 15 | |
| IV | | The8085Interrupts –RIMANDSIM instructions-8259Programmable  InterruptController-DirectMemoryAccess(DMA)and8257DMAcontroller. | | | | | | | | | | 15 | |
| V | | Introduction to Microcontroller - Microcontroller Vs Microprocessor -8051 Microcontroller architecture -8051 pin description.Timers andCounters–OperatingModes-ControlRegisters.Interrupts–Interrupts  in8051-InterruptsControlRegister–Executionofinterrupt. | | | | | | | | | | 15 | |
|  | | **Total** | | | | | | | | | | **75** | | |
| **CourseOutcomes** | | | | | | | | | **ProgrammemeOutcomea** | | | | | |
| CO | Oncompletionofthiscourse, studentswill | | | | | | | |  | | | | | |
| 1 | RemembertheBasicbinarycodesandtheirconversions.Binary concepts are used inMicroprocessorprogramming and provide a good understanding of thearchitectureof8085ointroducetheinternalorganization  ofIntel8085Microprocessor.. | | | | | | | | Po1 | | | | | |
| 2 | Understanding the8085instruction set and theirclassifications,enablesthe studentstowritethe programs  easilyontheir ownusingdifferentlogic | | | | | | | | Po1,Po2 | | | | | |
| 3 | Applying different types of instructions to convert binarycodes and analyzing the outcome. The instruction set isappliedtodevelopprogramsonmultibytearithmetic  operations. | | | | | | | | Po4,Po6 | | | | | |
| 4 | Analyzehowperipheraldevicesareconnectedto8085  usingInterruptsandDMAcontroller. | | | | | | | | Po4,Po5,Po6 | | | | | |
| 5 | Anexposuretocreaterealtimeapplicationsusing | | | | | | | | Po3,Po8 | | | | | |
|  | microcontroller. | | | | | | | |  | | | | | |
| **TextBook** | | | | | | | | | | | | | | |
| 1 | R.S.Gaonkar-"MicroprocessorArchitecture-ProgrammingandApplicationswith  8085"-5thEdition-PenramInternationalPublications,2009.[ForunitItounitIV] | | | | | | | | | | | | | |
| 2 | SoumitraKumarMandal-―MicroprocessorsandMicrocontrollers–Architectures, ProgrammingandInterfacingusing8085,8086,8051‖,TataMcGrawHillEducation  PrivateLimited.[forunitV]. | | | | | | | | | | | | | |
| **ReferenceBooks** | | | | | | | | | | | | | | |
| 1. | Mathur-―IntroductiontoMicroprocessor‖-3rdEdition-TataMcGraw-Hill-1993. | | | | | | | | | | | | | |
| 2. | RajKamal-―Microcontrollers:Architecture,Programming,InterfacingandSystem  Design‖,PearsonEducation,2005. | | | | | | | | | | | | | |
| 3. | KrishnaKant,―MicroprocessorsandMicrocontrollers–Architectures,Programming  andSystemDesign8085,8086,8051,8096‖,PHI,2008 | | | | | | | | | | | | | |
| **WebResources** | | | | | | | | | | | | | | |
| 1. | WebresourcesfromNDLLibrary,E-contentfromopensourcelibraries | | | | | | | | | | | | | |
| 2. | [https://www.bing.com/](https://www.bing.com/search?q=open%2Bsource%2BSTUDY%2BNOTES&qs=n&form=QBRE&sp=-1&pq=open%2Bsource%2Bstudy%2Bnotes&sc=8-23&sk&cvid=B56C9B9082BD4543B5424F5D24AC1E44&ghsh=0&ghacc=0&ghpl) | | | | | | | | | | | | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **1** | **1** | **3** | **3** | **-** |
| **CO2** | **2** | **3** | **1** | **1** | **1** | **1** |
| **CO3** | **3** | **2** | **1** | **3** | **3** | **-** |
| **CO4** | **3** | **3** | **1** | **2** | **3** | **-** |
| **CO5** | **1** | **1** | **1** | **3** | **2** | **1** |
| **Weightageofcourse**  **contributedtoeachPSO** | 12 | 10 | 5 | 12 | 12 | 2 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | | |
| **CIA** | **External** | **Total** | |
|  | **Microprocessor andmicrocontrollerLab** |  | - | - | 4 | - | 4 | 4 | 25 | 75 | 100 | |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | TointroducetheinternalorganizationofIntel8085Microprocessor. | | | | | | | | | | | |
| LO2 | Toknowaboutvariousinstructionsetsandclassifictions | | | | | | | | | | | |
| LO3 | Toenablethe studentstowriteassemblylanguageprogramsusing8085. | | | | | | | | | | | |
| LO4 | Tointerfacetheperipheraldevicesto8085usingInterrruptcontrollerandDMAinterface. | | | | | | | | | | | |
| LO5 | Toprovidereal-lifeapplicationsusingmicrocontroller. | | | | | | | | | | | |
|  | **Details** | | | | | | | | | **No. ofHours** | |
|  | **ListofExercises:** | | | | | | | | |  | |
|  | AdditionandSubtraction   1. 8-bitaddition 2. 16-bitaddition 3. 8-bitsubtraction 4. BCDsubtraction 5. MultiplicationandDivision    1. 8-bitmultiplication    2. BCDmultiplication    3. 8-bitdivision 6. SortingandSearching    1. Searchingforanelementinanarray.    2. SortinginAscendingandDescendingorder.    3. Findingthelargestandsmallestelementsinanarray.    4. Reversingarrayelements.    5. Blockmove. | | | | | | | | |  | |

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|  | | 1. CodeConversion    1. BCDtoHexandHextoBCD    2. BinarytoASCIIandASCIItobinary    3. ASCIItoBCDandBCDtoASCII 2. Simpleprogramson8051Microcontroller    1. Addition    2. Subtraction    3. Multiplication    4. Division    5. InterfacingExperimentsusing8051       1. RealisationofBooleanExpressionthroughports.       2. Timedelaygenerationusingsubroutines.       3. DisplayLEDsthroughports | |  |
|  | | **Total** | | **60** | |
| **CourseOutcomes** | | | **ProgrammemeOutcomea** | | |
| CO | Oncompletionofthiscourse, studentswill | |  | | |
| 1 | RemembertheBasicbinarycodesandtheirconversions.Binary concepts are used inMicroprocessorprogramming and provide a good understanding of thearchitectureof8085ointroducetheinternalorganization  ofIntel8085Microprocessor.. | | Po1 | | |
| 2 | Understandingthe8085instructionsetandtheir  classifications,enablesthestudentstowritetheprogramseasilyontheir ownusingdifferentlogic | | Po1,Po2 | | |
| 3 | Applying different types of instructions to convert binarycodes and analyzing the outcome. The instruction set isappliedtodevelopprogramsonmultibytearithmetic  operations. | | Po4,Po6 | | |
| 4 | Analyzehowperipheraldevicesare connectedto8085  usingInterruptsandDMAcontroller. | | Po4,Po5,Po6 | | |
| 5 | Anexposuretocreaterealtimeapplicationsusing | | Po3,Po8 | | |

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| --- | --- | --- |
|  | microcontroller. |  |
| **TextBook** | | |
| 1 | R.S.Gaonkar-"MicroprocessorArchitecture-ProgrammingandApplicationswith  8085"-5thEdition-PenramInternationalPublications,2009.[ForunitItounitIV] | |
| 2 | SoumitraKumarMandal-―MicroprocessorsandMicrocontrollers–Architectures, ProgrammingandInterfacingusing8085,8086,8051‖,TataMcGrawHillEducation  PrivateLimited.[forunitV]. | |
| **ReferenceBooks** | | |
| 1. | Mathur-―IntroductiontoMicroprocessor‖-3rdEdition-TataMcGraw-Hill-1993. | |
| 2. | RajKamal-―Microcontrollers:Architecture,Programming,InterfacingandSystem  Design‖,PearsonEducation,2005. | |
| 3. | KrishnaKant,―MicroprocessorsandMicrocontrollers–Architectures,Programming  andSystemDesign8085,8086,8051,8096‖,PHI,2008 | |
| **WebResources** | | |
| 1. | WebresourcesfromNDLLibrary,E-contentfromopensourcelibraries | |
| 2. | [https://www.bing.com/](https://www.bing.com/search?q=open%2Bsource%2BSTUDY%2BNOTES&qs=n&form=QBRE&sp=-1&pq=open%2Bsource%2Bstudy%2Bnotes&sc=8-23&sk&cvid=B56C9B9082BD4543B5424F5D24AC1E44&ghsh=0&ghacc=0&ghpl) | |

**MappingwithProgrammeOutcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **1** | **1** | **3** | **3** | **-** |
| **CO2** | **2** | **3** | **1** | **1** | **1** | **1** |
| **CO3** | **3** | **2** | **1** | **3** | **3** | **-** |
| **CO4** | **3** | **3** | **1** | **2** | **3** | **-** |
| **CO5** | **1** | **1** | **1** | **3** | **2** | **1** |
| **Weightageofcourse**  **contributedtoeachPSO** | 12 | 10 | 5 | 12 | 12 | 2 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **RDBMSwithPL\SQL** | Core | 5 | - | - | - | | 4 | 5 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | Describebasicconceptsofdatabasesystem | | | | | | | | | | | |
| LO2 | DesignaData modelandSchemasinRDBMS | | | | | | | | | | | |
| LO3 | CompetentinuseofSQL | | | | | | | | | | | |
| LO4 | AnalyzefunctionaldependenciesfordesigningrobustDatabase | | | | | | | | | | | |
| LO5 | Describebasicconceptsofdatabasesystem | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | | **No. ofHours** | |
| I | UNIT -I  Introduction to DBMS– Data and Information - Database – DatabaseManagementSystem–Objectives-Advantages–Components-Architecture. ER Model: Building blocks of ER Diagram – RelationshipDegree–Classification–ERdiagramtoTables–ISArelationship–  Constraints–AggregationandComposition–Advantages | | | | | | | | | | 15 | |
| II | RelationalModel:CODD‘sRule-RelationalDataModel-Key-Integrity–RelationalAlgebraOperations–Advantagesandlimitations–Relational  Calculus– DomainRelationalCalculus - QBE. | | | | | | | | | | 15 | |
| III | Structure of Relational Database. Introduction to Relational DatabaseDesign-Objectives–Tools–RedundancyandDataAnomaly–FunctionalDependency-Normalization–1NF–2NF–3NF–BCNF.  TransactionProcessing–Database Security. | | | | | | | | | | 15 | |
| IV | UNIT-IV  SQL:Commands–Datatypes–DDL-Selection,Projection,JoinandSet  Operations–AggregateFunctions–DML–Modification-Truncation-Constraints–Subquery. | | | | | | | | | | 15 | |
| V | UNIT -V  PL/SQL:Structure-Elements–OperatorsPrecedence–ControlStructure–IterativeControl-Cursors-Procedure-Function-Packages–Exceptional  Handling-Triggers. | | | | | | | | | | 15 | |
|  | **Total** | | | | | | | | | | **75** | |
| **CourseOutcomes** | | | | | | | **ProgrammeOutcome** | | | | | |
| CO | Oncompletionofthiscourse, studentswill | | | | | |  | | | | | |
| 1 | Understandbasicconceptsofdatabasesystem | | | | | | PO1 | | | | | |
| 2 | DesignaData modelandSchemasinRDBMS | | | | | | PO1,PO2 | | | | | |
| 3 | UnderstandCompetentinuseofSQL | | | | | | PO4,PO6 | | | | | |

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| 4 | Analyzefunctional dependencies for designing  robustDatabase | PO4,PO5,PO6 |
| 5 | Understandbasicconceptsofdatabasesystem | PO3,PO8 |
| **TextBook** | | |
| 1 | TEXTBOOK:  1.S.Sumathi,S.Esakkirajan,―FundamentalsofRelationalDatabaseManagement  System‖,SpringerInternationalEdition2007. | |
| **ReferenceBooks** | | |
| 1. | REFERENCEBOOKS: | |
| 2. | 1.AbrahamSilberchatz,HenryF.Korth,S.Sudarshan,―DatabaseSystemConcepts‖, McGrawHill2019,7thEdition. | |
| 3. | 2.AlexisLeon&MathewsLeon,―FundamentalsofDBMS‖,VijayNicolePublications 2014,2ndEdition. | |
| **WebResources** | | |
| 1. | NPTEL&MOOCcoursestitledRelationalDatabaseManagementSystems | |
| 2. | https://nptel.ac.in/courses/106106093/ | |
| 3. | https://nptel.ac.in/courses/106106095/ | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **1** | **3** | **-** | **-** |
| **CO2** | **-** | **-** | **1** | **-** | **2** | **2** |
| **CO3** | **3** | **2** | **1** | **3** | **-** | **-** |
| **CO4** | **3** | **-** | **1** | **-** | **2** | **2** |
| **CO5** | **3** | **2** | **1** | **3** | **2** | **2** |
| **Weightageofcourse**  **contributedtoeachPSO** | 12 | 6 | 5 | 9 | 6 | 6 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **PL/SQLLab** | Core | 4 | - | - | - | | | 4 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | | |
| LO1 | Toenablethestudentstolearnthedesigningofdatabasesystems,foundationonthe  relationalmodelofdataandnormalforms. | | | | | | | | | | | | |
| LO2 | Tounderstoodtheconceptsofdatabasemanagementsystem,designsimpleDatabase  models | | | | | | | | | | | | |
| LO3 | TolearnandunderstandtowritequeriesusingSQL,PL/SQL. | | | | | | | | | | | | |
| LO4 | Toenablethestudentstolearnthedesigningofdatabasesystems,foundationonthe  relationalmodelofdataandnormalforms. | | | | | | | | | | | | |
| LO5 | Tounderstoodtheconceptsofdatabasemanagementsystem,designsimpleDatabase  models | | | | | | | | | | | | |
|  | **ListofExercises:** | | | | | | | **No.of**  **Hours** | | | | | |
| II | 1. ***SQL***    1. DDLCOMMANDS    2. DMLCOMMANDS    3. TCLCOMMANDS 2. ***PL/SQL*** 3. FIBONACCISERIES 4. FACTORIAL 5. STRING REVERSE 6. SUMOFSERIES 7. TRIGGER   ***III.CURSOR***  9.STUDENT MARK ANALYSIS USINGCURSOR | | | | | | |  | | | | | |
|  | 1. ***APPLICATION***    1. LIBRARYMANAGEMENTSYSTEM    2. STUDENTMARKANALYSIS | | | | | | |  | | | | | |
|  | **Total** | | | | | | | 60 | | | | | |
| **CourseOutcomes** | | | | | | | **ProgrammeOutcomes** | | | | | | | |
| CO | Oncompletionofthiscourse, studentswill | | | | | |  | | | | | | | |
| 1 | Understand thevarious basicconcepts of DataBaseSystem.DifferencebetweenfilesystemandDBMS  andcomparevariousdatamodels. | | | | | | PO1 | | | | | | | |
| 2 | Definetheintegrityconstraints.UnderstandthebasicconceptsofRelationalDataModel,Entity-  RelationshipModel. | | | | | | PO1,PO2 | | | | | | | |
| 3 | Design database schema considering normalizationand relationships within database. Understand andconstructdatabaseusingStructured Query Language.Attain a good practical skill of managing andretrievingofdatausingDataManipulationLanguage  (DML) | | | | | | PO4,PO6 | | | | | | | |
| 4 | Classifythedifferentfunctionsandvariousjoin  operations andenhance the knowledgeofhandlingmultipletables. | | | | | | PO4,PO5,PO6 | | | | | | | |
| 5 | LearntodesignDatabaseoperationsandimplementusing PL/SQL programs. Learn basics of PL/SQLanddevelopprogramsusingCursors,Exceptions | | | | | | PO3,PO8 | | | | | | | |
| **TextBook** | | | | | | | | | | | | | | |
| 1 | Coronel,Morris,Rob,"DatabaseSystems,Design, ImplementationandManagement",  NinthEdition | | | | | | | | | | | | | |
| 2 | NileshShah,"DatabaseSystemsUsingOracle",2ndedition,PearsonEducationIndia,  2016 | | | | | | | | | | | | | |
| **ReferenceBooks** | | | | | | | | | | | | | | |
| 1. | Abraham Silberschatz, Henry F.Korth and S.Sudarshan,―Database System  Concepts‖,McGrawHillInternationalPublication,VIEdition | | | | | | | | | | | | | |
| 2. | ShioKumarSingh,―DatabaseSystems―,Pearsonpublications,IIEdition | | | | | | | | | | | | | |

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| **WebResources** | |
| 1. | WebresourcesfromNDLLibrary,E-contentfromopen-sourcelibraries |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **3** | **3** | **1** | **2** |
| **CO2** | **2** | **3** | **3** | **3** | **1** | **2** |
| **CO3** | **2** | **3** | **3** | **3** | **1** | **2** |
| **CO4** | **2** | **2** | **2** | **3** | **1** | **2** |
| **CO5** | **2** | **3** | **3** | **3** | **1** | **2** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 11 | 14 | 14 | 15 | 5 | 10 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **SoftwareEngineering** | Core | 5 | - | - | - | 4 | 5 | 25 | 75 | 100 |
| **CourseObjectives** | | | | | | | | | | | |
| LO1 | Gainbasicknowledgeofanalysisanddesignofsystems | | | | | | | | | | |
| LO2 | Abilitytoapplysoftwareengineeringprinciplesandtechniques | | | | | | | | | | |
| LO3 | Modelareliableandcost-effectivesoftwaresystem | | | | | | | | | | |
| LO4 | Abilitytodesignaneffectivemodelofthesystem | | | | | | | | | | |
| LO5 | PerformTestingatvariouslevelsandproduceanefficientsystem. | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No. ofHours** | | | | | |
| I | **Introduction**:Thesoftwareengineeringdiscipline,programsvs.softwareproducts,whystudysoftwareengineering,emergenceofsoftwareengineering,Notablechangesinsoftwaredevelopmentpractices,computersystemsengineering.  **SoftwareLifeCycleModels**:Whyusealifecyclemodel,Classicalwaterfallmodel,iterativewaterfallmodel,prototypingmodel,evolutionarymodel,spiralmodel,comparisonofdifferentlifecyclemodels. | | | | | | 15 | | | | | |
| II | **RequirementsAnalysisandSpecification:**Requirementsgatheringandanalysis,Softwarerequirementsspecification(SRS)  **Software Design**: Good software design, cohesion andcoupling, neat arrangement, software design approaches,object-orientedvsfunction-orienteddesign | | | | | | 15 | | | | | |

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| III | **Function-OrientedSoftwareDesign:**OverviewofSA/SDmethodology,structuredanalysis,dataflowdiagrams(DFD‘s),structureddesign,detaileddesign.**User-Interface design:** Characteristics of a goodinterface;basicconcepts;typesofuserinterfaces;componentbasedGUIdevelopment,auserinterfacemethodology. | 15 | |
| IV | **CodingandTesting:**Coding;codereview;testing;testing in the large vs testing in the small; unit testing;black-boxtesting;white-boxtesting;debugging;programanalysis tools; integration testing; system testing; somegeneralissuesassociatedwithtesting.**SoftwareReliabilityandQualityManagement:**Softwarereliability; statistical testing; software quality; softwarequalitymanagementsystem;SEIcapabilitymaturitymodel; personalsoftwareprocess. | 15 | |
| V | **ComputerAidedSoftwareEngineering:**CASEanditsscope; CASE environment; CASE support in softwarelife cycle; other characteristics of CASE tools; towardssecond generation CASE tool; architecture of a CASEenvironment. **Software Maintenance:** Characteristic ofsoftware maintenance; software reverseengineering;softwaremaintenanceprocessmodels;estimationofmaintenancecost; | 15 | |
|  | **Total** | **75** | |
| **CourseOutcomes** | | |
| **CourseOutcomes** | Oncompletionofthiscourse,studentswill; | |
| **CO1** | Gainbasicknowledgeofanalysisanddesignofsystems | PO1 |

|  |  |  |
| --- | --- | --- |
| **CO2** | Abilitytoapplysoftwareengineeringprinciplesand  techniques | PO1,PO2 |
| **CO3** | Modelareliableandcost-effectivesoftwaresystem | PO4,PO6 |
| **CO4** | Abilitytodesignaneffectivemodelofthe system | PO4,PO5,PO6 |
| **CO5** | PerformTestingatvariouslevelsandproduceanefficientsystem. | PO3,PO8 |
| **TextBooks** | | |
| 1. | RajibMall, FundamentalsofSoftwareEngineering,FifthEdition,Prentice-HallofIndia,2018 | |
| **ReferencesBooks** | | |
| 1. | RichardFairley,SoftwareEngineeringConcepts*,*TataMcGraw-Hill  publishingcompanyLtd,Edition1997 | |
| 2. | RogerS.Pressman,SoftwareEngineering,SeventhEdition,McGraw-Hill*.* | |
| 3. | JamesA.Senn,Analysis&Designof InformationSystems, SecondEdition,McGraw-HillInternationalEditions. | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **3** | **2** | **1** | **-** |
| **CO2** | **3** | **-** | **1** | **-** | **-** | **2** |
| **CO3** | **1** | **2** | **3** | **2** | **2** | **1** |
| **CO4** | **3** | **-** | **2** | **2** | **-** | **1** |
| **CO5** | **1** | **2** | **3** | **3** | **1** | **1** |
| **Weightageofcourse**  **contributedtoeachPSO** | 11 | 6 | 12 | 9 | 4 | 5 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | | | |
| **CIA** | | **External** | | **Total** |
|  | **MACHINELEARNINGTECHNIQUES** | Core | 5 | - | - | - | 4 | 25 | | 75 | | 100 |
| **LearningObjectives** | | | | | | | | | | | | |
| LO1 | ToLearnaboutMachineIntelligenceandMachineLearningapplications | | | | | | | | | | | |
| LO2 | Toimplementandapplymachinelearningalgorithmstoreal-worldapplications | | | | | | | | | | | |
| LO3 | Toidentifyandapplytheappropriatemachinelearningtechniquetoclassification,  patternrecognition,optimizationanddecisionproblems | | | | | | | | | | | |
| LO4 | Tocreateinstantbasedlearning | | | | | | | | | | | |
| LO5 | Toapplyadvancedlearning | | | | | | | | | | | |
| **UNIT** | **Contents** | | | | | | | | | | **No. Of.Hours** | |
| I | **IntroductionMachineLearning**- Difference betweenAI,MachineLearning and Big data. Supervised and unsupervised learning, parametricvsnon-parametricmodels,parametricmodelsforclassificationandregression-LinearRegression,LogisticRegression,NaïveBayesclassifier,simplenon-parametricclassifier-K-nearestneighbour,support  vectormachines | | | | | | | | | | **15** | |
| II | **Neuralnetworksandgeneticalgorithms**NeuralNetworkRepresentation –Problems –Perceptrons –Multilayer Networks andBackPropagationAlgorithms– AdvancedTopics–GeneticAlgorithms–HypothesisSpaceSearch–GeneticProgramming–ModelsofEvaluation  andLearning. | | | | | | | | | | **15** | |
| III | **Bayesianandcomputationallearning**BayesTheorem–ConceptLearning–MaximumLikelihood–MinimumDescriptionLengthPrinciple – Bayes Optimal Classifier – Gibbs Algorithm – Naïve BayesClassifier –Bayesian Belief Network–EMAlgorithm –ProbabilityLearning–SampleComplexity–FiniteandInfiniteHypothesis Spaces –  MistakeBoundModel. | | | | | | | | | | **15** | |
| IV | **Instantbasedlearning**K-NearestNeighbourLearning–LocallyweightedRegression–RadialBasisFunctions–CaseBasedLearning. | | | | | | | | | | **15** | |
| V | **Advancedlearning**Recommendationsystems–opinionmining,sentimentanalysis.LearningSetsofRules–SequentialCoveringAlgorithm – Learning Rule Set – First Order Rules – Sets of First OrderRules–InductiononInvertedDeduction–InvertingResolution–AnalyticalLearning–PerfectDomainTheories–ExplanationBaseLearning–FOCLAlgorithm–ReinforcementLearning–Task–Q-  Learning–TemporalDifferenceLearning. | | | | | | | | | | **15** | |
| **TOTALHOURS** | | | | | | | | | | | **75** | |
| **CourseOutcomes** | | | | | | | | | **Programme**  **Outcomes** | | | |
| CO | Oncompletionofthiscourse, studentswill | | | | | | | |  | | | |

|  |  |  |
| --- | --- | --- |
| CO1 | Appreciatetheimportanceofvisualizationinthedataanalyticssolution | PO1, PO2,PO3, PO4,PO5,PO6 |
| CO2 | Applystructuredthinkingtounstructuredproblems | PO1, PO2,PO3, PO4,PO5,PO6 |
| CO3 | Understandaverybroadcollectionofmachinelearningalgorithmsandproblems | PO1,PO2,  PO3,PO4,PO5,PO6 |
| CO4 | Learnalgorithmictopicsofmachinelearningandmathematicallydeepenoughtointroducetherequiredtheor | PO1,PO2,  PO3,PO4,PO5,PO6 |
| CO5 | Developanappreciationforwhatisinvolvedinlearningfromdata. | PO1,PO2,PO3,PO4,  PO5,PO6 |
| **Textbooks** | | |
| 1 | TomM. Mitchell, ―Machine Learning,McGraw-Hill Education(India)Private  Limited,2013. | |
| 2 | Bengio,Yoshua,IanJ.Goodfellow,andAaronCourville."Deeplearning"2015,MIT  Press | |
| **ReferenceBooks** | | |
| 1. | EthemAlpaydin,―IntroductiontoMachineLearning(AdaptiveComputationand  MachineLearning),TheMITPress2004. | |
| 2 | StephenMarsland,―MachineLearning:AnAlgorithmicPerspective,CRCPress,  2009. | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **3** | **3** | **3** | **3** |
| **CO2** | **3** | **3** | **3** | **3** | **2** | **3** |
| **CO3** | **3** | **3** | **3** | **3** | **3** | **3** |
| **CO4** | **3** | **3** | **2** | **3** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **2** |
| **Weightageofcoursecontributedtoeach**  **PSO** | **15** | **15** | **14** | **15** | **14** | **14** |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | | |
| **CIA** | **External** | | **Total** |
|  | MACHINELEARNING  LAB |  | - | - | 4 | - | 4 | 25 | 75 | | 100 |
| **LearningObjectives**:  ToapplytheconceptsofMachineLearningtosolvereal-worldproblemsandtoimplementbasicalgorithmsinclustering&classificationappliedtotext &numericdata | | | | | | | | | | | |
| **LABEXERCISES** | | | | | | | | | | RequiredHour | |
| 1. SolvingRegression&ClassificationusingDecisionTrees 2. RootNodeAttributeSelectionforDecisionTreesusingInformationGain 3. BayesianInferenceinGeneExpressionAnalysis 4. PatternRecognitionApplicationusingBayesianInference 5. BagginginClassification 6. Bagging,BoostingapplicationsusingRegressionTrees 7. Data &TextClassificationusingNeuralNetworks 8. UsingWekatoolforSVMclassificationforchosendomainapplication 9. Data&TextClusteringusingK-meansalgorithm 10. Data&TextClusteringusingGaussianMixtureModels | | | | | | | | | | **60** | |

|  |  |
| --- | --- |
| **CourseOutcomes** | |
| CO | Oncompletionofthiscourse, studentswill |
| CO1 | Effectivelyusethevariousmachinelearningtools |

|  |  |
| --- | --- |
| CO2 | UnderstandandimplementtheproceduresformachinelearningalgorithmsCO3 |
| CO3 | DesignPythonprogramsforvariousmachinelearningalgorithms |
| CO4 | ApplyappropriatedatasetstotheMachineLearningalgorithms |
| CO5 | Analyzethegraphicaloutcomesoflearningalgorithmswithspecificdatasets |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **3** | **3** | **1** | **2** |
| **CO2** | **2** | **3** | **3** | **3** | **1** | **2** |
| **CO3** | **2** | **3** | **3** | **3** | **1** | **2** |
| **CO4** | **2** | **3** | **3** | **3** | **1** | **2** |
| **CO5** | **2** | **3** | **3** | **3** | **1** | **2** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 11 | 15 | 15 | 15 | 5 | 10 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **NetworkSecurity** |  | 5 | - | - | - | 4 | 5 | 25 | 75 | 100 |
| **CourseObjectives** | | | | | | | | | | | |
| LO1 | Tofamiliarizeonthemodelofnetworksecurity,Encryptiontechniques | | | | | | | | | | |
| LO2 | TounderstandtheconceptofNumberTheory,theorems | | | | | | | | | | |
| LO3 | Tounderstandthedesignconceptofcryptographyandauthentication | | | | | | | | | | |
| LO4 | Todevelopexperimentsonalgorithmusedforsecurity | | | | | | | | | | |
| LO5 | Tounderstandaboutvirusandthreats,firewalls,andimplementationofCryptography | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No. ofHours** | | | | | |
| I | Model of network security – Security attacks, servicesand attacks –OSI security architecture –Classicalencryptiontechniques–SDES–BlockcipherPrinciplesDES–StrengthofDES–Blockcipherdesignprinciples–Block cipher mode of operation –Evaluation criteria for AES – RC4 - Differential andlinearcryptanalysis–Placementofencryptionfunction  –trafficconfidentiality. | | | | | | 15 | | | | | |
| II | NumberTheory–Primenumber–Modulararithmetic–Euclid‘salgorithm-Fermet‘sandEuler‘s theorem – Primality –Chineseremaindertheorem–Discretelogarithm–Publickeycryptography and RSA –Key distribution –Keymanagement–DiffieHellmankeyexchange–Ellipticcurvecryptography | | | | | | 15 | | | | | |
| III | Authenticationrequirement–Authenticationfunction–MAC–Hashfunction–Securityofhashfunctionand  MAC–SHA-HMAC–CMAC-Digitalsignature | | | | | | 15 | | | | | |

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|  | andauthenticationprotocols–DSS. |  | |
| IV | Authentication applications – Kerberos – X.509Authenticationservices-E-mailsecurity–IPsecurity  -Websecurity | 15 | |
| V | Intruder – Intrusion detection system – Virus andrelatedthreats–Countermeasures–Firewallsdesignprinciples–Trustedsystems–Practicalimplementationofcryptographyandsecurity | 15 | |
|  | **Total** | **75** | |
| **CourseOutcomes** | | |
| **CourseOutcomes** | Oncompletionofthiscourse, studentswill; | |
| **CO1** | Analyzeanddesignclassical encryptiontechniquesand  blockciphers. | PO1,PO3,PO6,PO8 |
| **CO2** | Understand and analyze public-key cryptography, RSAandotherpublic-keycryptosystemssuchasDiffie-  HellmanKeyExchange,ElGamalCryptosystem,etc | PO1,PO2,PO3,PO6 |
| **CO3** | UnderstandkeymanagementanddistributionschemesanddesignUser Authentication | PO3,PO5 |
| **CO4** | AnalyzeanddesignhashandMACalgorithms,anddigitalsignatures. | PO1,PO2,PO3,PO7 |
| **CO5** | Know about Intruders and Intruder Detection  mechanisms,TypesofMalicioussoftware, | P02,PO6,PO7 |
| **ReferenceText:** | | |
| 1. | WilliamStallings,―Cryptography&NetworkSecurity‖,PearsonEducation, FourthEdition2010. | |
| **References:** | | |
| 1. | CharlieKaufman,RadiaPerlman,MikeSpeciner,―NetworkSecurity,Privatecommunicationinpublicworld‖,PHISecondEdition,2002 | |
| 2. | BruceSchneier,NeilsFerguson,―PracticalCryptography‖,WileyDreamtechIndiaPvtLtd,FirstEdition,2003. | |
| 3. | DouglasRSimson―Cryptography– Theoryandpractice‖,CRCPress,FirstEdition,1995 | |

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| **WebResources** | |
| 1. | <https://www.javatpoint.com/computer-network-security> |
| 2. | <https://www.tutorialspoint.com/information_security_cyber_law/network_security.htm> |
| 3. | <https://www.geeksforgeeks.org/network-security/> |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **2** | **1** | **1** | **1** |
| **CO2** | **2** | **-** | **2** | **2** | **2** | **1** |
| **CO3** | **3** | **2** | **2** | **2** | **1** | **-** |
| **CO4** | **3** | **2** | **3** | **1** | **1** | **-** |
| **CO5** | **3** | **2** | **2** | **1** | **3** | **1** |
| **Weightageofcourse**  **contributedtoeachPSO** | 14 | 8 | 11 | 7 | 8 | 3 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | | |
| **CIA** | | **External** | **Total** |
|  | **Data Mining And Warehousing** |  | 5 | - | - | - | 4 | 5 | 25 | | 75 | 100 |
| **CourseObjectives** | | | | | | | | | | | | |
| LO1 | ToprovidetheknowledgeonDataMiningandWarehousingconceptsandtechniques | | | | | | | | | | | |
| LO2 | TostudythebasicconceptsofDataMining,ArchitectureandComparison. | | | | | | | | | | | |
| LO3 | TostudyasetofMiningAssociationRules,DataWarehouses. | | | | | | | | | | | |
| LO4 | TostudyaboutClassificationandPrediction,ClassifierAccuracy | | | | | | | | | | | |
| LO5 | Tostudythebasicconceptsofclusteranalysis,ClusterMethods | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No. ofHours** | | | **CourseObjectives** | | |
| I | *Introduction:Datamining–Functionalities–Classification–IntroductiontoDataWarehousing–DataPreprocessing:PreprocessingtheData–Datacleaning–DataIntegrationandTransformation–Data*  *Reduction* | | | | | | 15 | | | CO1 | | |
| II | DataMining,Primitives,LanguagesandSystemArchitecture:DataMining–Primitives–DataMiningQueryLanguage,ArchitectureofDataminingSystems. Concept Description, Characterization andComparison:ConceptDescription,DataGeneralizationandSummarization,AnalyticalCharacterization,MiningClassComparison–  StatisticalMeasures. | | | | | | 15 | | | CO2 | | |
| III | MiningAssociationRules:BasicConcepts–SingleDimensionalBooleanAssociationRulesFromTransactionDatabases,MultilevelAssociationRulesfrom transaction databases – Multi dimension  AssociationRulesfromRelationalDatabaseandData | | | | | | 15 | | | CO3 | | |

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| --- | --- | --- | --- |
|  | Warehouses. |  |  |
| IV | ClassificationandPrediction:Introduction–Issues–DecisionTreeInduction–BayesianClassification–Classification of Back Propagation. Classification basedon ConceptsfromAssociationRuleMining–OtherMethods.Prediction–Introduction–ClassifierAccuracy | 15 | CO4 |
| V | Cluster Analysis: Introduction – Types of DatainClusterAnalysis,PetitioningMethods–HierarchicalMethods-DensityBasedMethods–GRIDBasedMethod–ModelbasedClusteringMethod | 15 | CO5 |
|  | **Total** | **75** |  |
| **CourseOutcomes** | | | |
| **CourseOutcomes** | Oncompletionofthiscourse,studentswill; | | |
| **CO1** | Tounderstand thebasicconceptsand thefunctionality of  thevariousdatamininganddatawarehousingcomponent | PO1,PO3,PO6,PO8 | |
| **CO2** | To know the concepts of Data mining system  architectures | PO1,PO2,PO3,PO6 | |
| **CO3** | Toanalyzetheprinciplesofassociationrules | PO3,PO5 | |
| **CO4** | TogetanalyticalideaonClassificationandpredictionmethods | PO1,PO2,PO3,PO7 | |
| **CO5** | ToGainknowledgeonClusteranalysisanditsmethods. | PO2,PO6,PO7 | |
| **TextBooks**  **(LatestEditions)** | | | |
| 1. | HanandM.Kamber,―DataMiningConceptsandTechniques‖,2001,Harcourt IndiaPvt.Ltd,NewDelhi. | | |
| **ReferencesBooks**  **(Latesteditions)** | | | |
| 1. | K.P.Soman,ShyamDiwakar,V.Ajay―InsightintoDataMiningTheoryand  Practice―,PrenticeHallofIndiaPvt.Ltd,NewDelhi | | |

|  |  |
| --- | --- |
| 2. | ParteekBhatia,‗DataMiningandDataWarehousing:PrinciplesandPracticalTechniques‘, CambridgeUniversity Press,2019 |
| **WebResources** | |
| 1. | [https://www.topcoder.com/thrive/articles/data-warehousing-and-data-mining#:~:text=Data%20warehousing%20is%20a%20method,compiled%20in%20the%20data%20warehouse**.**](https://www.topcoder.com/thrive/articles/data-warehousing-and-data-mining#%3A~%3Atext%3DData%20warehousing%20is%20a%20method%2Ccompiled%20in%20the%20data%20warehouse) |
| 2. | <https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing> |
| 3. | <https://www.tutorialspoint.com/Data-Warehousing-and-Data-Mining> |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **3** | **3** | **3** | **3** |
| **CO2** | **3** | **3** | **2** | **3** | **2** | **2** |
| **CO3** | **2** | **2** | **-** | **3** | **-** | **3** |
| **CO4** | **3** | **3** | **2** | **3** | **1** | **1** |
| **CO5** | **1** | **3** | **3** | **3** | **3** | **2** |
| **Weightageofcourse**  **contributedtoeachPSO** | **12** | **14** | **10** | **15** | **9** | **11** |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | | | |
| **CIA** | | **External** | | **Total** |
|  | **MOBILEAPPLICATIONDEVELOPMENT** |  | 5 | - | - | - | 4 | 25 | | 75 | | 100 |
| **LearningObjectives** | | | | | | | | | | | | |
| LO1 | Developin-depthKnowledgeaboutthearchitectureandfeaturesofAndroid | | | | | | | | | | | |
| LO2 | Implementingthevariousoptionsavailableinviews. | | | | | | | | | | | |
| LO3 | Understandthefilehandlingconceptsandtherebyenablingtomanagedata  efficiently. | | | | | | | | | | | |
| LO4 | AbletodescribeclearlythefeaturesofSMSmessaging. | | | | | | | | | | | |
| LO5 | IllustratetheconceptsofLocationBasedServices | | | | | | | | | | | |
| **UNIT** | **Contents** | | | | | | | | | | **No. Of.Hours** | |
| I | **Android Fundamentals:** Android overview and Versions –Features ofAndroid – Architecture of Android - Setting up Android Environment(Eclipse/AndroidStudio,SDK,AVD)-AnatomyofanAndroidApplication-SimpleAndroidApplicationDevelopment. | | | | | | | | | | **15** | |
| II | **AndroidUserInterface:**Layouts:Linear,Relative,FrameandScrollview- Managing changes to Screen Orientation. Views: TextView,Button, ImageButton, EditText, CheckBox, RadioButton, RadioGroup,ProgressBar,AutoCompleteTextView,ListViewsandWebView | | | | | | | | | | **15** | |
| III | **Data Persistence:** Saving and Loading User Preferences. File Handling:FileSystem-InternalandExternalStorage-Permissions-FileManipulation-ManagingDatausingSqlite:Creationofdatabase-  Insertion,RetrievalandUpdationofrecords. | | | | | | | | | | **15** | |
| IV | **SMSMessaging:**SendingandReceivingmessages-SendingE-mail–Networking:DownloadingBinaryData–DownloadingTextFiles. | | | | | | | | | | **15** | |
| V | **Location Based Services:** Displaying maps- Displaying zoom control-Changing view – Adding Markers- Getting the location – Geo-codingPublishingAndroidApplications:Preparingforpublishing-DeployingAPKFiles. | | | | | | | | | | **15** | |
| **TOTALHOURS** | | | | | | | | | | | **75** | |
| **CourseOutcomes** | | | | | | | | | **ProgrammeOutcomes** | | | |
| CO | Oncompletionofthiscourse, studentswill | | | | | | | |  | | | |
| CO1 | Appreciatetheimportanceofvisualizationinthedataanalyticssolution | | | | | | | | PO1, PO2,PO3, PO4,PO5,PO6 | | | |
| CO2 | Applystructuredthinkingtounstructuredproblems | | | | | | | | PO1, PO2,PO3, PO4,PO5,PO6 | | | |

|  |  |  |
| --- | --- | --- |
| CO3 | Understandaverybroadcollectionofmachinelearningalgorithmsandproblems | PO1,PO2,  PO3,PO4,PO5,PO6 |
| CO4 | Learnalgorithmictopicsofmachinelearningandmathematicallydeepenoughtointroducetherequiredtheor | PO1,PO2,PO3,PO4,  PO5,PO6 |
| CO5 | Developanappreciationforwhatisinvolvedinlearningfromdata. | PO1, PO2,PO3,PO4,  PO5,PO6 |
| **Textbooks** | | |
| 1 | **WeiMeng Lee (2012),** ―*Beginning Android Application Development*‖,WroxPublications(JohnWiley,NewYork) | |
| **ReferenceBooks** | | |
| 1. | **EdBurnette**,―*HelloAndroid:IntroducingGoogle'sMobileDevelopmentPlatform*‖, 3rdedition,2010,ThePragmaticPublishers. | |
| 2 | **RetoMeier**,―*ProfessionalAndroid4ApplicationDevelopment*‖,2012,WroxPublications(John Wiley,NewYork). | |
| **WebResources** | | |
| 1. | https://[www.tutorialspoint.com/mobile\_development\_tutorials.htm](http://www.tutorialspoint.com/mobile_development_tutorials.htm) | |
| 2 | https://[www.tutorialspoint.com](http://www.tutorialspoint.com/)›Android›Android-Home | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **-** | **1** | **1** | **1** | **2** |
| **CO2** | **2** | **1** | **-** | **1** | **2** | **2** |
| **CO3** | **3** | **-** | **1** | **1** | **2** | **3** |
| **CO4** | **2** | **2** | **1** | **1** | **1** | **2** |
| **CO5** | **2** | **-** | **1** | **1** | **1** | **2** |
| **Weightageof**  **coursecontributedtoeachPSO** | 11 | 3 | 4 | 5 | 7 | 11 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | | |
| **CIA** | | **External** | **Total** |
|  | **MOBILEAPPLICATIONDEVELOPMENTLAB** |  | 4 | - | - | - | 4 | 25 | | 75 | 100 |
| **CourseObjectives**:   * Toexplainuserdefinedfunctionsandthe conceptsofclass. * Todemonstratethecreationcookiesandsessions * TofacilitatethecreationofDatabaseandvalidatetheuserinputs | | | | | | | | | | | |
| **LabExercises** | | | | | | | | | **RequiredHours** | | |
| 1. DevelopanapplicationforSimpleCounter. 2. Develop an applicationtodisplayyour personaldetails using GUIComponents. 3. Developa SimpleCalculatorthatusesradiobuttonsandtextview. 4. DevelopanapplicationthatusesIntentandActivity. 5. DevelopanapplicationthatusesDialogBoxes. 6. Developanapplicationtodisplaya SplashScreen. 7. DevelopanapplicationthatusesLayoutManagers. 8. DevelopanapplicationthatusesdifferenttypesofMenus. 9. Developanapplicationthatusestosendmessagesfromonemobiletoanothermobile. 10. Developanapplicationthatusesto sendE-mail.DevelopanapplicationthatplaysAudioand Video. 11. DevelopanapplicationthatusesLocalFileStorage. 12. DevelopanapplicationforSimpleAnimation. 13. DevelopanapplicationforLoginPageusingSqlite. 14. DevelopanapplicationforStudentMarksheetprocessingusingSqlite. | | | | | | | | | **60** | | |
| **CourseOutcomes** | | | | | | | | | | | |
| CO | Oncompletionofthiscourse, studentswill | | | | | | | | | | |
| CO1 | Tounderstandtheconceptsofcounter,dialogs. | | | | | | | | | | |
| CO2 | ConceptsofLayoutManagers.PerformsendingemailonaudioandvideoToenabletheapplicationsofaudioandvideo. | | | | | | | | | | |

|  |  |
| --- | --- |
| CO3 | ToapplyLocalFileStorageandDevelopmentoffiles. |
| CO4 | TodeterminetheconceptsofSimple AnimationToapplysearchingpages. |
| CO5 | UsageofStudentmarksheet-preparationinMAD.  ConceptsofprocessingSqliteareimplemented. |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **2** | **-** | **3** | **3** | 2 |
| **CO2** | **2** | **1** | **-** | **3** | **3** | 3 |
| **CO3** | **3** | **-** | **1** | **2** | **3** | 3 |
| **CO4** | **2** | **3** | **2** | **3** | **2** | 3 |
| **CO5** | **2** | **2** | **-** | **3** | **3** | 3 |
| **Weightageofcoursecontributed to eachPSO** | 11 | 8 | 3 | 14 | 14 | 14 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **IntroductiontoDataScience** |  | 5 | - | - | - | | 4 | 5 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | TolearnaboutbasicsofDataScienceandBigdata. | | | | | | | | | | | |
| LO2 | TolearnaboutoverviewandbuildingprocessofDataScience. | | | | | | | | | | | |
| LO3 | TolearnaboutvariousAlgorithmsinDataScience. | | | | | | | | | | | |
| LO4 | TolearnaboutHadoopFramework. | | | | | | | | | | | |
| LO5 | TolearnaboutcasestudyaboutData Science. | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | | **No.of**  **Hours** | |
| I | **Introduction:**Benefitsanduses–Factsofdata–Datascienceprocess–  Bigdataecosystemanddatascience | | | | | | | | | | 15 | |
| II | **TheDatascienceprocess**:Overview–researchgoals-retrievingdata-  transformation–ExploratoryDataAnalysis–Modelbuilding. | | | | | | | | | | 15 | |
| III | **Algorithms**:Machinelearningalgorithms–Modelingprocess–Types  –Supervised– Unsupervised-Semi-supervised | | | | | | | | | | 15 | |
| IV | **IntroductiontoHadoop**:Hadoopframework–Spark–replacing  MapReduce–NoSQL–ACID–CAP–BASE–types | | | | | | | | | | 15 | |
| V | **CaseStudy**:PredictionofDisease-Settingresearchgoals-Data  retrieval–preparation-exploration-Diseaseprofiling-presentationandautomation | | | | | | | | | | 15 | |
|  | **Total** | | | | | | | | | | **75** | |
| **CourseOutcomes** | | | | | | | **ProgrammeOutcome** | | | | | |
| CO | Oncompletionofthiscourse, studentswill | | | | | |  | | | | | |
| 1 | UnderstandthebasicsinData ScienceandBigdata. | | | | | | PO1 | | | | | |
| 2 | UnderstandoverviewandbuildingprocessinData  Science. | | | | | | PO1,PO2 | | | | | |
| 3 | UnderstandvariousAlgorithmsinDataScience. | | | | | | PO4,PO6 | | | | | |
| 4 | UnderstandHadoopFrameworkinDataScience. | | | | | | PO4,PO5,PO6 | | | | | |

|  |  |  |
| --- | --- | --- |
| 5 | CasestudyinDataScience. | PO3,PO8 |
| **TextBook** | | |
| 1 | DavyCielen,ArnoD.B.Meysman,MohamedAli,―IntroducingDataScience‖,  manningpublications2016 | |
| **ReferenceBooks** | | |
| 1. | RogerPeng,―TheArtofDataScience‖,lulu.com2016. | |
| 2. | MurtazaHaider,―GettingStartedwithDataScience–MakingSenseofDatawith  Analytics‖,IBMpress,E-book. | |
| 3. | DavyCielen,ArnoD.B.Meysman,MohamedAli,―IntroducingDataScience:Big Data,MachineLearning,andMore,UsingPythonTools‖,DreamtechPress2016. | |
| 4. | AnnalynNg,KennethSoo,―Numsense!DataSciencefortheLayman:NoMath Added‖,2017,1stEdition. | |
| 5. | CathyO'Neil,RachelSchutt,―DoingDataScienceStraightTalkfromtheFrontline‖, O'ReillyMedia2013. | |
| 6. | LillianPierson,―DataScienceforDummies‖,2017IIEdition | |
| **WebResources** | | |
| 1. | https://[www.w3schools.com/datascience/](http://www.w3schools.com/datascience/) | |
| 2. | https://en.wikipedia.org/wiki/Data\_science | |
| 3. | <http://www.cmap.polytechnique.fr/~lepennec/en/post/references/refs/> | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **`1** | **2** | **2** | **-** |
| **CO2** | **2** | **3** | **2** | **2** | **-** | **1** |
| **CO3** | **3** | **2** | **2** | **1** | **1** | **3** |
| **CO4** | **1** | **2** | **2** | **1** | **3** | **1** |
| **CO5** | **2** | **2** | **-** | **3** | **1** | **1** |
| **Weightageofcourse**  **contributedtoeachPSO** | 11 | 11 | 7 | 9 | 7 | 6 |

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

# Suggested Topics inElective courses (EC1-EC8)DisciplineSpecificElectives Syllabus

1. SoftwareMetrics
2. NaturalLanguageProcessing
3. AnalyticsforServiceIndustry
4. Cryptography
5. DatabaseManagementSystem
6. BigDataAnalytics
7. IOTanditsApplications
8. SoftwareProjectManagement
9. ImageProcessing
10. InformationSecurity
11. HumanComputerInteraction
12. Fuzzy Logic
13. ArtificialIntelligence
14. MobileAdhocNetwork
15. ComputationalIntelligence
16. GridComputing
17. CloudComputing
18. ArtificialNeuralNetwork
19. AgileProjectManagementandmore..

[Pl.Note:InSemester-VI-ForEC7andEC8subjects Instructionalhoursmaybeusedas:5per cycle]

**SOFTWAREMETRICS**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | | | |
| **CIA** | **External** | | | **Total** |
|  | | **4** | **-** | **-** | **-** | **3** | **4** | **25** | **75** | | | **100** |
| **LearningObjectives** | | | | | | | | | | | | |
| **LO1** | Gainasolidunderstandingofwhatsoftwaremetricsareandtheirsignificance | | | | | | | | | | | |
| **LO2** | Learnhowtoidentifyandselectappropriatesoftwaremetricsbasedonprojectgoals | | | | | | | | | | | |
| **LO3** | Acquireknowledgeandskillsincollectingandmeasuringsoftwaremetrics | | | | | | | | | | | |
| **LO4** | Learnhowtoanalyzeandinterpretsoftwaremetricsdatatoextractvaluableinsights | | | | | | | | | | | |
| **LO5** | Gaintheabilitytoevaluatesoftwarequalityusingappropriatemetrics | | | | | | | | | | | |
| **Unit** | **Contents** | | | | | | | | | **No.of**  **Hours** | | |
| I | **FundamentalsofMeasurement:Needfor**Measurement:Measurement in Software Engineering, Scope of Software Metrics,**TheBasicsofmeasurement**:Therepresentationaltheoryofmeasurement,Measurementandmodels,Measurementscalesand  scaletypes,meaningfulnessinmeasurement | | | | | | | | | **12** | | |
| II | **A Goal-Based Framework For Software Measurement:** Classifyingsoftwaremeasures,DeterminingwhattoMeasure,Applyingtheframework,Softwaremeasurementvalidation,PerformingSoftwareMeasurementValidation  **Empirical investigation**:Principles of Empirical Studies,PlanningExperiments,Planningcasestudiesasquasi-experiments,RelevantandMeaningfulStudies | | | | | | | | | | **12** | | |
| III | **SoftwareMetricsDataCollection:**Defininggooddata,Datacollection for incident reports, How to collect data, Reliability of datacollection Procedures  **Analyzing software measurement data:** Statistical distributions andhypothesis testing,Classicaldata analysis techniques,Examples ofsimpleanalysistechniques | | | | | | | | | | **12** | | |
| IV | **Measuring internal product attributes: Size** Properties of SoftwareSize, Code size, Design size, Requirements analysis and Specificationsize, Functionalsize measures and estimators, Applications of sizemeasures  **Measuringinternalproductattributes:Structure:**AspectsofStructural Measures, Control flow structure of program units, Design-levelAttributes,Object-orientedStructuralattributesandmeasures | | | | | | | | | | **12** | | |
| V | **MeasuringExternalProductAttributes:**Modellingsoftwarequality,  Measuringaspectsofquality,UsabilityMeasures,Maintainabilitymeasures,SecurityMeasures  **SoftwareReliability:MeasurementandPrediction:**Basicsofreliabilitytheory,Thesoftwarereliabilityproblem,Parametricreliabilitygrowthmodels,Predictiveaccuracy | | | | | | | | | | **12** | | |
| **TOTAL** | | | | | | | | | | | **60** | | |
| **CO** | **CourseOutcomes** | | | | | | | | | | | | |
| CO1 | Understandvariousfundamentalsofmeasurementandsoftwaremetrics | | | | | | | | | | | | |
| CO2 | Identifyframeworkandanalysistechniquesforsoftwaremeasurement | | | | | | | | | | | | |
| CO3 | Applyinternalandexternalattributesofsoftwareproductfor effortestimation | | | | | | | | | | | | |
| CO4 | Useappropriateanalyticaltechniquestointerpretsoftwaremetricsdataandderive  meaningfulinsights | | | | | | | | | | | | |
| CO5 | Recommendreliabilitymodelsforpredictingsoftwarequality | | | | | | | | | | | | |
| **Textbooks** | | | | | | | | | | | | | |
|  | SoftwareMetricsARigorousandPracticalApproach,NormanFenton,James  Bieman,ThirdEdition,2014 | | | | | | | | | | | | |
| ReferenceBooks | | | | | | | | | | | | | |
| 1 | Softwaremetrics,NormanE,FentonandShariLawrencePfleeger,International  ThomsonComputerPress,1997 | | | | | | | | | | | | |
| 2 | Metricandmodelsinsoftwarequalityengineering,StephenH.Kan,Secondedition,  2002,AddisonWesleyProfessional | | | | | | | | | | | | |
| 3 | PracticalSoftwareMetricsforProjectManagementandProcessImprovement,  RobertB.Grady,1992,PrenticeHall. | | | | | | | | | | | | |
| **NOTE:LatestEditionofTextbooksMaybeUsed** | | | | | | | | | | | | | |
| **WebResources** | | | | | | | | | | | | | |
| 1. | https://lansa.com/blog/general/what-are-software-metrics-how-can-i-measure-these-  metrics/ | | | | | | | | | | | | |
| 2. | https://stackify.com/track-software-metrics/ | | | | | | | | | | | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **2** | **-** | **3** | **3** | 2 |
| **CO2** | **3** | **1** | **2** | **3** | **3** | 3 |
| **CO3** | **3** | **1** | **1** | **2** | **3** | 3 |
| **CO4** | **2** | **3** | **2** | **3** | **2** | 3 |
| **CO5** | **2** | **2** | **-** | **3** | **3** | 3 |
| **Weightageofcoursecontributedtoeach**  **PSO** | 12 | 9 | 5 | 14 | 14 | 14 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | | |
| **CIA** | **External** | | **Total** |
|  | **NATURALLANGUAGEPROCESSING** | **Elect** | 4 | - | - | - | 3 | 25 | 75 | | 100 |
| **LearningObjectives** | | | | | | | | | | | |
| **LO1** | TounderstandapproachestosyntaxandsemanticsinNLP. | | | | | | | | | | |
| **LO2** | Tolearnnaturallanguageprocessingandtolearnhowtoapplybasicalgorithmsin  thisfield. | | | | | | | | | | |
| **LO3** | Tounderstand approaches todiscourse,generation,dialogue andsummarizationwithinNLP. | | | | | | | | | | |
| **LO4** | Togetacquaintedwiththealgorithmicdescriptionofthemainlanguagelevels:morphology,syntax,semantics,pragmaticsetc. | | | | | | | | | | |
| **LO5** | Tounderstandcurrentmethodsforstatisticalapproachestomachinetranslation. | | | | | | | | | | |
| **UNIT** | **Contents** | | | | | | | | | **No. Of.Hours** | |
| I | **Introduction :** Natural Language Processing tasks in syntax, semantics,and pragmatics – Issue- Applications – The role of machine learning –Probability Basics –Information theory – Collocations -N-gram LanguageModels – Estimating parameters and smoothing – Evaluating languagemodels. | | | | | | | | | **12** | |
| II | **WordlevelandSyntacticAnalysis:**WordLevelAnalysis:RegularExpressions-Finite-State Automata-Morphological Parsing-Spelling ErrorDetectionandcorrection-WordsandWordclasses-Part-ofSpeechTagging.SyntacticAnalysis:Context-freeGrammar-Constituency-Parsing-ProbabilisticParsing. | | | | | | | | | **12** | |
| III | **SemanticanalysisandDiscourseProcessing:**SemanticAnalysis:MeaningRepresentation-LexicalSemantics-Ambiguity-WordSenseDisambiguation. Discourse Processing: cohesion-Reference Resolution-DiscourseCoherenceandStructure. | | | | | | | | | **12** | |
| IV | **NaturalLanguageGeneration:**ArchitectureofNLGSystems-Generation Tasks and Representations- Application of NLG.MachineTranslation: Problems in Machine Translation. Characteristics of IndianLanguages-MachineTranslationApproaches-TranslationinvolvingIndianLanguages. | | | | | | | | | **12** | |
| V | **Informationretrieval and lexical resources:** Information Retrieval: | | | | | | | | |  | |

|  |  |  |  |
| --- | --- | --- | --- |
|  | DesignfeaturesofInformationRetrievalSystems-Classical,Non-classical, Alternative Models of Information Retrieval – valuation LexicalResources:WorldNet-FrameNetStemmers-POSTagger-ResearchCorporaSSAS. | **12** | |
| **TOTAL** | | | **60** |
| **CourseOutcomes** | | | **ProgrammeOutcomes** |
| CO | Oncompletionofthiscourse, studentswill | |  |
| CO1 | Describethefundamentalconceptsandtechniquesofnaturallanguageprocessing.  Explainthe advantages and disadvantages of different NLP  technologiesandtheirapplicabilityindifferentbusinesssituations. | | PO1, PO2,PO3, PO4,PO5,PO6 |
| CO2 | Distinguish among thevarious techniques,takingintoaccounttheassumptions, strengths,andweaknessesofeach  UseNLPtechnologiestoexploreandgaina broadunderstandingoftextdata. | | PO1, PO2,PO3, PO4,PO5,PO6 |
| CO3 | Useappropriatedescriptions,visualizations,andstatisticstocommunicatetheproblemsandtheirsolutions.  UseNLPmethodstoanalysesentimentofatextdocument. | | PO1, PO2,PO3, PO4,PO5,PO6 |
| CO4 | Analyzelargevolumetextdatageneratedfromarangeofreal-worldapplications.  UseNLPmethodstoperformtopicmodelling. | | PO1, PO2,PO3, PO4,PO5,PO6 |
| CO5 | Developroboticprocessautomationtomanagebusinessprocessesandtoincreaseandmonitortheirefficiencyandeffectiveness.  Determine the framework in which artificial intelligence and theInternetofthingsmayfunction,includinginteractionswith  people,enterprisefunctions,andenvironments. | | PO1, PO2,PO3, PO4,PO5,PO6 |
| **Textbooks** | | | |
| 1 | DanielJurafsky,JamesH.Martin,―Speech&languageprocessing‖,Pearson publications. | | |
| 2 | Allen,James.Naturallanguageunderstanding.Pearson,1995. | | |
| **ReferenceBooks** | | | |
| 1. | PierreM.Nugues,―AnIntroductiontoLanguageProcessingwithPerland Prolog‖,Springer | | |
| **WebResources** | | | |
| 1. | https://en.wikipedia.org/wiki/Natural\_language\_processing | | |
| 2. | https://[www.techtarget.com/searchenterpriseai/definition/natural-language-](http://www.techtarget.com/searchenterpriseai/definition/natural-language-)processing-NLP | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 3 | 3 | 3 | 1 |
| **CO2** | 2 | 3 | 3 | 3 | 2 | 3 |
| **CO3** | 1 | 3 | 3 | 3 | 1 | 3 |
| **CO4** | 3 | 2 | 1 | 3 | 2 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 3 |
| **Weightageofcoursecontributed to eachPSO** | 12 | 14 | 13 | 15 | 11 | 13 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | | **ANALYTICS FORSERVICEINDUSTRY** | **Elective** | 4 | - | - | - | 3 | 25 | 75 | 100 |
| **LearningObjectives** | | | | | | | | | | | |
| **LO1** | Recognizechallengesindealing withdatasetsin serviceindustry. | | | | | | | | | | |
| **LO2** | Identifyand apply appropriate algorithms for analyzing the healthcare, Human  resource,hospitalityandtourismdata. | | | | | | | | | | |
| **LO3** | Makechoicesforamodelfornewmachinelearningtasks. | | | | | | | | | | |
| **LO4** | Toidentifyemployeeswithhighattritionrisk. | | | | | | | | | | |
| **LO5** | ToPrioritizingvarioustalentmanagementinitiativesforyourorganization. | | | | | | | | | | |
| **UNIT** | **Contents** | | | | | | | | | **No. Of.Hours** | |
| I | **Healthcare Analytics :** Introduction to Healthcare Data Analytics-Electronic Health Records– Components of EHR- Coding Systems-Benefits of EHR- Barrier to Adopting HER Challenges-PhenotypingAlgorithms.BiomedicalImage Analysis andSignalAnalysis- GenomicDataAnalysisforPersonalizedMedicine.ReviewofClinicalPrediction  Models. | | | | | | | | | **12** | |
| II | **Healthcare Analytics Applications :** Applications and Practical Systemsfor Healthcare– Data Analytics for Pervasive Health- Fraud Detection inHealthcare-DataAnalyticsforPharmaceuticalDiscoveries-ClinicalDecisionSupportSystems-Computer-AssistedMedicalImageAnalysis  Systems-MobileImagingandAnalyticsforBiomedicalData. | | | | | | | | | **12** | |
| III | **HR Analytics:** Evolution of HR Analytics, HR information systems anddata sources, HR Metric and HR Analytics, Evolution of HR Analytics;HRMetricsandHRAnalytics;Intuitionversusanalyticalthinking;HRMS/HRISanddatasources;AnalyticsframeworkslikeLAMP,  HCM:21(r)Model. | | | | | | | | | **12** | |
| IV | **PerformanceAnalysis:**Predictingemployeeperformance,Trainingrequirements,evaluatingtraininganddevelopment,Optimizingselection  andpromotiondecisions. | | | | | | | | | **12** | |
| V | **Tourism and Hospitality Analytics:** Guest Analytics – LoyaltyAnalytics–CustomerSatisfaction–DynamicPricing–optimized  disruptionmanagement–Frauddetectioninpayments. | | | | | | | | | **12** | |

|  |  |  |  |
| --- | --- | --- | --- |
| **TOTALHOURS** | | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcomes** | |
| CO | Oncompletionofthiscourse,studentswill |  | |
| CO1 | Understandandcriticallyapplytheconceptsandmethodsofbusinessanalytics | PO1, PO2,PO3, PO4,PO5,PO6 | |
| CO2 | Identify,modelandsolvedecisionproblemsindifferentsettings. | PO1,PO2,  PO3,PO4,PO5,PO6 | |
| CO3 | Interpretresults/solutionsandidentifyappropriatecoursesofactionforagivenmanagerialsituationwhetheraproblemoran  opportunity. | PO1,PO2,PO3,PO4,  PO5,PO6 | |
| CO4 | Createviablesolutionstodecisionmakingproblems. | PO1,PO2,  PO3,PO4,PO5,PO6 | |
| CO5 | Instill a sense of ethical decision-making and a commitment to thelong-run welfare of both organizations and the communities theyserve. | PO1, PO2,PO3, PO4,PO5,PO6 | |
| **Textbooks** | | | |
| 1 | ChandanK.ReddyandCharuCAggarwal,―Healthcaredataanalytics‖,Taylor&Francis,2015. | | |
| 2 | EdwardsMartinR,EdwardsKirsten(2016),―PredictiveHRAnalytics:Masteringthe  HRMetric‖, KoganPagePublishers, ISBN-0749473924 | | |
| 3 | Fitz-enzJac(2010),―ThenewHRanalytics:predictingtheeconomicvalueofyour company‘shumancapitalinvestments‖,AMACOM,ISBN-13:978-0-8144-1643-3 | | |
| 4 | RajendraSahu,ManojDashandAnilKumar.ApplyingPredictiveAnalyticsWithintheServiceSector. | | |
| **ReferenceBooks** | | | |
| 1. | HuiYangandEvaK.Lee,―HealthcareAnalytics:FromDatatoKnowledgeto HealthcareImprovement,Wiley,2016 | | |
| 2. | Fitz-enzJac,MattoxIIJohn(2014),―PredictiveAnalyticsforHumanResources‖, Wiley,ISBN-1118940709. | | |
| **WebResources** | | | |
| 1. | https://[www.ukessays.com/essays/marketing/contemporary-issues-in-marketing-](http://www.ukessays.com/essays/marketing/contemporary-issues-in-marketing-)  marketing-essay.php | | |
| 2. | https://yourbusiness.azcentral.com/examples-contemporary-issues-marketing-field-  26524.html | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 2 | 3 | 3 | 3 | 3 | 3 |
| **CO3** | 3 | 3 | 2 | 3 | 3 | 2 |
| **CO4** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 3 |
| **Weightageofcourse**  **contributedtoeachPSO** | 14 | 15 | 14 | 15 | 15 | 14 |

S-Strong-3 M-Medium-2L-Low-1

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | | | |
| **CIA** | | **External** | | **Total** |
|  | **CRYPTOGRAPHY** | **Elect** | 4 | - | - | - | 3 | 25 | | 75 | | 100 |
| **LearningObjectives** | | | | | | | | | | | | |
| LO1 | TounderstandthefundamentalsofCryptography | | | | | | | | | | | |
| LO2 | Toacquireknowledgeonstandardalgorithmsusedtoprovideconfidentiality,integrityand authenticity. | | | | | | | | | | | |
| LO3 | Tounderstandthevariouskeydistributionandmanagementschemes. | | | | | | | | | | | |
| LO4 | Tounderstandhowtodeployencryptiontechniquestosecuredataintransitacross  datanetworks | | | | | | | | | | | |
| LO5 | TodesignsecurityapplicationsinthefieldofInformationtechnology | | | | | | | | | | | |
| **UNIT** | **Contents** | | | | | | | | | | **No.Of.**  **Hours** | |
| I | **Introduction:**TheOSIsecurityArchitecture–SecurityAttacks–SecurityMechanisms–SecurityServices–AmodelfornetworkSecurity. | | | | | | | | | | **12** | |
| II | **Classical Encryption Techniques:** Symmetric cipher model –  **SubstitutionTechniques:**CaesarCipher–Monoalphabeticcipher–Playfaircipher–PolyAlphabeticCipher–Transpositiontechniques–Stenography | | | | | | | | | | **12** | |
| III | **BlockCipherandDES:**BlockCipherPrinciples–DES–TheStrengthofDES–**RSA:**TheRSAalgorithm. | | | | | | | | | | **12** | |
| IV | **NetworkSecurityPractices**:IPSecurityoverview-IPSecurityarchitecture–AuthenticationHeader. **WebSecurity**:SecureSocketLayer  andTransportLayerSecurity–SecureElectronicTransaction. | | | | | | | | | | **12** | |
| V | Intruders–Malicioussoftware–Firewalls. | | | | | | | | | | **12** | |
| **TOTALHOURS** | | | | | | | | | | | **60** | |
| **CourseOutcomes** | | | | | | | | | **Programme**  **Outcomes** | | | |
| CO | Oncompletionofthiscourse, studentswill | | | | | | | |  | | | |
| CO1 | Analyzethevulnerabilitiesinanycomputingsystemandhencebeabletodesignasecurity solution. | | | | | | | | PO1, PO2,PO3, PO4,PO5,PO6 | | | |
| CO2 | Apply the different cryptographic operations of symmetriccryptographicalgorithms | | | | | | | | PO1, PO2,PO3, PO4,PO5,PO6 | | | |
| CO3 | Applythedifferentcryptographicoperationsofpublickeycryptography | | | | | | | | PO1,PO2,  PO3,PO4, | | | |

|  |  |  |
| --- | --- | --- |
|  |  | PO5,PO6 |
| CO4 | ApplythevariousAuthenticationschemestosimulatedifferentapplications. | PO1,PO2,PO3,PO4,  PO5,PO6 |
| CO5 | Understand various Security practices and System securitystandards | PO1,PO2,  PO3,PO4,PO5,PO6 |
| **Textbooks** | | |
| 1 | **WilliamStallings,**―CryptographyandNetworkSecurityPrinciplesandPractices‖. | |
| **ReferenceBooks** | | |
| 1. | **BehrouzA.Foruzan,**―CryptographyandNetworkSecurity‖,TataMcGraw-Hill, 2007. | |
| 2 | **AtulKahate**,―*CryptographyandNetworkSecurity*‖,SecondEdition,2003,TMH. | |
| 3 | **M.V.ArunKumar**,―*NetworkSecurity*‖,2011,FirstEdition,USP. | |
|  | **WebResources** | |
| 1 | https:[//www.tutorialspoint.com/cryptography/](http://www.tutorialspoint.com/cryptography/) | |
| 2 | https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 1 | 2 | 3 | 2 |
| **CO2** | 3 | 2 | 3 | 2 | 3 | 3 |
| **CO3** | 2 | 3 | 2 | 2 | 2 | 1 |
| **CO4** | 2 | 3 | 3 | 1 | 2 | 3 |
| **CO5** | 3 | 2 | 3 | 3 | 3 | 3 |
| **Weightageofcoursecontributed to eachPSO** | 13 | 13 | 12 | 10 | 13 | 12 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **Database ManagemetSystem** | Core | 4 | - | - | - | | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | Toenablethestudentstolearnthedesigningofdatabasesystems,foundationonthe  relationalmodelofdataandnormalforms. | | | | | | | | | | | |
| LO2 | Tounderstoodtheconceptsofdatabasemanagementsystem,designsimpleDatabase  models | | | | | | | | | | | |
| LO3 | Tolearnandunderstandto writequeriesusingSQL,PL/SQL. | | | | | | | | | | | |
| LO4 | Toenablethestudentstolearnthedesigningofdatabasesystems,foundationonthe  relationalmodelofdataandnormalforms. | | | | | | | | | | | |
| LO5 | Tounderstoodtheconceptsofdatabasemanagementsystem,designsimpleDatabase  models | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No.of**  **Hours** | | | | | |
|  | **DatabaseConcepts:**DatabaseSystems-DatavsInformation - Introducing the database -File system -Problems with file system – Database systems. Datamodels-Importance-BasicBuildingBlocks-Business rules - Evolution of Data models - Degrees ofDataAbstraction | | | | | | 12 | | | | | |
| II | **Design Concepts:** Relational database model - logicalviewofdata-keys-Integrityrules-relationalsetoperators - datadictionary and thesystem catalog-relationships-dataredundancyrevisited-indexes-codd'srules.Entityrelationshipmodel-ERdiagram | | | | | | 12 | | | | | |
| III | **NormalizationofDatabaseTables**:Database tables | | | | | | 12 | | | | | |

|  |  |  |  |
| --- | --- | --- | --- |
|  | and Normalization – The Need for Normalization –TheNormalizationProcess–HigherlevelNormalForm.  **IntroductiontoSQL**:DataDefinitionCommands–DataManipulationCommands–SELECTQueries–AdditionalDataDefinitionCommands–Additional  SELECTQueryKeywords–JoiningDatabaseTables. | |  |
| IV | **Advanced SQL**:Relational SET Operators: UNION –UNIONALL–INTERSECT-MINUS.SQLJoin  Operators: Cross Join – Natural Join – Join USINGClause – JOIN ON Clause – Outer Join.**Sub Queriesand Correlated Queries**: WHERE – IN – HAVING –ANY and ALL – FROM. SQL Functions: Date andTimeFunction–NumericFunction–StringFunction–ConversionFunction | | 12 |
| V | **PL/SQL**:AProgrammingLanguage:History–Fundamentals – Block Structure – Comments – DataTypes – Other Data Types – Variable Declaration –Assignment operation –Arithmetic operators.**ControlStructures and Embedded SQL**: Control Structures –NestedBlocks–SQLinPL/SQL–DataManipulation  – Transaction Control statements.**PL/SQL Cursorsand Exceptions**: Cursors – Implicit Cursors, ExplicitCursorsandAttributes–CursorFORloops–SELECT…FOR UPDATE – WHERE CURRENT OFclause – Cursor with Parameters – Cursor Variables –Exceptions–TypesofExceptions. | | 12 |
|  | **Total** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcomes** | | |
| CO | Oncompletionofthiscourse, studentswill |  | | |
| 1 | UnderstandthevariousbasicconceptsofDataBase  System.DifferencebetweenfilesystemandDBMS | PO1 | | |

|  |  |  |
| --- | --- | --- |
|  | andcomparevariousdatamodels. |  |
| 2 | Definethe integrityconstraints. Understand the  basicconceptsofRelationalDataModel,Entity-RelationshipModel. | PO1,PO2 |
| 3 | Design database schema considering normalizationand relationships within database. Understand andconstructdatabaseusingStructured Query Language.Attain a good practical skill of managing andretrievingofdatausingDataManipulationLanguage  (DML) | PO4,PO6 |
| 4 | Classify the different functions and various joinoperationsandenhancetheknowledgeofhandling  multipletables. | PO4,PO5,PO6 |
| 5 | LearntodesignDatabaseoperationsandimplementusing PL/SQL programs. Learn basics of PL/SQLanddevelopprogramsusingCursors,Exceptions | PO3,PO8 |
| **TextBook** | | |
| 1 | Coronel,Morris,Rob,"DatabaseSystems,Design, ImplementationandManagement",  NinthEdition | |
| 2 | NileshShah,"DatabaseSystemsUsingOracle",2ndedition,PearsonEducationIndia,  2016 | |
| **ReferenceBooks** | | |
| 1. | Abraham Silberschatz, Henry F.Korth and S.Sudarshan,―Database System  Concepts‖,McGrawHillInternationalPublication,VIEdition | |
| 2. | ShioKumarSingh,―DatabaseSystems―,Pearsonpublications,IIEdition | |
| **WebResources** | | |
| 1. | WebresourcesfromNDLLibrary,E-contentfromopen-sourcelibraries | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 2 | 3 |
| **CO3** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 2 | 3 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 2 |
| **Weightageofcoursecontributed to eachPSO** | 15 | 15 | 14 | 15 | 14 | 14 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **BigDataAnalytics** |  | 4 | - | - | - | | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | UnderstandtheBigDataPlatformanditsUsecases,MapReduceJobs | | | | | | | | | | | |
| LO2 | Toidentifyandunderstandthebasicsofclusteranddecisiontree | | | | | | | | | | | |
| LO3 | TostudyabouttheAssociationRules,RecommendationSystem | | | | | | | | | | | |
| LO4 | Tolearnaboutthe conceptofstream | | | | | | | | | | | |
| LO5 | UnderstandtheconceptsofNoSQLDatabases | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No. ofHours** | | | | | |
| I | Evolution of Big data — Best Practices for Big dataAnalytics — Big data characteristics — Validating —The Promotion of the Value of Big Data — Big DataUse Cases- Characteristics of Big Data Applications —Perception and Quantification of Value -UnderstandingBig Data Storage —A General Overview of High-PerformanceArchitecture—HDFS—MapReduce  andYARN—MapReduceProgrammingModel | | | | | | 12 | | | | | |
| II | Advanced Analytical Theory and Methods: Overviewof Clustering — K-means — Use Cases — Overviewof theMethod—DeterminingtheNumberofClusters  — Diagnostics — Reasons to Choose and Cautions .-Classification:DecisionTrees—OverviewofaDecision Tree — The General Algorithm — DecisionTreeAlgorithms—EvaluatingaDecisionTree—Decision Trees in R — Naïve Bayes — Bayes  Theorem—NaïveBayesClassifier. | | | | | | 12 | | | | | |
| III | AdvancedAnalyticalTheoryandMethods:Association | | | | | | 12 | | | | | |

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| --- | --- | --- | --- |
|  | Rules—Overview—AprioriAlgorithm—EvaluationofCandidateRules—ApplicationsofAssociationRules—FindingAssociation&findingsimilarity — Recommendation System: CollaborativeRecommendation- Content Based Recommendation —KnowledgeBasedRecommendation-Hybrid  RecommendationApproaches. | |  |
| IV | IntroductiontoStreamsConcepts—StreamDataModelandArchitecture—StreamComputing,Sampling Data in a Stream — Filtering Streams —Counting Distinct Elements in a Stream — Estimatingmoments—CountingonenessinaWindow—DecayingWindow—RealtimeAnalyticsPlatform(RTAP) applications — Case Studies — RealTime Sentiment Analysis, Stock Market Predictions.UsingGraphAnalyticsforBigData:GraphAnalytics | | 12 |
| V | NoSQL Databases : Schema-less Models: IncreasingFlexibility for Data Manipulation-Key Value Stores-Document Stores — Tabular Stores — Object DataStores—GraphDatabasesHive—Sharding—Hbase  — Analyzing big data with twitter — Big data for E-Commerce Big data for blogs — Review of Basic DataAnalyticMethodsusingR. | | 12 |
|  | **Total** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcomes** | | |
| CO | Oncompletionofthiscourse, studentswill |  | | |
| 1 | Work withbigdatatoolsanditsanalysistechniques. | PO1 | | |
| 2 | Analyzedatabyutilizingclusteringandclassificationalgorithms. | PO1,PO2 | | |

|  |  |  |
| --- | --- | --- |
| 3 | Learnandapplydifferentminingalgorithmsandrecommendationsystemsforlargevolumesofdata. | PO4,PO6 |
| 4 | Performanalyticsondatastreams. | PO4,PO5,PO6 |
| 5 | LearnNoSQLdatabasesandmanagement. | PO3,PO8 |
| **TextBook** | | |
| 1 | AnandRajaramanandJeffreyDavidUllman,―MiningofMassiveDatasets‖, CambridgeUniversityPress,2012. | |
| **ReferenceBooks** | | |
| 1. | DavidLoshin,―BigDataAnalytics:FromStrategicPlanningtoEnterprise  IntegrationwithTools,Techniques,NoSQL,andGraph‖,MorganKaufmann/ElsevierPublishers,2013 | |
| 2. | EMCEducationServices,―DataScienceandBigDataAnalytics:Discovering, Analyzing,VisualizingandPresentingData‖,Wileypublishers,2015. | |
| **WebResources** | | |
| 1. | [https://www.simplilearn.com](https://www.simplilearn.com/) | |
| 2. | <https://www.sas.com/en_us/insights/analytics/big-data-analytics.html> | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 1 | 3 | 2 | 2 | 3 | 1 |
| **CO2** | 3 | 2 | 3 | 2 | 3 | 3 |
| **CO3** | 1 | 3 | 2 | 2 | 2 | 1 |
| **CO4** | 3 | 3 | 3 | 1 | 3 | 3 |
| **CO5** | 3 | 2 | 3 | 3 | 3 | 3 |
| **Weightageofcoursecontributedtoeach**  **PSO** | 11 | 13 | 13 | 10 | 14 | 11 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **InternetofThingsanditsapplications** |  | 4 | - | - | - | | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | UseofDevices,GatewaysandDataManagementinIoT. | | | | | | | | | | | |
| LO2 | DesignIoTapplicationsindifferentdomainandbeabletoanalyzetheirperformance | | | | | | | | | | | |
| LO3 | ImplementbasicIoTapplicationsonembeddedplatform | | | | | | | | | | | |
| LO4 | TogainknowledgeonIndustryInternetofThings | | | | | | | | | | | |
| LO5 | ToLearnabouttheprivacyandSecurityissuesinIoT | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No. ofHours** | | | | | |
| I | IoT&WebTechnology,TheInternetofThingsToday,TimeforConvergence,TowardstheIoTUniverse,Internet of Things Vision, IoT Strategic Research andInnovationDirections,IoTApplications,FutureInternetTechnologies,Infrastructure,NetworksandCommunication,Processes,DataManagement,Security, Privacy&Trust,DeviceLevelEnergyIssues,IoTRelatedStandardization,Recommendationson  ResearchTopics. | | | | | | 12 | | | | | |
| II | M2MtoIoT–ABasicPerspective–Introduction,SomeDefinitions,M2MValueChains,IoTValueChains, An emerging industrial structure for IoT, Theinternationaldrivenglobalvaluechainandglobalinformationmonopolies.M2MtoIoT-AnArchitecturalOverview–Buildinganarchitecture,Maindesignprinciplesandneededcapabilities,AnIoTarchitecture  outline,standardsconsiderations. | | | | | | 12 | | | | | |
| III | IoT Architecture -State of the Art – Introduction, Stateof the art, Architecture. Reference Model- Introduction,Reference Model and architecture, IoTreference  Model, IoTReference Architecture- Introduction, | | | | | | 12 | | | | | |

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| --- | --- | --- | --- |
|  | FunctionalView,InformationView,Deploymentand  OperationalView,OtherRelevantarchitecturalviews | |  |
| IV | IoTApplicationsforValueCreationsIntroduction,IoTapplications for industry: Future Factory Concepts,Brownfield IoT, Smart Objects, Smart Applications,Four Aspects in your Business to Master IoT, ValueCreation from Big Data and Serialization, IoT forRetailing Industry, IoT For Oil and GasIndustry,Opinions on IoT Application and Value for Industry,HomeManagement | | 12 |
| V | Internet of Things Privacy, Security and GovernanceIntroduction,OverviewofGovernance,PrivacyandSecurityIssues,ContributionfromFP7Projects,Security, Privacy and Trust in IoT-Data-Platforms forSmart Cities, First Steps Towards a Secure Platform,Smartie Approach. DataAggregation for the IoTinSmartCities,Security | | 12 |
|  | **Total** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcomes** | | |
| CO | Oncompletionofthiscourse, studentswill |  | | |
| 1 | Work withbigdatatoolsanditsanalysistechniques. | PO1 | | |
| 2 | Analyzedatabyutilizingclusteringandclassificationalgorithms. | PO1,PO2 | | |
| 3 | Learnandapplydifferentminingalgorithmsandrecommendationsystemsforlargevolumesofdata. | PO4,PO6 | | |
| 4 | Performanalyticsondatastreams. | PO4,PO5,PO6 | | |
| 5 | LearnNoSQLdatabasesandmanagement. | PO3,PO8 | | |
| **TextBook** | | | | |
| 1 | VijayMadisettiandArshdeepBahga,―InternetofThings:(AHands-onApproach)‖,  UniversitiesPress(INDIA)PrivateLimited2014,1stEdition. | | | |
| **ReferenceBooks** | | | | |
| 1. | MichaelMiller,―TheInternetofThings:HowSmartTVs,SmartCars,SmartHomes,  andSmartCitiesAreChangingtheWorld‖,kindleversion. | | | |
| 2. | FrancisdaCosta,―RethinkingtheInternetofThings:AScalableApproachto  ConnectingEverything‖,ApressPublications2013,1stEdition,. | | | |

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| --- | --- |
| 3 | WaltenegusDargie,ChristianPoellabauer,"FundamentalsofWirelessSensorNetworks:  TheoryandPractice‖4..CunoPfister,―GettingStartedwiththeInternetofThings‖, O‟ReillyMedia2011 |
| **WebResources** | |
| 1. | [https://www.simplilearn.com](https://www.simplilearn.com/) |
| 2. | https://[www.javatpoint.com](http://www.javatpoint.com/) |
| 3. | https://[www.w3schools.com](http://www.w3schools.com/) |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **-** | **-** | **2** | **-** | **2** |
| **CO2** | **2** | **1** | **-** | **1** | **3** | **1** |
| **CO3** | **3** | **-** | **1** | **1** | **-** | **1** |
| **CO4** | **2** | **-** | **-** | **2** | **1** | **2** |
| **CO5** | **2** | **-** | **-** | **2** | **-** | 2 |
| **Weightageofcourse**  **contributedtoeachPSO** | 11 | 1 | 1 | 8 | 4 | 8 |

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

**SOFTWAREPROJECTMANAGEMENT**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | | |
| **CIA** | **External** | | **Total** |
|  | | **4** | **-** | **-** | **-** | **3** | **4** | **25** | **75** | | **100** |
| **LearningObjectives** | | | | | | | | | | | |
| **LO1** | Todefineandhighlightimportanceofsoftware projectmanagement. | | | | | | | | | | |
| **LO2** | Toformulateanddefinethesoftwaremanagementmetrics& strategyinmanagingprojects | | | | | | | | | | |
| **LO3** |  | | | | | | | | | | |
| **LO4** | Understandtoapplysoftwaretestingtechniquesincommercialenvironment | | | | | | | | | | |
| **Unit** | **Contents** | | | | | | | | | **No.of**  **Hours** | |
| I | Introduction to Competencies - Product Development Techniques -Management Skills - Product Development Life Cycle - SoftwareDevelopmentProcessandmodels-TheSEICMM-International  OrganizationforStandardization. | | | | | | | | | **12** | |
| II | Managing Domain Processes - Project Selection Models - ProjectPortfolio Management- Financial Processes- Selecting a ProjectTeam - Goal and Scope of the Software Project -Project Planning -Creating the Work Breakdown Structure - Approaches to Building aWBS-ProjectMilestones-WorkPackages-BuildingaWBSfor  Software. | | | | | | | | | **12** | |
| III | Tasks and Activities - Software Size and Reuse Estimating - TheSEICMM-ProblemsandRisks-CostEstimation- EffortMeasures-COCOMO:ARegressionModel-COCOMOII -SLIM:AMathematicalModel-OrganizationalPlanning-Project  RolesandSkillsNeeded. | | | | | | | | | **12** | |
| IV | Project Management Resource Activities - Organizational Form andStructure - Software Development Dependencies - Brainstorming -Scheduling Fundamentals - PERTand CPM - Leveling ResourceAssignments-MaptheScheduletoaRealCalendar- CriticalChain  Scheduling. | | | | | | | | | **12** | |
| V | Quality: Requirements – The SEI CMM - Guidelines - Challenges -QualityFunctionDeployment-BuildingtheSoftwareQualityAssurance - Plan - Software Configuration Management: Principles -Requirements-PlanningandOrganizing-Tools-Benefits-Legal  IssuesinSoftware-CaseStudy | | | | | | | | | **12** | |
| **TOTAL** | | | | | | | | | | **60** | |
| **CO** | **CourseOutcomes** | | | | | | | | | | |
| CO1 | Understandtheprinciplesandconceptsofprojectmanagement | | | | | | | | | | |
| CO2 | Knowledgegainedtotrainsoftwareproject managers | | | | | | | | | | |
| CO3 | Applysoftwareprojectmanagementmethodologies. | | | | | | | | | | |

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| --- | --- |
| CO4 | Abletocreatecomprehensiveprojectplans |
| CO5 | Evaluateandmitigaterisksassociatedwithsoftwaredevelopmentprocess |
| **Textbooks** | |
|  | RobertT.Futrell,DonaldF.Shafer,LindaI.Safer,―QualitySoftwareProject Management‖,PearsonEducationAsia2002. |
| **ReferenceBooks** | |
| 1. | PankajJalote,―SoftwareProjectManagementinPractice‖,AddisonWesley2002. |
| 2. | Hughes,―SoftwareProjectManagement‖,TataMcGrawHill2004,3rdEdition. |
| **NOTE:LatestEditionofTextbooksMaybeUsed** | |
| **WebResources** | |
| 1. | NPTEL&MOOCcoursestitledSoftwareProjectManagement |
| 2. | [www.smartworld.com/notes/software-project-management](http://www.smartworld.com/notes/software-project-management) |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **MAPPINGTABLE** | | | | | | |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **2** | **-** | **3** | **3** | **1** |
| **CO2** | **2** | **1** | **-** | **3** | **3** | **-** |
| **CO3** | **3** | **-** | **1** | **2** | **3** | **3** |
| **CO4** | **2** | **3** | **2** | **3** | **2** | **-** |
| **CO5** | **2** | **2** | **-** | **3** | **3** | **3** |
| **Weightageofcoursecontributed**  **toeachPSO** | **11** | **8** | **3** | **14** | **14** | **7** |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **ImageProcessing** | Elective | 4 | - | - | - | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | Tolearnfundamentalsofdigitalimageprocessing. | | | | | | | | | | |
| LO2 | Tolearnabout various2DImagetransformations | | | | | | | | | | |
| LO3 | Tolearnaboutvariousimageenhancementprocessingmethodsandfilters | | | | | | | | | | |
| LO4 | TolearnaboutvariousclassificationofImagesegmentationtechniques | | | | | | | | | | |
| LO5 | Tolearnaboutvariousimagecompressiontechniques | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | **No.of**  **Hours** | |
| I | **Digital Image Fundamentals:** Image representation - Basic relationshipbetween pixels, Elements of DIP system -Applications of Digital ImageProcessing - 2D Systems - Classification of 2D Systems - MathematicalMorphology- Structuring Elements- Morphological Image Processing-2DConvolution-2DConvolutionThroughGraphicalMethod-2D  ConvolutionThroughMatrixAnalysis | | | | | | | | | 12 | |
| II | 2DImagetransforms:Propertiesof2D-DFT-Walshtransform-Hadamardtransform-Haartransform-DiscreteCosineTransform-  Karhunen-LoeveTransform-SingularValueDecomposition | | | | | | | | | 12 | |
| III | ImageEnhancement:Spatialdomainmethods-Pointprocessing-Intensitytransformations-Histogramprocessing-Spatialfiltering-smoothing filter- Sharpening filters - Frequency domain methods: lowpassfiltering, highpassFiltering-Homomorphicfilter. | | | | | | | | | 12 | |
| IV | Image segmentation:Classification of Image segmentation techniques -Regionapproach–Clusteringtechniques-Segmentationbasedonthresholding-Edgebasedsegmentation-Classificationofedges-Edge  detection-Houghtransform-Activecontour. | | | | | | | | | 12 | |
| V | ImageCompression:Needfor compression-Redundancy-Classification  ofimage-Compressionschemes-Huffmancoding-Arithmeticcoding- | | | | | | | | | 12 | |

|  |  |  |  |
| --- | --- | --- | --- |
|  | Dictionarybasedcompression-Transformbasedcompression, | |  |
|  | **Total** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcome** | |
| CO | Oncompletionofthiscourse, studentswill |  | |
| 1 | Understand the fundamental concepts of digitalimageprocessing. | PO1 | |
| 2 | Understandvarious2DImagetransformations | PO1,PO2 | |
| 3 | Understandimageenhancementprocessing  techniquesandfilters | PO4,PO6 | |
| 4 | Understandtheclassification of Imagesegmentationtechniques | PO4,PO5,PO6 | |
| 5 | Understandvariousimagecompressiontechniques | PO3,PO8 | |
| **TextBook** | | | |
| 1 | SJayaraman,SEsakkirajan,TVeerakumar,Digitalimageprocessing,TataMcGrawHill,2015 | | |
| 2 | GonzalezRafelC,DigitalImageProcessing,PearsonEducation,2009 | | |
| **ReferenceBooks** | | | |
| 1. | 1.JainAnilK,Fundamentalsofdigitalimageprocessing:,PHI,1988 | | |
| 2. | KennethRCastleman,Digitalimageprocessing:,PearsonEducation,2/e,2003 | | |
| 3. | PrattWilliamK,DigitalImageProcessing:,JohnWiley,4/e,2007 | | |
| **WebResources** | | | |
| 1. | https://kanchiuniv.ac.in/coursematerials/Digital%20image%20processing%20-  Vijaya%20Raghavan.pdf | | |
| 2. | <http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203>  rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf | | |
| 3. | https://dl.acm.org/doi/10.5555/559707 | | |
| 4. | https://[www.ijert.org/image-processing-using-web-2-0-2](http://www.ijert.org/image-processing-using-web-2-0-2) | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 1 | 3 | 2 | 2 | 3 | 1 |
| **CO2** | 3 | 2 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 3 | 2 | 2 | 2 | 1 |
| **CO4** | 3 | 3 | 3 | 1 | 3 | 3 |
| **CO5** | 3 | 2 | 3 | 3 | 3 | 3 |
| **Weightageofcoursecontributedtoeach**  **PSO** | 13 | 13 | 13 | 10 | 14 | 11 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **InformationSecurity** | **Elective** | 4 | - | - | - | | 3 | 4 | 25 | 75 | 100 |
| **CourseObjectives** | | | | | | | | | | | | |
| LO1 | Toknowtheobjectivesofinformationsecurity | | | | | | | | | | | |
| LO2 | Understandthe importance andapplicationofeachofconfidentiality,integrity,authenticationand availability | | | | | | | | | | | |
| LO3 | Understandvariouscryptographicalgorithms | | | | | | | | | | | |
| LO4 | Understandthebasiccategoriesofthreatstocomputersandnetworks | | | | | | | | | | | |
| LO5 | Tostudyabouttheconceptsofsecurityinnetworks,websecurity | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No.ofHours** | | | | | | |
| I | IntroductiontoInformationSecurity:Securitymindset,ComputerSecurityConcepts(CIA),Attacks,Vulnerabilitiesandprotections,SecurityGoals,SecurityServices,Threats,Attacks,Assets,  malware,programanalysisandmechanisms | | | | | | 12 | | | | | | |
| II | TheSecurityProbleminComputing:ThemeaningofcomputerSecurity,ComputerCriminals,Methodsof Defense.Cryptography:ConceptsandTechniques:Introduction,plaintextandciphertext,substitutiontechniques,transpositiontechniques,encryptionanddecryption | | | | | | 12 | | | | | | |
| III | SymmetricandAsymmetricCryptographicTechniques:DES,AES,RSAalgorithms  .AuthenticationandDigitalSignatures:UseofCryptographyforauthentication,Secure Hashfunction,Keymanagement–Kerberos | | | | | | 12 | | | | | | |

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| --- | --- | --- | --- |
| IV | Program Security : Non-malicious Program errors –Bufferoverflow,Incompletemediation,Time-of-check to Time-of- use Errors, Viruses, Trapdoors,Salami attack, Man-in-the- middle attacks, Covertchannels.FileprotectionMechanisms,UserAuthenticationDesigningTrustedO.S:Securitypolices,modelsofsecurity,trustedO.Sdesign,AssuranceintrustedO.S.Implementationexamples | 12 | |
| V | SecurityinNetworks:Threatsinnetworks,NetworkSecurityControls–Architecture,Encryption,ContentIntegrity,StrongAuthentication,AccessControls,WirelessSecurity, Honeypots, Traffic flow security. WebSecurity:Websecurityconsiderations,SecureSocketLayerandTransportLayerSecurity,Secureelectronictransaction | 12 | |
|  | **Total** | **60** | |
| **CourseOutcomes** | | |
| **CourseOutcomes** | Oncompletionofthiscourse, studentswill; | **ProgrammeOutcomes** |
| **CO1** | Understand network security threats, security  services,andcountermeasures | PO1 |
| **CO2** | Understand vulnerability analysis of network  security | PO1,PO2 |
| **CO3** | Acquirebackgroundonhashfunctions;authentication;firewalls;intrusiondetectiontechniques | PO4,PO6 |
| **CO4** | Gainhands-onexperiencewithprogrammingandsimulationtechniquesforsecurityprotocols. | PO4,PO5,PO6 |
| **CO5** | Applymethodsforauthentication,accesscontrol,  intrusiondetectionandprevention | PO3,PO8 |
| **TextBooks**  **(LatestEditions)** | | |

|  |  |
| --- | --- |
| 1. | SecurityinComputing,FourthEdition,byCharlesP.Pfleeger,PearsonEducation |
| 2. | CryptographyAndNetworkSecurityPrinciplesAndPractice,FourthorFifthEdition,WilliamStallings,Pearson |
|  |  |
| **ReferencesBooks**  **(Latesteditions,andthestyleasgivenbelowmustbestrictlyadheredto)** | |
| 1. | CryptographyandNetworkSecurity:CKShyamala,NHarini,DrTR  Padmanabhan,WileyIndia,lstEdition |
| 2. | CryptographyandNetworkSecurity:ForouzanMukhopadhyay,McGraw  Hill,2"dEdition |
| 3. | InformationSecurity,PrinciplesandPractice:MarkStamp,WileyIndia |
| 4. | PrinciplesofComputerSceurity:WM.ArthurConklin,GregWhite,TMH |
| **WebResources** | |
| 1. | <https://www.geeksforgeeks.org/what-is-information-security/> |
| 2. | [https://www.tutorialspoint.com/what-is-information-security#:~:text=Information%20security%20is%20designed%20and,destruction](https://www.tutorialspoint.com/what-is-information-security#%3A~%3Atext%3DInformation%20security%20is%20designed%20and%2Cdestruction%2C%20alteration%2C%20and%20disruption)  [%2C%20alteration%2C%20and%20disruption.](https://www.tutorialspoint.com/what-is-information-security#%3A~%3Atext%3DInformation%20security%20is%20designed%20and%2Cdestruction%2C%20alteration%2C%20and%20disruption) |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **3** | **1** | **2** | **3** | **2** |
| **CO2** | **2** | **-** | **1** | **-** | **3** | **2** |
| **CO3** | **-** | **3** | **1** | **3** | **-** | **-** |
| **CO4** | **2** | **3** | **1** | **3** | **3** | **-** |
| **CO5** | **2** | **3** | **1** | **3** | **3** | **2** |
| **Weightageofcoursecontributed to eachPSO** | 8 | 12 | 5 | 11 | 12 | 6 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **HumanComputerInteraction** | Elective | 4 | - | - | - | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | TolearnaboutthefoundationsofHumanComputerInteraction. | | | | | | | | | | |
| LO2 | Tolearnthedesignandsoftwareprocesstechnologies. | | | | | | | | | | |
| LO3 | TolearnHCI modelsandtheories. | | | | | | | | | | |
| LO4 | TolearnMobileEcosystem. | | | | | | | | | | |
| LO5 | TolearnthevarioustypesofWebInterfaceDesign. | | | | | | | | | | |
|  |  | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | **No. ofHours** | |
| I | **FOUNDATIONSOFHCI:**   * TheHuman:I/Ochannels–Memory * Reasoningandproblemsolving;TheComputer:Devices–Memory–processingandnetworks; * Interaction:Models– frameworks–Ergonomics–styles–   elements–interactivity-Paradigms.-CaseStudies | | | | | | | | | 12 | |
| II | **DESIGN&SOFTWAREPROCESS:**   * InteractiveDesign: * Basics– process–scenarios * Navigation:screendesignIterationandprototyping. * HCIinsoftwareprocess: * Software life cycle – usability engineering – Prototyping inpractice–designrationale.Designrules:principles,standards,   guidelines,rules.EvaluationTechniques–UniversalDesign | | | | | | | | | 12 | |

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| III | **MODELSANDTHEORIES:**   * HCI Models : Cognitive models:-Socio-Organizational issuesandstakeholderrequirements Communicationandcollaborationmodels-Hypertext, Multimediaand[WWW.](http://WWW/) | | 12 |
| IV | **MobileHCI:**   * MobileEcosystem:Platforms,Applicationframeworks * TypesofMobileApplications:Widgets,Applications,Games * MobileInformationArchitecture,Mobile2.0, * MobileDesign:ElementsofMobileDesign,Tools.-CaseStudies | | 12 |
| V | **WEB INTERFACE DESIGN:** Designing Web Interfaces – Drag &Drop,DirectSelection,ContextualTools,Overlays,InlaysandVirtualPages,ProcessFlow -CaseStudies | | 12 |
|  | **Total** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcome** | |
| CO | Oncompletionofthiscourse, studentswill |  | |
| 1 | UnderstandthefundementalsofHCI. | PO1 | |
| 2 | Understandthedesignandsoftwareprocesstechnologies. | PO1,PO2 | |
| 3 | UnderstandHCImodelsandtheories. | PO4,PO6 | |
| 4 | UnderstandMobile Ecosystem, typesofMobileApplications,mobileArchitectureanddesign. | PO4,PO5,PO6 | |
| 5 | UnderstandthevarioustypesofWebInterface  Design. | PO3,PO8 | |
| **TextBook** | | | |
| 1 | AlanDix,JanetFinlay,GregoryAbowd,RussellBeale,‖Human-Computer  Interaction‖‖,III Edition,PearsonEducation,2004(UNITI,II&III) | | |
| 2 | BrianFling,―‖Mobile Design and Development‖,IEdition,O‗ReillyMediaInc.,2009(UNIT–IV) | | |
| 3 | BillScottandTheresaNeil,―DesigningWebInterfaces‖,FirstEdition,O‗Reilly, | | |

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|  | 2009.(UNIT-V) |
| **ReferenceBooks** | |
| 1. | Shneiderman,―DesigningtheUserInterface:StrategiesforEffectiveHuman-Computer  Interaction‖,VEdition,PearsonEducation. |
| **WebResources** | |
| 1. | https://[www.interaction-design.org/literature/topics/human-computer-interaction](http://www.interaction-design.org/literature/topics/human-computer-interaction) |
| 2. | https://link.springer.com/10.1007/978-0-387-39940-9\_192 |
| 3. | https://en.wikipedia.org/wiki/Human%E2%80%93computer\_interaction |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **-** | **1** | **2** | **1** | **2** |
| **CO2** | **2** | **1** | **2** | **1** | **3** | **1** |
| **CO3** | **3** | **2** | **1** | **1** | **-** | **1** |
| **CO4** | **2** | **-** | **3** | **2** | **1** | **3** |
| **CO5** | **2** | **3** | **-** | **2** | **3** | 2 |
| **Weightageofcoursecontributedtoeach**  **PSO** | 11 | 6 | 7 | 8 | 8 | 9 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **FuzzyLogic** | Elective | 4 | - | - | - | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | Tounderstandthebasic conceptofFuzzylogic | | | | | | | | | | |
| LO2 | Tolearnthevariousoperationsonrelationproperties | | | | | | | | | | |
| LO3 | Tostudyaboutthemembershipfunctions | | | | | | | | | | |
| LO4 | TolearnabouttheDefuzzificationandFuzzyRule-BasedSystem | | | | | | | | | | |
| LO5 | TolearntheconceptsofApplicationsofFuzzyLogic | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No. ofHours** | | | | |
| I | Introduction toFuzzy Logic- FuzzySets-FuzzySetOperations,PropertiesofFuzzySets,ClassicalandFuzzyRelations:Introduction-CartesianProductofRelation-ClassicalRelations-CardinalityofCrispRelation. | | | | | | 12 | | | | |
| II | OperationsonCrispRelation-PropertiesofCrispRelations-Composition Fuzzy Relations, Cardinality ofFuzzyRelations-OperationsonFuzzyRelations-Properties of Fuzzy Relations-Fuzzy Cartesian ProductandComposition-ToleranceandEquivalenceRelations  ,CrispRelation. | | | | | | 12 | | | | |
| III | MembershipFunctions:Introduction,FeaturesofMembershipFunction,ClassificationofFuzzySets,Fuzzification,MembershipValueAssignments,Intuition, Inference,RankOrdering. | | | | | | 12 | | | | |

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| IV | Defuzzification: Introduction, Lambda Cuts for FuzzySets, Lambda Cuts for Fuzzy Relations, DefuzzificationMethods,FuzzyRule-BasedSystem:Introduction,FormationofRules,DecompositionofRules,AggregationofFuzzyRules,PropertiesofSetofRules. | | 12 |
| V | ApplicationsofFuzzyLogic:FuzzyLogicinAutomotiveApplications,FuzzyAntilockBrakeSystem-Antilock-Braking System and Vehicle Speed-EstimationUsing FuzzyLogic. | | 12 |
|  | **TOTAL** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcomes** | | |
| CO | Oncompletionofthiscourse, studentswill |  | | |
| 1 | UnderstandthebasicsofFuzzy sets,operationand  properties. | PO1 | | |
| 2 | ApplyCartesianproductandcompositiononFuzzyrelations and usethe tolerance and Equivalencerelations. | PO1,PO2 | | |
| 3 | AnalyzevariousfuzzificationmethodsandfeaturesofmembershipFunctions. | PO4,PO6 | | |
| 4 | Evaluatedefuzzificationmethodsforrealtimeapplications. | PO4,PO5,PO6 | | |
| 5 | DesignanapplicationusingFuzzylogicanditsRelations. | PO3,PO8 | | |
| **TextBook** | | | | |
| 1 | S.N.Sivanandam,S.SumathiandS.N.Deepa-IntroductiontoFuzzyLogicusingMATLAB,Springer-VerlagBerlinHeidelberg2007. | | | |
| **ReferenceBooks** | | | | |
| 1. | GuanrongChenandTrungTatPham-IntroductiontoFuzzySets,FuzzyLogicandFuzzyControlSystems | | | |
| 2. | TimothyJRoss,FuzzyLogicwithEngineeringApplications | | | |

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| **WebResources** | |
| 1. | <https://www.javatpoint.com/fuzzy-logic> |
| 2. | <https://www.guru99.com/what-is-fuzzy-logic.html> |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 2 | 3 | 2 | 2 | 1 | 1 |
| **CO2** | 3 | 2 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 3 | 2 | 2 | 2 | 3 |
| **CO4** | 2 | 3 | 1 | 1 | 3 | 3 |
| **CO5** | 3 | 2 | 3 | 3 | 3 | 3 |
| **Weightageofcourse**  **contributedtoeachPSO** | 13 | 13 | 11 | 10 | 12 | 13 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **ArtificialIntelligence** | Elective | 4 | - | - | - | | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | TolearnvariousconceptsofAITechniques. | | | | | | | | | | | |
| LO2 | TolearnvariousSearchAlgorithminAI. | | | | | | | | | | | |
| LO3 | TolearnprobabilisticreasoningandmodelsinAI. | | | | | | | | | | | |
| LO4 | TolearnaboutMarkovDecisionProcess. | | | | | | | | | | | |
| LO5 | TolearnvarioustypeofReinforcementlearning. | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | | **No.of**  **Hours** | |
| I | Introduction:Concept of AI, history, current status, scope, agents,  environments,ProblemFormulations,Reviewoftreeandgraphstructures,Statespacerepresentation,SearchgraphandSearchtree | | | | | | | | | | 12 | |
| II | SearchAlgorithms:Randomsearch,Searchwithclosedandopenlist,DepthfirstandBreadthfirstsearch,Heuristicsearch,Bestfirstsearch,  A\*algorithm,GameSearch | | | | | | | | | | 12 | |
| III | ProbabilisticReasoning:Probability,conditionalprobability,BayesRule, Bayesian Networks- representation, construction and inference,temporalmodel,hiddenMarkovmodel. | | | | | | | | | | 12 | |
| IV | MarkovDecision process : MDP formulation, utility theory, utility  functions,valueiteration,policyiterationandpartiallyobservableMDPs. | | | | | | | | | | 12 | |
| V | ReinforcementLearning:Passivereinforcementlearning,directutilityestimation, adaptive dynamic programming, temporal difference  learning,activereinforcementlearning-Qlearning | | | | | | | | | | 12 | |
|  | **Total** | | | | | | | | | | **60** | |
| **CourseOutcomes** | | | | | | | **ProgrammeOutcome** | | | | | |
| CO | Oncompletionofthiscourse, studentswill | | | | | |  | | | | | |

|  |  |  |
| --- | --- | --- |
| 1 | UnderstandthevariousconceptsofAITechniques. | PO1 |
| 2 | UnderstandvariousSearchAlgorithminAI. | PO1,PO2 |
| 3 | Understandprobabilisticreasoningandmodelsin  AI. | PO4,PO6 |
| 4 | UnderstandMarkovDecisionProcess. | PO4,PO5,PO6 |
| 5 | UnderstandvarioustypeofReinforcementlearningTechniques. | PO3,PO8 |
| **TextBook** | | |
| 1 | StuartRussellandPeterNorvig,―ArtificialIntelligence:AModernApproach‖,3rd Edition,PrenticeHall. | |
|  | ElaineRichandKevinKnight,―ArtificialIntelligence‖,TataMcGrawHill | |
| **ReferenceBooks** | | |
| 1. | Trivedi,M.C.,―AClassicalApproachtoArtificalIntelligence‖,KhannaPublishing House,Delhi. | |
| 2. | SarojKaushik,―ArtificialIntelligence‖,CengageLearningIndia,2011 | |
| 3. | DavidPooleandAlanMackworth,―ArtificialIntelligence:Foundationsfor ComputationalAgents‖,CambridgeUniversityPress2010 | |
| **WebResources** | | |
| 1. | NPTEL&MOOCcoursestitledArtificialIntelligenceandExpertSystems | |
| 2. | <https://nptel.ac.in/courses/106106140/> | |
| 3. | <https://nptel.ac.in/courses/106106126/> | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **3** | **2** | **3** | **2** | **-** |
| **CO2** | **2** | **-** | **2** | **3** | **3** | **2** |
| **CO3** | **1** | **2** | **-** | **-** | **2** | **3** |
| **CO4** | **3** | **1** | **2** | **2** | **2** | **1** |
| **CO5** | **2** | **1** | **3** | **1** | **2** | **2** |
| **Weightageofcoursecontributed to eachPSO** | 10 | 7 | 9 | 9 | 11 | 8 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **MobileAd-hocNetwork** | Elective | 4 | - | - | - | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | TolearnaboutbasicsconceptsofAd-hocnetwork models. | | | | | | | | | | |
| LO2 | TolearnaboutMediumAccessProtocols(MAC). | | | | | | | | | | |
| LO3 | TolearnaboutNetworkRoutingProtocolsandAlgorithms. | | | | | | | | | | |
| LO4 | TolearnaboutDeliveryandSecurityinTransportLayer. | | | | | | | | | | |
| LO5 | Tolearnaboutcrosslayerdesignandoptimizationtechniques,Integrationofad-hoc  withMobileIPnetworks. | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | **No.of**  **Hours** | |
| I | **Introduction**:Introductiontoad-hocnetworks–definition,characteristicsfeatures,applications.Characteristicsofwirelesschannel,ad-hocmobilitymodelsindoorandout-doormodels. | | | | | | | | | 12 | |
| II | **MediumAccessProtocol:**   * MACProtocols:Designissues,goalsandclassification. * Contentionbasedprotocols–withreservation,schedulingalgorithms, protocolsusingdirectionalantennas. * IEEE standards: 802.11a, 802.11b, 802.11g, 802.15.   HIPERLAN. | | | | | | | | | 12 | |
| III | **NetworkProtocols:**  Routing Protocols: Design issues, goals and classification. Proactive Vsreactiverouting,unicastroutingalgorithms,Multicastroutingalgorithms, hybrid routing algorithm, energy aware routing algorithm,hierarchicalrouting,QoSawarerouting. | | | | | | | | | 12 | |
| IV | **End–enddeliveryandsecurity:**TransportLayer:Issuesindesigning  –Transportlayerclassification, ad-hoc transportprotocols. Securityissuesinad-hocnetworks:issuesandchallenges,networksecurityattacks,secureroutingprotocols. | | | | | | | | | 12 | |

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| V | Needforcrosslayerdesign,crosslayeroptimization,parameteroptimization techniques, cross layer cautionary perspective. Integrationofad-hocwith MobileIP networks. | | 12 |
|  | **Total** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcome** | |
| CO | Oncompletionofthiscourse, studentswill |  | |
| 1 | UnderstandthebasicsconceptsofAd-hocnetworkmodels. | PO1 | |
| 2 | UnderstandtheMediumAccessProtocols(MAC). | PO1,PO2 | |
| 3 | UnderstandNetworkRoutingProtocols,designissuesandvarioustypesofRoutingAlgorithms. | PO4,PO6 | |
| 4 | Understandtheconcepts of Delivery andSecurity inTransportLayer. | PO4,PO5,PO6 | |
| 5 | UnderstandcrosslayertechniquesandIntegration  ofad-hocwithMobileIPnetworks. | PO3,PO8 | |
| **TextBook** | | | |
| 1 | C.SivaRamMurthyandB.S.Manoj,AdhocWirelessNetworksArchitectureandProtocolsIIedition,PearsonEdition,2007. | | |
|  | CharlesE.Perkins, Adhoc Networking, Addison –Wesley,2000 | | |
| **ReferenceBooks** | | | |
| 1. | StefanoBasagni,MarcoConti,SilviaGiordanoandIvanstojmenovic,Mobilead-hocnetworking,Wiley-IEEEpress,2004. | | |
| 2. | MohammadIlyas,Thehandbookofad-hocwirelessnetworks,CRCpress,2002. | | |
| 3. | T.Camp,J.Boleng,andV.Davies―ASurveyofMobilityModelsforAd-hoc Network‖ | | |
| 4. | Research,―WirelessCommn.andMobileComp-SpecialIssueonMobileAd-hoc networkingResearch,TrendsandApplications‖,Vol.2,no.5,2002,pp.483–502. | | |
| 5. | A survey of integrating IP mobility protocols and Mobile Ad-hoc networks,FekriM.bduljalilandShrikant K.Bodhe,IEEEcommunicationSurveyandtutorials,no:12007. | | |
| **WebResources** | | | |
| 1. | https://en.wikipedia.org/wiki/Wireless\_ad\_hoc\_network | | |
| 2. | https://[www.ijert.org/mobile-ad-hoc-network](http://www.ijert.org/mobile-ad-hoc-network) | | |

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| --- | --- |
| 3. | https://books.google.com/books/about/Mobile\_Ad\_Hoc\_Networking.html  id=GnkcHEsxAigC |

**MappingwithProgrammeOutcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **2** | **-** | **3** | **3** | **1** |
| **CO2** | **2** | **1** | **2** | **3** | **3** | **-** |
| **CO3** | **3** | **2** | **1** | **2** | **3** | **3** |
| **CO4** | **3** | **3** | **2** | **3** | **2** | **-** |
| **CO5** | **2** | **2** | **-** | **3** | **3** | **3** |
| **Weightageofcoursecontributed to eachPSO** | 12 | 10 | 5 | 14 | 14 | 7 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **ComputatiionalIntelligence** | Elective | 4 | - | - | - | | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | ToidentifyandunderstandthebasicsofAIanditssearch. | | | | | | | | | | | |
| LO2 | TostudyabouttheFuzzylogicsystems. | | | | | | | | | | | |
| LO3 | UnderstandandapplytheconceptsofNeuralNetworkanditsfunctions. | | | | | | | | | | | |
| LO4 | UnderstandtheconceptsofArtificalNeuralNetwork | | | | | | | | | | | |
| LO5 | TostudyabouttheGeneticAlgorithm. | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No. ofHours** | | | | | |
| I | **Introduction to AI**: Problem formulation – AIApplications – Problems – State Space and Search –ProductionSystems–BreadthFirstandDepthFirst–Travelling Salesman Problem – Heuristic searchtechniques: Generate and Test – Types of HillClimbing. | | | | | | 12 | | | | | |
| II | **FuzzyLogicSystems:**  Notion of fuzziness – Operations on fuzzy sets – T-norms and other aggregation operators – Basics ofApproximate Reasoning – Compositional Rule ofInference – Fuzzy Rule Based Systems – Schemesof Fuzzification – Inferencing – Defuzzification –FuzzyClustering–fuzzyrule-basedclassifier. | | | | | | 12 | | | | | |
| III | **NeuralNetworks:**WhatisNeuralNetwork,Learningrules andvarious activation functions,Single layerPerceptions, Back Propagation networks, Architectureof Backpropagation (BP) Networks, Back propagationLearning, Variation of Standard Back propagation  NeuralNetwork,IntroductiontoAssociativeMemory, | | | | | | 12 | | | | | |

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|  | Adaptive Resonance theory and Self Organizing Map,RecentApplications | |  |
| IV | **ArtificialNeuralNetworks:**FundamentalConcepts  – Basic Models of Artificial Neural Networks –  ImportantTerminologiesofANNs–McCulloch-PittsNeuron–LinearSeparability–HebbNetwork. | | 12 |
| V | **Genetic Algorithm:** Introduction–BiologicalBackground – Genetic Algorithm Vs TraditionalAlgorithm–BasicTerminologiesinGeneticAlgorithm–SimpleGA–GeneralGeneticAlgorithm–OperatorsinGeneticAlgorithm | | 12 |
|  | **Total** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcomes** | | |
| CO | Oncompletionofthiscourse, studentswill |  | | |
| 1 | Describethefundamentalsofartificialintelligenceconceptsandsearchingtechniques. | PO1 | | |
| 2 | Developthefuzzylogicsetsandmembershipfunctionanddefuzzificationtechniques. | PO1,PO2 | | |
| 3 | Understand theconceptsof Neural Networkandanalyzeandapplythelearningtechniques | PO4,PO6 | | |
| 4 | Understandtheartificialneuralnetworksanditsapplications. | PO4,PO5,PO6 | | |
| 5 | Understand theconceptof GeneticAlgorithm andAnalyzetheoptimizationproblemsusingGAs. | PO3,PO8 | | |
| **TextBook** | | | | |
| 1 | S.N.SivanandamandS.N.Deepa,―PrinciplesofSoftComputing‖,2ndEdition,Wiley IndiaPvt.Ltd. | | | |
| 2 | StuartRussellandPeterNorvig,―ArtificialIntelligence-AModernApproach‖,2nd Edition,Pearson Educationin Asia. | | | |
| 3 | S.Rajasekaran,G.A.Vijayalakshmi,―NeuralNetworks,FuzzyLogicandGenetic Algorithms:Synthesis&Applications‖,PHI. | | | |
| **ReferenceBooks** | | | | |
| 1. | F.Martin,Mcneill,andEllenThro,―FuzzyLogic:APracticalapproach‖,AP Professional,2000.ChinTeng Lin,C.S.GeorgeLee,‖Neuro-Fuzzy Systems‖,PHI | | | |

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| --- | --- |
| 2. | ChinTengLin,C.S.GeorgeLee,‖Neuro-FuzzySystems‖,PHI. |
| **WebResources** | |
| 1. | <https://www.javatpoint.com/artificial-intelligence-tutorial> |
| 2. | <https://www.w3schools.com/ai/> |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 2 | 3 | 2 | 2 | - | 1 |
| **CO2** | 3 | 2 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 1 | 2 | 2 | 2 | 3 |
| **CO4** | 2 | 3 | - | 1 | 3 | - |
| **CO5** | 3 | 2 | 3 | 3 | 3 | 3 |
| **Weightageofcoursecontributed to eachPSO** | 13 | 11 | 10 | 10 | 11 | 10 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **GridComputing** | Elective | 4 | - | - | - | | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | TolearnthebasicconstructionandapplicationofGridcomputing. | | | | | | | | | | | |
| LO2 | TolearngridcomputingorganizationandtheirRole. | | | | | | | | | | | |
| LO3 | TolearnGridComputingAnotomy. | | | | | | | | | | | |
| LO4 | TolearnGridComputingroadmap. | | | | | | | | | | | |
| LO5 | TolearnvarioustypeofGridArchitecture. | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | | **No. ofHours** | |
| I | Introduction:EarlyGridActivity,CurrentGridActivity,OverviewofGridBusinessareas,GridApplications, GridInfrastructures. | | | | | | | | | | 12 | |
| II | Grid Computing organization and their Roles: Organizations DevelopingGridStandards,andBestPracticeGuidelines,GlobalGridForum(GCF),#OrganizationDevelopingGridComputingToolkitsandFramework#, Organization and building and using grid based solutionstosolvecomputing,commercialorganizationbuildingandGridBased  solutions. | | | | | | | | | | 12 | |
| III | Grid Computing Anatomy: The Grid Problem, The conceptual of virtualorganizations, # Grid Architecture # and relationship to other distributedtechnology. | | | | | | | | | | 12 | |
| IV | The Grid Computing Road Map: Autonomic computing, Business ondemand and infrastructure virtualization, Service-Oriented ArchitectureandGrid,#SemanticGrids#. | | | | | | | | | | 12 | |
| V | MergingtheGridservicesArchitecturewiththeWebServicesArchitecture: Service-Oriented Architecture, Web Service Architecture,#XMLmessagesandEnveloping#,ServicemessagedescriptionMechanisms,RelationshipbetweenWebServicesandGridServices,  WebservicesInteroperabilityandtheroleoftheWS-IOrganization. | | | | | | | | | | 12 | |
|  | **Total** | | | | | | | | | | **60** | |
| **CourseOutcomes** | | | | | | | **ProgrammeOutcome** | | | | | |
| CO | Oncompletionofthiscourse, studentswill | | | | | |  | | | | | |
| 1 | Tounderstandthebasicelementsandconceptsof | | | | | | PO1 | | | | | |

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| --- | --- | --- |
|  | Gridcomputing. |  |
| 2 | TounderstandtheGridcomputingtoolkitsand  Framework. | PO1,PO2 |
| 3 | TounderstandtheconceptsofAnotomyofGrid  Computing. | PO4,PO6 |
| 4 | Tounderstandtheconceptofserviceoriented  architecture. | PO4,PO5,PO6 |
| 5 | ToGainknowledgeongridandwebservice  architecture. | PO3,PO8 |
| **TextBook** | | |
| 1 | JoshyJosephandCraigFellenstein,Gridcomputing,Pearson/IBMPress,PTR,2004. | |
| **ReferenceBooks** | | |
| 1. | 1.AhmerAbbasandGraigcomputing,APracticalGuidetotechnologyandapplications,CharlesRiverMedia,2003. | |
| **WebResources** | | |
| 1. | https://en.wikipedia.org/wiki/Grid\_computing | |
| 2. | https://link.springer.com/chapter/10.1007/978-1-84882-409-6\_4 | |
| 3. | https://[www.redbooks.ibm.com/redbooks/pdfs/sg246778.pdf](http://www.redbooks.ibm.com/redbooks/pdfs/sg246778.pdf) | |

**MappingwithProgrammeOutcomes:**

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| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **3** | **1** | **2** | **1** | **2** |
| **CO2** | **2** | **1** | **2** | **1** | **3** | **1** |
| **CO3** | **3** | **2** | **1** | **1** | **-** | **1** |
| **CO4** | **3** | **-** | **3** | **2** | **1** | **3** |
| **CO5** | **2** | **3** | **1** | **2** | **3** | 2 |
| **Weightageofcourse**  **contributedtoeachPSO** | 12 | 9 | 8 | 8 | 8 | 9 |

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **CloudComputing** | Elective | 4 | - | - | - | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | LearningfundamentalconceptsandTechnologiesofCloudComputing. | | | | | | | | | | |
| LO2 | Learningvariouscloudservicetypesandtheirusesandpitfalls. | | | | | | | | | | |
| LO3 | TolearnaboutCloudArchitectureand Applicationdesign. | | | | | | | | | | |
| LO4 | To know thevarious aspects of applicationdesign,benchmarking andsecurityon theCloud. | | | | | | | | | | |
| LO5 | TolearnthevariousCaseStudiesinCloudComputing. | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | **No. ofHours** | |
| I | Introduction to Cloud Computing: Definition of Cloud Computing –Characteristics of Cloud Computing – Cloud Models – Cloud ServiceExamples–Cloud-basedServicesandApplications.  Cloud Concepts and Technologies: Virtualization – Load balancing –Scalability and Elasticity – Deployment – Replication – Monitoring –SoftwareDefinedNetworking–NetworkFunctionVirtualization–  MapReduce–IdentityandAccessManagement–ServiceLevelAgreements–Billing. | | | | | | | | | 12 | |
| II | CloudServices  Compute Services: Amazon Elastic Computer Cloud - Google ComputeEngine-WindowsAzureVirtualMachines  StorageServices:AmazonSimpleStorageService-GoogleCloudStorage-WindowsAzureStorage  Database Services: Amazon Relational Data Store - Amazon DynamoDB - Google Cloud SQL - Google Cloud Data Store - Windows AzureSQLDatabase-WindowsAzureTableService  Application Services: Application Runtimes and Frameworks - QueuingServices-EmailServices-NotifictionServices-MediaServices  ContentDeliveryServices:AmazonCloudFront-WindowsAzureContentDelivery Network  Analytics Services: Amazon Elastic MapReduce - Google MapReduceService-GoogleBigQuery-WindowsAzureHDInsight | | | | | | | | | 12 | |

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| --- | --- | --- | --- |
|  | DeploymentandManagementServices:AmazonElasticBeanstack-AmazonCloudFormation  IdentityandAccessManagementServices:AmazonIdentiy andAccessManagement-WindowsAzureActiveDirectory  OpenSource Private Cloud Software: CloudStack– Eucalyptus -  OpenStack | |  |
| III | **Cloud Application Design:** Introduction – Design Consideration forCloudApplications–Scalability–ReliabilityandAvailability–Security – Maintenance and Upgradation – Performance – ReferenceArchitecturesforCloudApplications–CloudApplicationDesignMethodologies:ServiceOrientedArchitecture(SOA),CloudComponentModel,IaaS,PaaSandSaaSServicesforCloudApplications, Model View Controller (MVC), RESTful Web Services –Data Storage Approaches: Relational Approach (SQL), Non-RelationalApproach(NoSQL). | | 12 |
| IV | **CloudApplicationBenchmarkingandTuning:**IntroductiontoBenchmarking – Steps in Benchmarking – Workload Characteristics –ApplicationPerformanceMetrics–DesignConsiderationforBenchmarkingMethodology–BenchmarkingToolsandTypesofTests  –DeploymentPrototyping.  **Cloud Security:** Introduction – CSA Cloud Security Architecture –Authentication(SSO)–Authorization–IdentityandAccessManagement – Data Security : Securing data at rest, securing data inmotion –KeyManagement–Auditing. | | 12 |
| V | **Case Studies:** Cloud Computing for Healthcare – Cloud Computing forEnergy Systems - Cloud Computing for Transportation Systems - CloudComputingforManufacturingIndustry-CloudComputingforEducation. | | 12 |
|  | **Total** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcome** | |
| CO | Oncompletionofthiscourse, studentswill |  | |
| 1 | UnderstandthefundamentalconceptsandTechnologiesinCloudComputing. | PO1 | |
| 2 | Able to understandvarious cloudservicetypes andtheirusesand pitfalls. | PO1,PO2 | |
| 3 | AbletounderstandCloudArchitectureand | PO4,PO6 | |

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| --- | --- | --- |
|  | Applicationdesign. |  |
| 4 | Understand thevarious aspectsof applicationdesign,benchmarkingandsecurityintheCloud. | PO4,PO5,PO6 |
| 5 | UnderstandvariousCaseStudiesinCloudComputing. | PO3,PO8 |
| **TextBook** | | |
| 1 | ArshdeepBahga, VijayMadisetti,*CloudComputing–AHandsOnApproach*,  UniversitiesPress(India)Pvt.Ltd.,2018 | |
| **ReferenceBooks** | | |
| 1. | AnthonyT Velte,TobyJVelte,RobertElsenpeter,*CloudComputing:APractical*  *Approach*,TataMcGraw-Hill,2013. | |
| 2. | BarrieSosinsky,*CloudComputingBible*,WileyIndiaPvt.Ltd.,2013. | |
| 3. | DavidCrookes,*CloudComputinginEasySteps*,TataMcGrawHill,2015. | |
| 4. | Dr.KumarSaurabh,*CloudComputing*,WileyIndia,SecondEdition2012. | |
| **WebResources** | | |
| 1. | https://en.wikipedia.org/wiki/Cloud\_computing | |
| 2. | https://link.springer.com/chapter/10.1007/978-3-030-34957-8\_7 | |
| 3. | https://webobjects.cdw.com/webobjects/media/pdf/solutions/cloud-computing/121838-  CDW-Cloud-Computing-Reference-Guide.pdf | |

**MappingwithProgrammeOutcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **2** | **2** | **3** | **3** | **1** |
| **CO2** | **3** | **1** | **2** | **3** | **3** | **-** |
| **CO3** | **3** | **2** | **1** | **2** | **1** | **3** |
| **CO4** | **3** | **3** | **2** | **3** | **2** | **-** |
| **CO5** | **2** | **2** | **1** | **3** | **3** | **3** |
| **Weightageofcoursecontributed to eachPSO** | 13 | 10 | 8 | 14 | 12 | 7 |

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **ArtificialNeural**  **Networks** |  | 4 | - | - | - | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | **Understand thebasicsofartificialneuralnetworks,learningprocess,singlelayer**  **andmulti-layerperceptronnetworks.** | | | | | | | | | | |
| LO2 | UnderstandtheErrorCorrectionandvariouslearningalgorithmsandtasks. | | | | | | | | | | |
| LO3 | IdentifythevariousSingleLayerPerceptionLearningAlgorithm. | | | | | | | | | | |
| LO4 | IdentifythevariousMulti-LayerPerceptionNetwork. | | | | | | | | | | |
| LO5 | AnalyzetheDeepLearningofvariousNeuralnetworkanditsApplications. | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | **No. ofHours** | |
| I | ArtificialNeuralModel-Activationfunctions-FeedforwardandFeedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem - Multilayer Networks. Learning Algorithms-Errorcorrection-GradientDescentRules,PerceptionLearning  Algorithm,PerceptionConvergenceTheorem. | | | | | | | | | 12 | |
| II | Introduction,Errorcorrectionlearning,Memory-basedlearning,Hebbianlearning,Competitivelearning,Boltzmannlearning,creditassignmentproblem,Learningwithandwithoutteacher,learningtasks,  MemoryandAdaptation. | | | | | | | | | 12 | |
| III | *.*SinglelayerPerception:Introduction,PatternRecognition,Linearclassifier, Simple perception, Perception learning algorithm, ModifiedPerception learning algorithm, Adaptive linear combiner, Continuousperception,Learningincontinuousperception.LimitationofPerception. | | | | | | | | | 12 | |
| IV | Multi-LayerPerceptionNetworks:Introduction,MLP with2hidden  layers,SimplelayerofaMLP,Deltalearningruleoftheoutputlayer, | | | | | | | | | 12 | |

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|  | Multilayerfeedforwardneuralnetworkwithcontinuousperceptions,  Generalizeddeltalearningrule,Backpropagationalgorithm | |  |
| V | Deep learning- Introduction- Neuro architectures building blocks for theDL techniques, Deep Learning and Neocognitron, Deep ConvolutionalNeural Networks, Recurrent Neural Networks (RNN), feature extraction,DeepBeliefNetworks,RestrictedBoltzmanMachines,TrainingofDNN  andApplications | | 12 |
|  | **Total** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcome** | |
| CO | Oncompletionofthiscourse, studentswill |  | |
| 1 | **Studentswilllearnthebasicsofartificialneuralnetworks with single layer and multi-layer**  **perceptionnetworks.** | PO1 | |
| 2 | Learn about the Error Correction and various  learningalgorithmsandtasks. | PO1,PO2 | |
| 3 | LearnthevariousPerceptionLearningAlgorithm. | PO4,PO6 | |
| 4 | Learnabout the various Multi-Layer Perception  Network. | PO4,PO5,PO6 | |
| 5 | Understandthe Deep Learning of various Neural  networkanditsApplications. | PO3,PO8 | |
| **TextBook** | | | |
| 1 | NeuralNetworksAClassroomApproach-SatishKumar,McGrawHill-SecondEdition. | | |
| 2. | ―NeuralNetwork-AComprehensiveFoundation‖-SimonHaykins,PearsonPrentice Hall,2nd Edition,1999. | | |
| **ReferenceBooks** | | | |
| 1. | ArtificialNeuralNetworks-B.Yegnanarayana,PHI,NewDelhi1998. | | |
| **WebResources** | | | |
| 1. | https://[www.w3schools.com/ai/ai\_neural\_networks.asp](http://www.w3schools.com/ai/ai_neural_networks.asp) | | |
| 2. | https://en.wikipedia.org/wiki/Artificial\_neural\_network | | |
| 3. | https://link.springer.com/chapter/10.1007/978-3-642-21004-4\_12 | | |

**MappingwithProgrammeOutcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 2 | 3 | 2 | 2 | - | 1 |
| **CO2** | 3 | 2 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 1 | 2 | 2 | 2 | 3 |
| **CO4** | 2 | 3 | 3 | 1 | 3 | 1 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 3 |
| **Weightageofcoursecontributedtoeach**  **PSO** | 13 | 12 | 13 | 10 | 11 | 11 |

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **AgileProject**  **Management** | Elective | 4 | - | - | - | 3 | 4 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | Learningofsoftwaredesign,softwaretechnologiesand APIs. | | | | | | | | | | |
| LO2 | DetaileddemonstrationaboutAgiledevelopmentandtestingtechniques. | | | | | | | | | | |
| LO3 | LearningaboutAgilePlanningandExecution. | | | | | | | | | | |
| LO4 | ingofAgileManagementDesignandQualityCheck. | | | | | | | | | | |
| LO5 | DetailedexaminationofAgiledevelopmentandtestingtechniques. | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | **No.of**  **Hours** | |
| I | **Introduction:ModernizingProjectManagement:**ProjectManagementNeededaMakeover–IntroducingAgileProjectManagement.  **ApplyingtheAgileManifestoandPrinciples:**UnderstandingtheAgile manifesto – Outlining the four values of the Agile manifesto –Defining the 15 Agile Principles – Adding the Platinum Principles –ChangesasaresultofAgileValues–TheAgilelitmustest.  **Why BeingAgile Works Better:**Evaluating Agile benefits – HowAgile approaches beat historical approaches – Why people like beingAgile. | | | | | | | | | 12 | |
| II | **BeingAgile**  **Agile Approaches:** Diving under the umbrella of Agile approaches –ReviewingtheBigThree:Lean,Scrum,ExtremeProgramming-Summary | | | | | | | | | 12 | |

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|  | **AgileEnvironmentsinAction:**Creatingthephysicalenvironment–Low-techcommunicating–High-techcommunicating–Choosingtools.  **AgileBehavioursinAction:**EstablishingAgileroles–Establishingnewvalues–Changingteamphilosophy. |  |
| III | **AgilePlanningandExecution**  **DefiningtheProductVisionandRoadmap:**Agileplanning–Defining the product vision – Creating a product roadmap – Completingtheproductbacklog.  **Planning Releases and Sprints:** Refining requirements and estimates –Releaseplanning–Sprintplanning.  **WorkingThroughouttheDay:**Planningyourday–Trackingprogress  – Agile roles in the sprint – Creating shippable functionality – The endoftheday.  **Showcasing Work, Inspecting and Adapting:** The sprint review – Thesprintretrospective.  **PreparingforRelease:**Preparingtheproductfordeployment(thereleasesprint)–Preparingtheoperationalsupport–Preparingtheorganization for product deployment - Preparing the marketplace forproductdeployment | 12 |
| IV | **AgileManagement**  **Managing Scope and Procurement:** What‘s different about Agilescopemanagement–ManagingAgilescope–What‘sdifferentaboutAgileprocurement–ManagingAgileprocurement.  **Managing Time and Cost:** What‘s different about Agile timemanagement–ManagingAgileschedules–What‘sdifferentaboutAgilecost management–ManagingAgilebudgets.  **Managing Team Dynamics and Communication:** What‘s differentaboutAgileteamdynamics– ManagingAgileteamdynamics–What‘s | 12 |

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|  | differentaboutAgilecommunication–ManagingAgilecommunication.  **ManagingQualityandRisk:**What‘sdifferentaboutAgilequality–ManagingAgilequality–What‘sdifferentaboutAgileriskmanagement  –ManagingAgilerisk. | |  |
| V | **ImplementingAgile**  **Building a Foundation:** Organizational and individual commitment –Choosingtherightpilotteammembers– CreatingandenvironmentthatenablesAgility–SupportAgilityinitiallyandovertime.  **BeingaChangeAgent:**BecomingAgilerequireschange–whychangedoesn‘t happen on its own – Platinum Edge‘s Change Roadmap –Avoidingpitfalls–Signsyourchangesareslipping.  **Benefits, Factors for Success and Metrics:** Ten key benefits of Agileproject management – Ten key factors for project success – Ten metricsforAgileOrganizations. | | 12 |
|  | **Total** | | **60** |
| **CourseOutcomes** | | **ProgrammeOutcome** | |
| CO | Oncompletionofthiscourse, studentswill |  | |
| 1 | Understanding of software design, softwaretechnologiesandAPIsusingAgileManagement. | PO1 | |
| 2 | Understanding of Agiledevelopmentandtestingtechniques. | PO1,PO2 | |
| 3 | UnderstandingaboutAgilePlanningandExecutionusingSprint. | PO4,PO6 | |
| 4 | Understanding of Agile Management Design, scope ,Procurement, managing Time and Cost and QualityCheck. | PO4,PO5,PO6 | |

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| --- | --- | --- |
| 5 | Analysing of Agile development and testingtechniques. | PO3,PO8 |
| **TextBook** | | |
| 1 | MarkC.Layton,StevenJ.Ostermiller,AgileProjectManagementforDummies,2ndEdition,Wiley IndiaPvt.Ltd.,2018. | |
|  | Jeff Sutherland, Scrum – The Art of Doing Twice the Work in Half the Time, Penguin,2014. | |
| **ReferenceBooks** | | |
| 1. | MarkC.Layton,DavidMorrow,*ScrumforDummies*,2ndEdition,WileyIndiaPvt.Ltd.,2018. | |
| 2. | MikeCohn,SucceedingwithAgile–SoftwareDevelopmentusingScrum,Addison-WesleySignatureSeries,2010. | |
| 3. | AlexMoore,AgileProjectManagement,2020. | |
| 4. | AlexMoore,*Scrum*,2020. | |
| 5. | Andrew Stellmanand JenniferGreene,*LearningAgile: UnderstandingScrum, XP,Lean,andKanban*,Shroff/O'Reilly,FirstEdition,2014. | |
| **WebResources** | | |
| 1. | [www.agilealliance.org/resources](http://www.agilealliance.org/resources) | |

**MappingwithProgrammeOutcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **3** | **1** | **2** | **1** | **2** |
| **CO2** | **3** | **1** | **2** | **1** | **3** | **1** |
| **CO3** | **3** | **2** | **1** | **1** | **3** | **1** |
| **CO4** | **3** | **2** | **3** | **2** | **1** | **3** |
| **CO5** | **2** | **3** | **1** | **2** | **3** | 2 |
| **Weightageofcourse**  **contributedtoeachPSO** | 13 | 11 | 8 | 8 | 11 | 9 |

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

**AnnexureII**

**SkillEnhancementCourse(SEC1–SEC8)**

1. FundamentalsofInformationTechnology
2. IntroductiontoHTML
3. WebDesigning
4. PHPProgramming
5. Software Testing
6. ProblemSolvingTechniques
7. UnderstandingInternet
8. Office Automation
9. Quantitative Aptitude
10. OpenSourceTechnologies
11. MultimediaSystems
12. AdvancedExcel
13. Biometrics
14. CyberForensics
15. PatternRecognition
16. EnterpriseResourcePlanning
17. RoboticsandApplications
18. SimulationandModelling
19. OrganizationBehaviorandmore..

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| **SubjectCode** | | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | | |
| **CIA** | **External** | | **Total** |
|  | | **FUNDAMENTALSOFINFORMATIONTECHNOLOGY** | SpecificElecti  ve | 2 | - | - | - | 2 | 25 | 75 | | 100 |
| **Learning Objectives** | | | | | | | | | | | | |
| **LO1** | Understandbasicconceptsandterminologyofinformationtechnology. | | | | | | | | | | | |
| **LO2** | Have abasicunderstandingofpersonalcomputersandtheiroperation | | | | | | | | | | | |
| **LO3** | Beabletoidentifydatastorageanditsusage | | | | | | | | | | | |
| **LO4** | Get greatknowledgeofsoftware anditsfunctionalities | | | | | | | | | | | |
| **LO5** | Understandaboutoperatingsystemandtheiruses | | | | | | | | | | | |
| **UNIT** | **Contents** | | | | | | | | | | **No.Of.**  **Hours** | |
| I | **IntroductiontoComputers**-GenerationsofComputer–DataandInformation – Components of Computer – Software – Hardware – InputDevices-OutputDevices––TypesofOperatingSystem. | | | | | | | | | | **6** | |

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| II | **MSWord**:Introduction–ElementsofWindow–Files,FoldersandDirectories – Text Manipulating: Cut, Copy, Paste, Drag and Drop – TextFormatting: Font – Style, Size, Face and Colors (Both foreground andbackground)–Alignment-BulletsandNumbering-Headerandfooter-  watermark–insertingobjects(images,otherapplicationdocument)–Tablecreation – Mailmerge. | | | **6** |
| III | **MsExcel**:Introduction–Insertingrowsandcolumns–Sizingrowsandcolumns–Implementingformulas–Generating series-Functionsinexcel  –CreationofChart–Insertingobjects–Filter–Sorting–Insertingworksheet. | | | **6** |
| IV | **MSPowerPoint**:Introduction–SlidesManipulation(Insertingnew,Copy,paste, delete and duplicate slides) –Slide show– Types of Views – TypesofAnimations–InsertingObjects–Implementingmultimedia(Videoand  Audio)–Templates(Built-inandUser-Defined). | | | **6** |
| V | **Internet**: Introductionto Internet and Intranet–Services of Internet-Domain Name – URL – Browser – Types of Browsers – Search Engine -E-Mail – Basic Components of E-Mail –.How to send groupmail.**E-Commerce**:DigitalSignature–DigitalCurrency–Onlineshoppingand  transaction. | | | **6** |
| **TOTALHOURS** | | | | **30** |
| **CourseOutcomes** | | | **Programme**  **Outcomes** | |
| CO | | Oncompletionofthiscourse,studentswill |  | |
| CO1 | | Learnthebasicsofcomputer,Construct thestructureoftherequiredthingsincomputer,learnhowtouseit. | PO1, PO2, PO3,PO4,PO5,PO6 | |
| CO2 | | Developorganizationalstructureusingforthedevicespresentcurrentlyunderinputor outputunit. | PO1, PO2, PO3,PO4,PO5,PO6 | |
| CO3 | | ConceptofstoringdataincomputerusingtwoheadernamelyRAMandROMwithdifferenttypesofROMwithadvancementinstoragebasis. | PO1, PO2, PO3,PO4,PO5,PO6 | |
| CO4 | | Work withdifferent software,Writeprograminthesoftwareand  applicationsofsoftware. | PO1, PO2, PO3,PO4,PO5,PO6 | |
| CO5 | | UsageofOperatingsystemininformationtechnologywhichreallyacts  asainterpreterbetweensoftwareand hardware. | PO1,PO2,PO3,  PO4,PO5,PO6 | |
| **Textbooks** | | | | |
| 1 | | AnoopMathew,S.KavithaMurugeshan(2009),―FundamentalofInformationTechnology‖,MajesticBooks. | | |
| 2 | | AlexisLeon,MathewsLeon,‖FundamentalofInformationTechnology‖,2ndEdition. | | |
| 3 | | S.KBansal,―FundamentalofInformationTechnology‖. | | |
| **ReferenceBooks** | | | | |

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| --- | --- |
| 1. | BhardwajSushilPuneetKumar,―FundamentalofInformationTechnology‖ |
| 2. | GGWILKINSON,―FundamentalsofInformationTechnology‖,Wiley-Blackwell |
| 3. | [ARavichandran](https://www.bookganga.com/eBooks/Books?AID=5563813659127023211),―FundamentalsofInformationTechnology‖,KhannaBookPublishing |
| **WebResources** | |
| 1. | https://testbook.com/learn/computer-fundamentals |
| 2. | https://[www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html](http://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html) |
| 3. | https://[www.javatpoint.com/computer-fundamentals-tutorial](http://www.javatpoint.com/computer-fundamentals-tutorial) |
| 4. | https://[www.tutorialspoint.com/computer\_fundamentals/index.htm](http://www.tutorialspoint.com/computer_fundamentals/index.htm) |
| 5. | https://[www.nios.ac.in/media/documents/sec229new/Lesson1.pdf](http://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf) |

**MappingwithProgrammeOutcomes:**

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| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **3** | **2** | **2** | **1** | **1** |
| **CO2** | **3** | **2** | **3** | **2** | **3** | **3** |
| **CO3** | **3** | **2** | **2** | **2** | **2** | **3** |
| **CO4** | **2** | **3** | **3** | **3** | **3** | **1** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **2** |
| **Weightageofcourse**  **contributedtoeachPSO** | **13** | **13** | **13** | **12** | **12** | **10** |

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | | | | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | | |
| **CIA** | **External** | | **Total** |
|  | | | | **INTRODUCTIONTOHTML** | Specific  Elective | 2 | - | - |  | 2 | 25 | 75 | | 100 |
| **Learning Objectives** | | | | | | | | | | | | | | |
| LO1 | | | Inserta graphicwithinawebpage. | | | | | | | | | | | |
| LO2 | | | Createalinkwithinawebpage. | | | | | | | | | | | |
| LO3 | | | Createatablewithinawebpage. | | | | | | | | | | | |
| LO4 | | | Insertheadinglevelswithinawebpage. | | | | | | | | | | | |
| LO5 | | | Insertorderedandunorderedlistswithina webpage.Createawebpage. | | | | | | | | | | | |
| **UNIT** | | | **Contents** | | | | | | | | | | **No.Of.**  **Hours** | |
| I | | | Introduction:WebBasics:What isInternet–Webbrowsers–WhatisWebpage  –HTMLBasics:Understandingtags. | | | | | | | | | | **6** | |
| II | | | Tags forDocumentstructure(HTML,Head,Body Tag).Blockleveltextelements:Headingsparagraph(<p>tag)–Font styleelements:(bold,italic, font,small,strong,strike,bigtags) | | | | | | | | | | **6** | |
| III | | | Lists:Types oflists:Ordered,Unordered–NestingLists –Othertags:Marquee,  HR,BR-UsingImages–CreatingHyperlinks. | | | | | | | | | | **6** | |
| IV | | | Tables:CreatingbasicTable,Tableelements,Caption–Tableandcellalignment–Rowspan,Colspan –Cellpadding. | | | | | | | | | | **6** | |
| V | | | Frames:Frameset–TargetedLinks–Noframe–Forms :Input,Textarea,Select,Option. | | | | | | | | | | **6** | |
| **TOTALHOURS** | | | | | | | | | | | | | **30** | |
| **CourseOutcomes** | | | | | | | | | | | **ProgrammeOutcomes** | | | |
| CO | | Oncompletionofthiscourse,studentswill | | | | | | | | |  | | | |
| CO1 | | Knows the basic concept in HTMLConceptof resourcesinHTML | | | | | | | | | PO1, PO2, PO3,PO4,PO5,PO6 | | | |
| CO2 | | Knows Design concept.Conceptof MetaData  Understandtheconcept ofsave the files. | | | | | | | | | PO1, PO2, PO3,PO4,PO5,PO6 | | | |
| CO3 | | Understand the page formatting.Conceptoflist | | | | | | | | | PO1, PO2, PO3,PO4,PO5,PO6 | | | |
| CO4 | | CreatingLinks.  Knowtheconceptofcreatinglinktoemailaddress | | | | | | | | | PO1, PO2,PO3,  PO4,PO5,PO6 | | | |
| CO5 | | Conceptof addingimages  Understandthetablecreation. | | | | | | | | | PO1, PO2,PO3,  PO4,PO5,PO6 | | | |
| **Textbooks** | | | | | | | | | | | | | | |
| 1 | ―MasteringHTML5andCSS3MadeEasy‖,TeachUCompInc.,2014. | | | | | | | | | | | | | |
| 2 | **ThomasMichaud, “FoundationsofWebDesign:IntroductiontoHTML&CSS”** | | | | | | | | | | | | | |

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| **WebResources** | |
| 1. | <https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf> |
| 2. | <https://www.w3schools.com/html/default.asp> |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 2 | 3 | 3 | 3 |
| **CO3** | 2 | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 2 | 3 | 3 |
| **Weightageofcourse**  **contributedtoeachPSO** | 14 | 15 | 14 | 14 | 15 | 15 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | | **S** | **Credits** | **Inst.** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **WEBDESIGNING** | Specific  Elective | 2 | - | - | | - | 2 | 2 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | Understandthebasicsof HTMLanditscomponents | | | | | | | | | | | |
| LO2 | TostudyabouttheGraphicsinHTML | | | | | | | | | | | |
| LO3 | Understandandapplytheconceptsof XMLandDHTML | | | | | | | | | | | |
| LO4 | UnderstandtheconceptofJavaScript | | | | | | | | | | | |
| LO5 | Toidentifyandunderstandthe goalsandobjectivesoftheAjax | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | **No.ofHours** | | | | | | |
| I | HTML:HTML-Introduction-tagbasics-pagestructure-addingcommentsworkingwithtexts,paragraphs and line break. Emphasizing test- headingandhorizontalrules-list-fontsize,faceandcolor-  alignmentlinks-tables-frames. | | | | | 6 | | | | | | |
| II | Forms&ImagesUsingHtml:Graphics:Introduction-How to work efficiently with images inwebpages,imagemaps,GIFanimation,addingmultimedia, data collection with html forms textbox,password,listbox,combobox,textarea,toolsfor  buildingwebpagefrontpage. | | | | | 6 | | | | | | |
| III | XML & DHTML: Cascading style sheet (CSS)-whatis CSS-Why we use CSS-adding CSS to your webpages-Groupingstyles-extensiblemarkuplanguage(XML). | | | | | 6 | | | | | | |
| IV | Dynamic HTML: Document object model (DCOM)-Accessing HTML & CSS through DCOM Dynamiccontentstyles&positioning-Eventbubbling-databinding.  JavaScript: Client-side scripting, What is JavaScript,HowtodevelopJavaScript,simpleJavaScript,variables,functions,conditions,loopsandrepetition, | | | | | 6 | | | | | | |

|  |  |  |  |
| --- | --- | --- | --- |
| V | Advancescript,JavaScriptandobjects,JavaScriptownobjects,theDOMandwebbrowserenvironments,formsandvalidations. | 6 | |
|  | **Total** | **30** | |
| **CourseOutcomes** | | | **ProgrammeOutcome** |
| CO | Oncompletionofthiscourse,studentswill | |  |
| 1 | DevelopworkingknowledgeofHTML | | PO1, PO3,PO6, PO8 |
| 2 | AbilitytoDevelopandpublishWebpagesusingHypertextMarkupLanguage(HTML). | | PO1,PO2,PO3,PO6 |
| 3 | AbilitytooptimizepagestylesandlayoutwithCascadingStyleSheets(CSS). | | PO3,PO5 |
| 4 | Abilitytodevelopajavascript | | PO1,PO2,PO3, PO7 |
| 5 | AnabilitytodevelopwebapplicationusingAjax. | | P02,PO6,PO7 |
| **TextBook** | | | |
| 1 | PankajSharma,―WebTechnology‖,SkKataria&SonsBangalore2011. | | |
| 2 | MikeMcgrath,―JavaScript‖,DreamTechPress2006,1stEdition. | | |
| 3 | AchyutSGodbole&AtulKahate,―WebTechnologies‖,2002,2ndEdition. | | |
| **ReferenceBooks** | | | |
| 1. | LauraLemay,RafeColburn,JenniferKyrnin,―MasteringHTML,CSS&JavascriptWeb  Publishing‖,2016. | | |
| 2. | DTEditorialServices(Author),―HTML5BlackBook(CoversCSS3,JavaScript,XML,  XHTML,AJAX,PHP,jQuery)‖,Paperback2016,2ndEdition. | | |
| **WebResources** | | | |
| 1. | NPTEL&MOOCcoursestitledWebDesignandDevelopment. | | |
| 2. | [https://www.geeksforgeeks.org](https://www.geeksforgeeks.org/) | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **-** | **2** | **1** | **1** |
| **CO2** | **3** | **3** | **-** | **2** | **-** | **1** |
| **CO3** | **3** | **3** | **-** | **2** | **2** | **1** |
| **CO4** | **3** | **3** | **-** | **2** | **-** | **1** |
| **CO5** | **3** | **3** | **3** | **2** | **-** | **1** |
| **Weightageofcoursecontributed to eachPSO** | 15 | 15 | 3 | 10 | 3 | 4 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | | |
| **CIA** | **External** | **Total** | |
|  | **PHPPROGRAMMING** | SpecificElective | 2 |  |  |  | | 2 | 2 | 25 | 75 | 100 | |
| **CourseObjective** | | | | | | | | | | | | | |
| LO1 | ToprovidethenecessaryknowledgeonbasicsofPHP. | | | | | | | | | | | | |
| LO2 | Todesignanddevelopdynamic,database-drivenwebapplicationsusingPHPversion. | | | | | | | | | | | | |
| LO3 | Togetanexperience onvariouswebapplicationdevelopmenttechniques. | | | | | | | | | | | | |
| LO4 | TolearnthenecessaryconceptsforworkingwiththefilesusingPHP. | | | | | | | | | | | | |
| LO5 | Togetaknowledgeon OOPSwithPHP. | | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | | **No.of**  **Hours** | |
| I | IntroductiontoPHP-BasicKnowledgeofwebsites-IntroductionofDynamicWebsite-IntroductiontoPHP-ScopeofPHP-XAMPP  and WAMPInstallation | | | | | | | | | | 6 | |
| II | PHPProgrammingBasics-SyntaxofPHP-EmbeddingPHPinHTML-EmbeddingHTMLinPHP.  Introduction to PHP Variable -Understanding Data Types -UsingOperators -Using Conditional Statements -If(), else if() and else ifconditionStatement. | | | | | | | | | | 6 | |
| III | Switch()Statements-Usingthewhile()Loop-Usingthefor()LoopPHPFunctions.  PHPFunctions-CreatinganArray-ModifyingArrayElements-ProcessingArrayswithLoops-GroupingFormSelectionswith  Arrays-UsingArrayFunctions. | | | | | | | | | | 6 | |
| IV | PHPAdvancedConcepts -ReadingandWriting Files -Reading Data  fromaFile. | | | | | | | | | | 6 | |
| V | ManagingSessionsandUsingSessionVariables-DestroyingaSession-StoringDatainCookies-SettingCookies. | | | | | | | | | | 6 | |
|  | **Total** | | | | | | | | | | **30** | | |
| **CourseOutcomes** | | | | | | | **ProgrammeOutcomes** | | | | | | |
| CO | Oncompletionofthiscourse,studentswill | | | | | |  | | | | | | |
| 1 | WritePHPscriptstohandleHTMLforms | | | | | | PO1,PO4,PO6,PO8. | | | | | | |
| 2 | Writeregularexpressionsincludingmodifiers,operators,andmetacharacters. | | | | | | PO2,PO5,PO7. | | | | | | |
| 3 | CreatePHP Programusingtheconceptof array. | | | | | | PO3,PO6,PO8. | | | | | | |
| 4 | CreatePHPprogramsthatusevariousPHP | | | | | | PO2,PO3,PO5,PO8. | | | | | | |

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| --- | --- | --- |
|  | libraryfunctions |  |
| 5 | Manipulate filesanddirectories. | PO3,PO5,PO6. |
| **TextBook** | | |
| 1 | **HeadFirstPHP&MySQL:ABrain-FriendlyGuide-2009-**[**Lynnmighley**](https://www.amazon.in/Lynn-Beighley/e/B001IGOUMY/ref%3Ddp_byline_cont_book_1)**and**[**Michael**](https://www.amazon.in/Michael-Morrison/e/B000AQ2H3C/ref%3Ddp_byline_cont_book_2)  [**Morrison.**](https://www.amazon.in/Michael-Morrison/e/B000AQ2H3C/ref%3Ddp_byline_cont_book_2) | |
| 2 | **TheJoyofPHP:ABeginner'sGuidetoProgrammingInteractiveWebApplicationswithPHPand MySQL-** [**AlanForbes**](https://www.amazon.in/Alan-Forbes/e/B00BBPOUOA/ref%3Ddp_byline_cont_ebooks_1) | |
| **ReferenceBooks** | | |
| 1. | PHP:TheCompleteReference-StevenHolzner. | |
| 2. | [DTEditorialServices](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=DT%2BEditorial%2BServices&search-alias=stripbooks)(Author),―*HTML5BlackBook(CoversCSS3,JavaScript,XML, XHTML,AJAX,PHP,jQuery)*‖,Paperback2016,2ndEdition. | |
| **WebResources** | | |
| 1. | ReferMOOCCourseslikeNPTELandSWAYAM | |
| 2. | <https://www.w3schools.com/php/default.asp> | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **3** | **1** | **1** | **-** | **1** |
| **CO2** | **2** | **-** | **1** | **1** | **2** | **1** |
| **CO3** | **3** | **3** | **1** | **1** | **-** | **1** |
| **CO4** | **1** | **3** | **2** | **1** | **-** | **1** |
| **CO5** | **3** | **2** | **1** | **1** | **-** | **1** |
| **Weightageofcoursecontributed to eachPSO** | 12 | 11 | 6 | 5 | 2 | 5 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | | **Credits** | **Inst.Hours** | **Marks** | | | |
| **CIA** | **External** | **Total** | |
|  | **SoftwareTesting** | Specific  Elective | 2 | - | - | - | | | 2 | 2 | 25 | 75 | 100 | |
| **CourseObjective** | | | | | | | | | | | | | | |
| LO1 | Tostudyfundamentalconceptsinsoftwaretesting | | | | | | | | | | | | | |
| LO2 | Todiscussvarious softwaretestingissuesandsolutionsinsoftwareunittest,integrationandsystemtesting. | | | | | | | | | | | | | |
| LO3 | TostudythebasicconceptofDataflowtestingandDomaintesting. | | | | | | | | | | | | | |
| LO4 | ToAcquireknowledgeonpathproductsandpathexpressions. | | | | | | | | | | | | | |
| LO5 | TolearnaboutLogicbasedtestinganddecisiontables | | | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | **No.ofHours** | | | | | |
| **I** | Introduction: Purpose–Productivity and Quality in Software–Testing Vs Debugging–Modelfor Testing–Bugs–TypesofBugs–TestingandDesignStyle. | | | | | | | 6 | | | | | |
| **II** | Flow / Graphs and Path Testing – Achievable paths –PathinstrumentationApplicationTransactionFlowTestingTechniques. | | | | | | | 6 | | | | | |
| **III** | DataFlowTestingStrategies-DomainTesting:DomainsandPaths–DomainsandInterfaceTesting. | | | | | | | 6 | | | | | |
| **IV** | Linguistic–Metrics–StructuralMetric –PathProductsandPathExpressions.SyntaxTesting–Formats–TestCases | | | | | | | 6 | | | | | |
| **V** | Logic Based Testing–Decision Tables–TransitionTesting–States,StateGraph,StateTesting. | | | | | | | 6 | | | | | |
|  | **Total** | | | | | | | **30** | | | | | |
| **CourseOutcomes** | | | | | | | **ProgramOutcomes** | | | | | | | |
| **CO** | Oncompletionofthiscourse,studentswill | | | | | |  | | | | | | | |
| **1** | Studentslearntoapplysoftwaretestingknowledgeandengineeringmethods | | | | | | PO1 | | | | | | | |
| **2** | Haveanabilitytoidentifytheneedsof softwaretest | | | | | | PO1,PO2 | | | | | | | |

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| --- | --- | --- |
|  | automation,anddefineanddevelopatesttooltosupporttestautomation. |  |
| **3** | Have an ability understand and identify various softwaretesting problems, and solve these problems by designingandselectingsoftwaretestmodels,criteria,strategies,andmethods. | PO4,PO6 |
| **4** | Have basic understandingandknowledge  of contemporary issues in software testing, such ascomponent-basedsoftwaretestingproblems | PO4,PO5,PO6 |
| **5** | Have an ability to use software testing methods andmodernsoftwaretestingtoolsfortheirtestingprojects. | PO3,PO8 |
| **TextBook** | | |
| **1** | B.Beizer,―SoftwareTestingTechniques‖,IIEdn.,DreamTechIndia,NewDelhi,2003. | |
| **2** | K.V.K.Prasad,―SoftwareTestingTools‖,DreamTech.India,NewDelhi,2005 | |
| **ReferenceBooks** | | |
| **1.** | I.Burnstein,2003,―PracticalSoftwareTesting‖,SpringerInternationalEdn. | |
| **2.** | E.Kit,1995,―SoftwareTestingintheRealWorld:ImprovingtheProcess‖,  PearsonEducation,Delhi. | |
| **3.** | R.Rajani,andP.P.Oak,2004,―SoftwareTesting‖,TataMcgrawHill,New  Delhi. | |
| **WebResources** | | |
| **1.** | <https://www.javatpoint.com/software-testing-tutorial> | |
| **2.** | <https://www.guru99.com/software-testing.html> | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **3** | **2** | **2** | **2** | **-** |
| **CO2** | **3** | **2** | **2** | **3** | **3** | **2** |
| **CO3** | **2** | **3** | **3** | **2** | **2** | **3** |
| **CO4** | **2** | **1** | **2** | **2** | **2** | **1** |
| **CO5** | **2** | **2** | **3** | **2** | **2** | **2** |
| **Weightageofcoursecontributed to eachPSO** | 11 | 10 | 12 | 11 | 11 | 8 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | | **PROBLEM SOLVINGTECHNIQUES** | SpecificElective | 2 | - | - | - | 2 | 2 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | Understandthesystematicapproachtoproblemsolving. | | | | | | | | | | | |
| LO2 | Knowthe approachandalgorithmstosolve specificfundamentalproblems. | | | | | | | | | | | |
| LO3 | Understandtheefficientapproachtosolvespecificfactoring-related problems. | | | | | | | | | | | |
| LO4 | Understandtheefficientarray-relatedtechniquestosolvespecificproblems. | | | | | | | | | | | |
| LO5 | Understandtheefficientmethodstosolve specificproblemsrelatedtotextprocessing.  Understandhowrecursionworks. | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | | **No.of**  **Hours** | |
| I | **Introduction:** Notion of algorithms and programs – Requirements for solvingproblems by computer – The problem-solving aspect: Problem definition phase,Getting started on a problem, The use of specific examples, Similarities amongproblems,Workingbackwards from thesolution–Generalproblem-solvingstrategies-Problemsolvingusingtop-downdesign–Implementationofalgorithms–TheconceptofRecursion. | | | | | | | | | | 6 | |
| II | **Fundamental Algorithms**: Exchanging the values of two variables – Counting -Summationofasetofnumbers-Factorialcomputation-Sinefunctioncomputation - Fibonacci Series generation - Reversing the digits of an integer –BaseConversion. | | | | | | | | | | 6 | |
| III | **Factoring Methods**: Finding the square root of a number – The smallest divisorof an integer – Greatest common divisor of two integers - Generating primenumbers – Computing the prime factors of an integer – Generation of pseudo-random numbers -Raising a number to a large power– Computing the *n*thFibonaccinumber. | | | | | | | | | | 6 | |
| IV | **Array Techniques**: Array order reversal – Array counting or histograming –Finding the maximum number in a set - Removal of duplicates from an orderedarray-Partitioninganarray–Findingthe*k*thsmallestelement–Longestmonotonesubsequence. | | | | | | | | | | 6 | |
| V | **Text Processing and Pattern Searching**: Text line length adjustment – Left andright justification of text – Keyword searching in text – Text line editing – Linearpatternsearch.  **Recursivealgorithms**: TowersofHanoi–Permutationgeneration. | | | | | | | | | | 6 | |

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| --- | --- | --- | --- | --- |
|  | **Total** | | | **30** |
| **CourseOutcomes** | | | **ProgrammeOutcome** | |
| CO | | Oncompletionofthiscourse,studentswill |  | |
| 1 | | Understand the logic of problem and analysesimplementationofalgorithmandTopDownapproach  andconceptof Recursion | PO1,PO6 | |
| 2 | | Able tounderstandtheSequence ofNumbersandSeries  Fibonacci,Reversing,BaseConversion. | PO2 | |
| 3 | | AbletodoAlgebraicoperations | PO2,PO4 | |
| 4 | | Coverageof ArraysanditsLogics | PO6,PO8 | |
| 5 | | TextProcessingandPatternSearchingApproach | PO7 | |
| **TextBook** | | | | |
| 1 | | R.G.Dromey,*HowtoSolveitbyComputer*,PearsonIndia,2007 | | |
| **ReferenceBooks** | | | | |
| 1. | | George Polya, Jeremy Kilpatrick, *The Stanford Mathematics Problem Book: With Hints andSolutions*,DoverPublications,2009(KindleEdition2013). | | |
| 2. | | GregW. Scragg,*ProblemSolvingwithComputers*,Jones&Bartlett1stedition, 1996. | | |
| **WebResources** | | | | |
| 1. | | <https://www.studytonight.com/> | | |
| 2. | | <https://www.w3schools.com/> | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **3** | **1** | **2** | **1** | **2** |
| **CO2** | **2** | **2** | **2** | **1** | **3** | **1** |
| **CO3** | **3** | **2** | **1** | **2** | **3** | **3** |
| **CO4** | **2** | **2** | **3** | **2** | **3** | **3** |
| **CO5** | **2** | **3** | **1** | **2** | **3** | 2 |
| **Weightageofcourse**  **contributedtoeachPSO** | 11 | 12 | 8 | 9 | 13 | 11 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **OFFICEAUTOMATION** | Specific  Elective | 2 | - | - | - | | 2 | 2 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | Understandthebasicsofcomputersystemsanditscomponents. | | | | | | | | | | | |
| LO2 | Understandandapplythe basicconceptsofawordprocessingpackage. | | | | | | | | | | | |
| LO3 | Understandandapplythe basicconceptsofelectronicspreadsheet software. | | | | | | | | | | | |
| LO4 | Understandandapplythebasicconceptsofdatabasemanagement system. | | | | | | | | | | | |
| LO5 | UnderstandandcreateapresentationusingPowerPointtool. | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | | | | **No. ofHours** | |
| I | **Introductory concepts:** Memory unit– CPU-Input Devices: Key board, MouseandScanner.Outputdevices:Monitor,Printer.IntroductiontoOperatingsystems&itsfea  tures:DOS– UNIX–Windows.IntroductiontoProgrammingLanguages. | | | | | | | | | | 6 | |
| II | **Word Processing:** Open, Save and close word document; Editing text –tools,formatting,bullets;SpellChecker-Documentformatting–Paragraphalignment,indentation,headersandfooters,numbering  ;printing–Preview,options,merge. | | | | | | | | | | 6 | |
| III | **Spreadsheets:**Excel–opening,enteringtextanddata,formatting,navigating;Formulas–entering,handlingand copying; Charts–creating, formatting andprinting,analysistables,preparationoffinancialstatements,introductiontodataanalytics. | | | | | | | | | | 6 | |
| IV | **Database Concepts:** The concept of data base management system; Datafield, records,andfiles,Sortingandindexingdata;Searchingrecords.Designingqueries,andreports;Linkingofdatafiles;UnderstandingProgramming environment in DBMS; Developing menu drive applicationsinquerylanguage(MS–Access). | | | | | | | | | | 6 | |
| V | **Power point:** Introduction to Power point - Features – Understanding slidetypecasting&viewingslides–creatingslideshows.Applyingspecialobject – including objects & pictures – Slide transition–Animation effects,audioinclusion ,timers. | | | | | | | | | | 6 | |
|  | **Total** | | | | | | | | | | **30** | |
| **CourseOutcomes** | | | | | | | **ProgrammeOutcomes** | | | | | |
| CO | Oncompletionofthiscourse,studentswill | | | | | |  | | | | | |
| 1 | Possess the knowledge on the basics of computers and itscomponents | | | | | | PO1,PO2,PO3,PO6,PO8 | | | | | |
| 2 | GainknowledgeonCreatingDocuments,spreadsheetand  presentation. | | | | | | PO1,PO2,PO3,PO6 | | | | | |

|  |  |  |
| --- | --- | --- |
| 3 | LearntheconceptsofDatabaseandimplementtheQuery  inDatabase. | PO3,PO5,PO7 |
| 4 | Demonstratetheunderstandingofdifferentautomation  tools. | PO3,PO4,PO5,PO7 |
| 5 | Utilizetheautomationtoolsfordocumentation,calculationandpresentationpurpose. | PO4,PO6,PO7,PO8 |
| **TextBook** | | |
| 1 | PeterNorton,―IntroductiontoComputers‖–TataMcGraw-Hill. | |
| **ReferenceBooks** | | |
| 1. | JenniferAckermanKettel,GuyHat-Davis,CurtSimmons,―Microsoft2003‖,Tata  McGrawHill. | |
| **WebResources** | | |
| 1. | <https://www.udemy.com/course/office-automation-certificate-course/> | |
| 2. | <https://www.javatpoint.com/automation-tools> | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **2** | **2** | **3** | **3** | **1** |
| **CO2** | **3** | **1** | **2** | **3** | **3** | **3** |
| **CO3** | **3** | **2** | **1** | **2** | **1** | **3** |
| **CO4** | **3** | **3** | **2** | **2** | **2** | **1** |
| **CO5** | **2** | **2** | **1** | **3** | **1** | **3** |
| **Weightageofcourse**  **contributedtoeachPSO** | 13 | 10 | 8 | 13 | 10 | 11 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | | |
| **CIA** | **External** | **Total** | |
|  | **QuantitativeAptitude** | SpecificElective | 2 | - | - | - | 2 | 2 | 25 | 75 | 100 | |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | Tounderstandthebasicconceptsofnumbers | | | | | | | | | | | |
| LO2 | Understandandapplytheconceptofpercentage,profit&loss | | | | | | | | | | | |
| LO3 | Tostudythebasicconceptsoftimeandwork,interests | | | | | | | | | | | |
| LO4 | Tolearntheconceptsofpermutation,probability,discounts | | | | | | | | | | | |
| LO5 | Tostudyabouttheconceptsofdatarepresentation,graphs | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | **No.of**  **Hours** | | | |
| I | Numbers-HCFandLCMof numbers-Decimalfractions-Simplification-Squarerootandcuberoots-Average-problemsonNumbers. | | | | | | | 6 | | | |
| II | ProblemsonAges-SurdsandIndices- percentage -profitsand loss - ratioandproportion-partnership-Chainrule. | | | | | | | 6 | | | |
| III | Timeandwork-pipesandcisterns-TimeandDistance   * problemsontrains-Boatsandstreams-simpleinterest * compoundinterest-Logarithms-Area-Volumeandsurfacearea-racesandGamesofskill. | | | | | | | 6 | | | |
| IV | Permutation and combination-probability-TrueDiscount-BankersDiscount– Height andDistances-Oddmanout&Series. | | | | | | | 6 | | | |
| V | Calendar-Clocks-stocksand shares- Datarepresentation-Tabulation– Bar Graphs- Pie charts-Linegraphs. | | | | | | | 6 | | | |
|  | **Total** | | | | | | | **30** | | | |
| **CourseOutcomes** | | | | | | | | **ProgrammeOutcome** | | | | |
| CO | Oncompletionofthiscourse,studentswill | | | | | | |  | | | | |
| 1 | understandtheconcepts,applicationandthe problemsofnumbers | | | | | | | PO1 | | | | |
| 2 | To have basic knowledge and understanding about percentage,profit&lossrelatedprocessings | | | | | | | PO1,PO2 | | | | |

|  |  |  |
| --- | --- | --- |
| 3 | To understandtheconceptsoftimeandwork | PO4,PO6 |
| 4 | Speaksabouttheconceptsofprobability,discount | PO4,PO5,PO6 |
| 5 | Understanding the concept of problem solving involved in stocks& shares,graphs | PO3,PO8 |
| **TextBook** | | |
| 1 | ―QuantitativeAptitude‖,R.S.AGGARWAL.,S.Chand&CompanyLtd., | |
| **ReferenceBooks** | | |
| 1. |  | |
| **WebResources** | | |
| 1. | <https://www.javatpoint.com/aptitude/quantitative> | |
| 2. | <https://www.toppr.com/guides/quantitative-aptitude/> | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **3** | **1** | **2** | **-** | **2** |
| **CO2** | **2** | **2** | **2** | **3** | **3** | **1** |
| **CO3** | **3** | **2** | **2** | **2** | **3** | **3** |
| **CO4** | **3** | **2** | **3** | **2** | **3** | **3** |
| **CO5** | **2** | **3** | **1** | **2** | **3** | 3 |
| **Weightageofcourse**  **contributedtoeachPSO** | 12 | 12 | 9 | 11 | 12 | 12 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | | |
| **CIA** | **External** | **Total** | |
| **SKILLENHANCEMENT**  **COURSE** | | **OpenSourceSoftwareTechnologies** | SkillEnha.Course | 2 | - | - | - | | 2 | 2 | 25 | 75 | 100 | |
| **CourseObjective** | | | | | | | | | | | | | | |
| LO1 | | AbletoAcquireandunderstandthebasicconceptsinJava,applicationofOOPSconcepts. | | | | | | | | | | | | |
| LO2 | | Acquireknowledgeaboutoperatorsanddecision-makingstatements. | | | | | | | | | | | | |
| LO3 | | ToIdentifythesignificanceandapplicationofClasses,arraysandinterfacesand  analyzingjavaarrays | | | | | | | | | | | | |
| LO4 | | UnderstandabouttheapplicationsofOOPSconceptsandanalyzeoverridingand  packagesthroughjavaprograms. | | | | | | | | | | | | |
| LO5 | | CanCreatewindow-based programmingusingappletand graphicsprogramming. | | | | | | | | | | | | |
| **UNIT** | | **Details** | | | | | | | | | | **No. ofHours** | |
| I | | OpenSource–opensourcevs.commercialsoftware–WhatisLinux  –FreeSoftware–WhereIcanuseLinux -Linuxkernel–Linuxdistributions. | | | | | | | | | | 6 | |
| II | | : Introduction Linux Essential Commands –File System concept –Standard Files –The Linux Security Model – Introduction to Unix –UnixComponentsUnixFiles–FileAttributesandPermission–StandardI/O–Redirection– PipesandFilters–GrepandStreamEditor | | | | | | | | | | 6 | |
| III | | Introduction - Apache Explained – Starting, Stopping and RestartingApache –Modifying the Default configuration – Securing Apache – SetuserandGroup | | | | | | | | | | 6 | |
| IV | | **UNIT IV: MySQL:** Introduction to MySQL – The show databases andtable – The USE command –Create Database and Tables – DescribeTable–Select,Insert, UpdateandDeletestatementdatabase. | | | | | | | | | | 6 | |
| V | | * I**ntroduction** –PHP Form processing – Database Access withPHP–MySQL,MySQLFunctions–InsertingRecords–SelectingRecords–DeletingRecords–UpdateRecords. | | | | | | | | | | 6 | |
|  | | **Total** | | | | | | | | | | **30** | | |
| **CourseOutcomes** | | | | | | | | **ProgrammemeOutcomea** | | | | | | |
| CO | Oncompletionofthiscourse, studentswill | | | | | | |  | | | | | | |
| 1 | Acquireandunderstandthebasicconceptsin | | | | | | | Po1 | | | | | | |

|  |  |  |
| --- | --- | --- |
|  | Java,applicationofOOPSconcepts. |  |
| 2 | Acquireknowledgeaboutoperatorsanddecision-making  statements. | Po1,Po2 |
| 3 | Identify thesignificance andapplicationof Classes,arraysandinterfacesandanalyzingjavaarrays | Po4,Po6 |
| 4 | UnderstandabouttheapplicationsofOOPSconceptsand analyze overriding and packages through javaprograms. | Po4,Po5,Po6 |
| 5 | Createwindow-based programmingusingappletand  graphicsprogramming. | Po3,Po8 |
| **TextBook** | | |
| 1 | 1.JamesLeeandBrentWare―OpenSourceWebDevelopmentwithLAMP using | |
| 2 | 2.LINUX,Apache,MySQL,PerlandPHP‖,DorlingKindersley(India)Pvt.Ltd,2008. | |
| **ReferenceBooks** | | |
| 1. | EricRosebrock,EricFilson,―SettingupLAMP:GettingLinux,Apache,MySQLand PHPand  workingtogether‖,JohnWileyandSons,2004. | |
| 2. | 2.AnthonyButcher,―TeachYourselfMySQLin21days‖,2ndEdition,SamsPublication. | |
| 3. | 3.RichBower,DanielLopezRidreejo,AlianLiska,―ApacheAdministrator‘s Handbook‖,Sams  Publication. | |
| 4. | 4.TammyFox,―RedHatEnterpriseLinux5AdministrationUnleashed‖,SamsPublication. | |
| 5. | 5.NaramoreEligabette,GernerJason,WroxPress,WileyDreamtechPress,  ―BeginningPHP5,  Apache,MySQLWeb Development‖,2005. | |
| **WebResources** | | |
| 1. | [IntroductiontoOpen-Sourceanditsbenefits-GeeksforGeeks](https://www.geeksforgeeks.org/introduction-to-open-source-and-its-benefits/) | |
| 2. | [https://www.bing.com/](https://www.bing.com/search?q=open%2Bsource%2BSTUDY%2BNOTES&qs=n&form=QBRE&sp=-1&pq=open%2Bsource%2Bstudy%2Bnotes&sc=8-23&sk&cvid=B56C9B9082BD4543B5424F5D24AC1E44&ghsh=0&ghacc=0&ghpl) | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 1 | 3 | 2 | 2 | 1 | 1 |
| **CO2** | 3 | 1 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 2 | - | 2 | 1 |
| **CO4** | 2 | - | 3 | 3 | 3 | 1 |
| **CO5** | 3 | 3 | 3 | 3 | 3 | 2 |
| **Weightageofcoursecontributedtoeach**  **PSO** | 12 | 9 | 13 | 10 | 12 | 8 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **MultimediaSystems** | Specific  Elective | 2 | - | - | - | | 2 | | 2 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | | |
| LO1 | UnderstandthedefinitionofMultimedia | | | | | | | | | | | | |
| LO2 | TostudyabouttheImageFileFormats,SoundsAudioFileFormats | | | | | | | | | | | | |
| LO3 | UnderstandtheconceptsofAnimationandDigitalVideoContainers | | | | | | | | | | | | |
| LO4 | TostudyabouttheStageofMultimediaProject | | | | | | | | | | | | |
| LO5 | UnderstandtheconceptofOwnershipofContentCreatedforProjectAcquiringTalent | | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | **No.of**  **Hours** | | | | | |
| **I** | Multimedia Definition-Use Of Multimedia-Delivering Multimedia- Text: About Fonts andFaces-UsingTextinMultimedia -Computers andText Font Editing and Design Tools-Hypermedia andHypertext. | | | | | | | 6 | | | | | |
| **II** | Images:PlanApproach-OrganizeTools-ConfigureComputerWorkspace-MakingStill Images-Color -ImageFileFormats.Sound:ThePowerofSound-DigitalAudio-MidiAudio-Midivs.DigitalAudio-MultimediaSystemSounds Audio File Formats -Vaughan'sLawofMultimediaMinimums-AddingSoundtoMultimediaProject | | | | | | | 6 | | | | | |
| **III** | Animation:ThePowerofMotion-PrinciplesofAnimation-AnimationbyComputer-MakingAnimationsthatWork. Video: Using Video -WorkingwithVideoandDisplays-DigitalVideoContainers-ObtainingVideoClips-ShootingandEditingVideo | | | | | | | 6 | | | | | |
| **IV** | Making Multimedia:TheStageof Multimedia Project-The Intangible Needs -The Hardware Needs - The SoftwareNeeds-AnAuthoringSystemsNeeds-Multimedia  ProductionTeam. | | | | | | | 6 | | | | | |
| **V** | Planning andCosting:The ProcessofMakingMultimedia-Scheduling-Estimating-RFPsandBidProposals.Designing and Producing- ContentandTalent:AcquiringContent-OwnershipofContentCreatedforProject-AcquiringTalent | | | | | | | 6 | | | | | |
|  | **Total** | | | | | | | | **30** | | | | |
| **CourseOutcomes** | | | | | | | **ProgrammeOutcomes** | | | | | | | |
| **CO** | Oncompletionofthiscourse,studentswill | | | | | |  | | | | | | | |
| **1** | understand the concepts, importance, application and theprocessof developingmultimedia | | | | | | PO1 | | | | | | | |
| **2** | tohave basicknowledgeandunderstandingaboutimagerelatedprocessings | | | | | | PO1,PO2 | | | | | | | |
| **3** | Tounderstand theframeworkofframesand bitimagestoanimations | | | | | | PO4,PO6 | | | | | | | |
| **4** | Speaksaboutthemultimediaprojectsandstagesofrequirementinphasesofproject. | | | | | | PO4,PO5,PO6 | | | | | | | |
| **5** | Understanding the concept of cost involved in multimediaplanning,designing,andproducing | | | | | | PO3,PO8 | | | | | | | |
| **TextBook** | | | | | | | | | | | | | | |
| **1** | TayVaughan,"Multimedia:MakingItWork",8thEdition,Osborne/McGraw-  Hill,2001. | | | | | | | | | | | | | |
| **ReferenceBooks** | | | | | | | | | | | | | | |
| **1.** | RalfSteinmetz&KlaraNahrstedt"MultimediaComputing,Communication&Applications",PearsonEducation,2012. | | | | | | | | | | | | | |
| **WebResources** | | | | | | | | | | | | | | |
| **1.** | <https://www.geeksforgeeks.org/multimedia-systems-with-features-or-characteristics/> | | | | | | | | | | | | | |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **3** | **2** | **3** | **3** | **2** | **1** |
| **CO2** | **3** | **2** | **3** | **3** | **2** | **1** |
| **CO3** | **3** | **2** | **3** | **3** | **2** | **1** |
| **CO4** | **3** | **2** | **3** | **3** | **1** | **1** |
| **CO5** | **3** | **3** | **3** | **3** | **1** | **1** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 15 | 11 | 15 | 15 | 8 | 5 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **Advanced Excel** | Specific  Elective | 2 | - | - | - | | 2 | 2 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | Handlelargeamountsofdata | | | | | | | | | | | |
| LO2 | Aggregatenumericdata andsummarizeintocategoriesandsubcategories | | | | | | | | | | | |
| LO3 | Filtering,sorting,andgroupingdataorsubsetsofdata | | | | | | | | | | | |
| LO4 | Createpivottablestoconsolidatedatafrommultiplefiles | | | | | | | | | | | |
| LO5 | Presentingdataintheformofchartsandgraphs | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No. ofHours** | | | | | |
| I | Basics of Excel-Customizing common options-Absoluteand relative cells-Protecting and un-protecting worksheetsandcells-Working with Functions-Writing conditionalexpressions-logicalfunctions-lookupandreferencefunctions-VlookUPwithExactMatch,ApproximateMatch-Nested VlookUP with Exact Match-VlookUP withTables,DynamicRanges-NestedVlookUPwithExactMatch-Using VLookUP to consolidate Data from MultipleSheets | | | | | | 6 | | | | | |
| II | DataValidations-Specifyingavalidrangeofvalues-Specifyingalistofvalidvalues-Specifyingcustomvalidationsbasedonformula-WorkingwithTemplatesDesigningthestructureofatemplate-templatesforstandardization of worksheets - Sorting and Filtering Data -Sortingtables-multiple-levelsorting-customsorting-Filtering data for selected view -advanced filter options-Working with ReportsCreating subtotals-Multiple-levelsubtotal. | | | | | | 6 | | | | | |
| III | CreatingPivottables FormattingandcustomizingPivot  tables- advancedoptionsofPivottables- Pivotcharts- | | | | | | 6 | | | | | |

|  |  |  |  |
| --- | --- | --- | --- |
|  | ConsolidatingdatafrommultiplesheetsandfilesusingPivottables-externaldatasources-dataconsolidationfeature to consolidate data-Show ValueAs % of Row,%of Column, Running Total, Compare with Specific Field-ViewingSubtotalunderPivot-CreatingSlicers. | |  |
| IV | More FunctionsDate and time functions-Text functions-Database functions-Power Functions - FormattingUsingauto formatting option for worksheets-Using conditionalformatting option for rows,columns andcells-WhatIfAnalysis- GoalSeek-DataTables-ScenarioManager. | | 6 |
| V | Charts -Formatting Charts-3D Graphs-Bar and LineChart together-Secondary Axis in Graphs-Sharing Chartswith PowerPoint/ MS Word,Dynamically- New FeaturesOfExcelSparklines,InlineCharts,dataCharts-Overviewof allthenewfeatures. | | 6 |
|  | **Total** | | **30** |
| **CourseOutcomes** | | **ProgrammeOutcomes** | | |
| CO | Oncompletionofthiscourse,studentswill |  | | |
| 1 | Workwithbigdatatoolsanditsanalysistechniques. | PO1 | | |
| 2 | Analyzedatabyutilizingclusteringandclassificationalgorithms. | PO1,PO2 | | |
| 3 | Learn and apply different miningalgorithmsandrecommendationsystemsforlargevolumesofdata. | PO4,PO6 | | |
| 4 | Performanalyticsondata streams. | PO4,PO5,PO6 | | |
| 5 | LearnNo-SQLdatabasesandmanagement. | PO3,PO8 | | |
| **TextBook** | | | | |
| 1 | **Excel2019All** | | | |
| 2 | **MicrosoftExcel2019PivotTable DataCrunching** | | | |
| **ReferenceBooks** | | | | |
|  |  | | | |
|  |  | | | |
| **WebResources** | | | | |

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| --- | --- |
| 1. | [https://www.simplilearn.com](https://www.simplilearn.com/) |
| 2 | https://[www.javatpoint.com](http://www.javatpoint.com/) |
| 3 | https://[www.w3schools.com](http://www.w3schools.com/) |

**MappingwithProgrammeOutcomes:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **2** | **2** | **1** | **3** | **-** |
| **CO2** | **3** | **2** | **2** | **1** | **1** | **3** |
| **CO3** | **3** | **2** | **1** | **2** | **1** | **3** |
| **CO4** | **3** | **3** | **2** | **2** | **2** | **1** |
| **CO5** | **3** | **2** | **1** | **3** | **1** | **3** |
| **Weightageofcourse**  **contributedtoeachPSO** | 14 | 11 | 8 | 9 | 8 | 10 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | | |
| **CIA** | **External** | **Total** | |
|  | **Biometrics** | SpecificElective | 2 | - | - | - | 2 | 2 | 25 | 75 | 100 | |
| **Course Objectives** | | | | | | | | | | | | |
| LO1 | Identifythevariousbiometrictechnologies. | | | | | | | | | | | |
| LO2 | Designofbiometric recognition. | | | | | | | | | | | |
| LO3 | Developsimpleapplicationsforprivacy | | | | | | | | | | | |
| LO4 | Understandtheneedofbiometricinthesociety | | | | | | | | | | | |
| LO5 | Understandthescopeofbiometrictechniques | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No. ofHours** | | | | |
| I | **Introduction**:WhatisBiometrics,History,TypesofbiometricTraits,Generalarchitectureofbiometricsystems, Basic working of biometric matching, Biometricsystemerrorandperformancemeasures,Designofbiometric system, Applications of biometrics, Biometricsversustraditionalauthenticationmethods.  **FaceBiometrics:**Introduction,BackgroundofFaceRecognition,DesignofFaceRecognitionSystem,  Neural Network for Face Recognition, Face Detection inVideo Sequences,Challenges in Face Biometrics, .7 FaceRecognitionMethods,AdvantagesandDisadvantages. | | | | | | 6 | | | | |
| II | **Retina and Iris Biometrics:** Introduction, Performance ofBiometrics,Design of Retina Biometrics,Design of IrisRecognitionSystem,IrisSegmentationMethod,Determination of Iris Region, Determination of Iris Region,ApplicationsofIrisBiometrics,AdvantagesandDisadvantages  **VeinandFingerprintBiometrics:**Introduction,BiometricsUsingVeinPatternofPalm,FingerprintBiometrics,FingerprintRecognitionSystem,MinutiaeExtraction,FingerprintIndexing,ExperimentalResults,AdvantagesandDisadvantages. | | | | | | 6 | | | | |

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| III | **PrivacyEnhancementUsingBiometrics:**Introduction,Privacy Concerns Associated with Biometric Deployments,Identity and Privacy, Privacy Concerns,Biometrics withPrivacy Enhancement,Comparison of Various BiometricsinTermsof Privacy,SoftBiometrics.  **MultimodalBiometrics:**IntroductiontoMultimodalBiometrics , Basic Architecture of Multimodal Biometrics,Multimodal Biometrics Using Face and Ear, Characteristicsand Advantages of Multimodal Biometrics, CharacteristicsandAdvantagesof MultimodalBiometrics. | 6 | |
| IV | **WatermarkingTechniques:**Introduction,DataHidingMethods,BasicFrameworkofWatermarking,ClassificationofWatermarking,ApplicationsofWatermarking,AttacksonWatermarks,PerformanceEvaluation,CharacteristicsofWatermarks,GeneralWatermarking Process, Image Watermarking Techniques,Watermarking Algorithm, Experimental Results, Effect ofAttacks on Watermarking Techniques, Attacks on SpatialDomainWatermarking. | 6 | |
| V | **ScopeandFuture:**ScopeandFutureMarketofBiometrics,BiometricTechnologies,ApplicationsofBiometrics,BiometricsandInformationTechnologyInfrastructure, Role of Biometrics in Enterprise Security,RoleofBiometricsinBorderSecurity,SmartCardTechnologyandBiometrics,RadioFrequencyIdentification(RFID)Biometrics,DNABiometrics,ComparativeStudyof VariousBiometricTechniques.  **BiometricStandards:**Introduction,StandardDevelopmentOrganizations,ApplicationProgrammingInterface(API),InformationSecurityandBiometricStandards,BiometricTemplateInteroperability. | 6 | |
|  | **Total** | **30** | |
| **CourseOutcomes** | | |
| **CourseOutcomes** | Oncompletionofthiscourse,studentswill; | |
| **CO1** | Tounderstandthebasicconceptsandthefunctionalityof  theBiometrics,FaceBiometrics,Types,ArchitectureandApplications. | PO1,PO3,PO6, PO8 |
| **CO2** | ToknowtheconceptsRetinaandIrisBiometricsandVein | PO1,PO2,PO3,PO6 |

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|  | andFingerprintBiometrics. |  |
| **CO3** | ToanalysethePrivacyEnhancementandMultimodalBiometrics. | PO3,PO5 |
| **CO4** | Togetanalyticalidea onWatrmarkingTechniques | PO1,PO2,PO3, PO7 |
| **CO5** | ToGainknowledgeonFuturescopeofBiometrics,and  StudyofvariousBiometricTechniques. | PO2,PO6,PO7 |
| **RecommendedText** | | |
| 1. | Biometrics: ConceptsandApplicationsbyG.R Sinha andSandeepB.Patil,Wiley,2013 | |
| **ReferencesBooks** | | |
| 1. | Guide to Biometrics by Ruud M. Bolle , SharathPankanti, Nalinik.Ratha, AndrewW.Senior,JonathanH.Connell,Springer2009 | |
| 2. | IntroductiontoBiometricsbyAnilk.Jain,ArunA.Ross,KarthikNandakumar | |
| 3. | HandbookofBiometricsbyAnilK. Jain,PatrickFlynn, ArunA.Ross. | |
| **WebResources** | | |
| 1. | <https://www.tutorialspoint.com/biometrics/index.htm> | |
| 2. | <https://www.javatpoint.com/biometrics-tutorial> | |
| 3. | [https://www.thalesgroup.com/en/markets/digital-identity-and-](https://www.thalesgroup.com/en/markets/digital-identity-and-security/government/inspired/biometrics)  [security/government/inspired/biometrics](https://www.thalesgroup.com/en/markets/digital-identity-and-security/government/inspired/biometrics) | |

**MappingwithProgrammeOutcomes:**

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| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 1 | 3 | 2 | 2 | 1 | 1 |
| **CO2** | 3 | 1 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | 1 | - | 2 | 3 |
| **CO4** | 3 | - | 3 | 3 | 3 | 1 |
| **CO5** | 3 | 3 | 3 | 3 | 1 | 2 |
| **Weightageofcourse**  **contributedtoeachPSO** | 13 | 9 | 12 | 10 | 10 | 10 |

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

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| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **CyberForensics** | SpecificElective | 2 | - | - | - | | 2 | 2 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | | |
| LO1 | Understandthedefinitionofcomputerforensicsfundamentals. | | | | | | | | | | | |
| LO2 | TostudyabouttheTypesofComputerForensicsEvidence | | | | | | | | | | | |
| LO3 | Understandandapplytheconceptsof DuplicationandPreservationofDigitalEvidence | | | | | | | | | | | |
| LO4 | Understandthe conceptsofElectronic EvidenceandIdentificationofData | | | | | | | | | | | |
| LO5 | TostudyabouttheDigitalDetective,NetworkForensicsScenario, DamagingComputer  Evidence. | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No.of**  **Hours** | | | | | |
| **I** | **OverviewofComputerForensicsTechnology:**ComputerForensicsFundamentals:WhatisComputerForensics UseofComputerForensicsinLawEnforcement, Computer Forensics Assistance to HumanResources/Employment Proceedings, Computer ForensicsServices, Benefits of professional Forensics Methodology,Steps taken by Computer Forensics Specialists. Types ofComputer.ForensicsTechnology:TypesofBusinessComputerForensic,Technology–TypesofMilitaryComputerForensicTechnology–TypesofLawEnforcement–ComputerForensic.Technology–Typesof  BusinessComputerForensic Technology. | | | | | | 6 | | | | | |
| **II** | **ComputerForensicsEvidenceandcapture:**DataRecovery:DataRecoveryDefined,DataBack–upandRecovery, The Role of Back –up in Data Recovery, TheData –Recovery Solution. Evidence Collection and DataSeizure:CollectionOptions,Obstacles,TypesofEvidence,TheRulesofEvidence,VolatileEvidence,General Procedure, Collection and Archiving, Methods ofCollections,Artefacts,CollectionSteps,Controlling  Contamination:Thechainofcustody. | | | | | | 6 | | | | | |

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| **III** | **DuplicationandPreservationofDigitalEvidence:**Processingsteps,LegalAspectsofcollectingandPreserving Computer forensic Evidence. Computer imageVerificationandAuthentication:SpecialneedsofEvidentialAuthentication,PracticalConsideration,PracticalImplementation. | 6 |
| **IV** | **Computer Forensics Analysis:** Discovery of ElectronicEvidence: ElectronicDocument Discovery: A PowerfulNew Litigation Tool. Identification of Data: Time Travel,ForensicIdentificationandAnalysisofTechnical  SurveillanceDevices. | 6 |
| **V** | **Reconstructing Past Events:** How to Become a DigitalDetective, Useable File Formats, Unusable File Formats,Converting Files. Networks: Network Forensics Scenario,a technical approach, Destruction Of E–Mail, DamagingComputerEvidence,DocumentingTheIntrusionon  Destructionof Data,SystemTesting. | 6 |
|  | **Total** | **30** |
| **CourseOutcomes** | | **ProgrammeOutcomes** | |
| **CO** | Oncompletionofthiscourse,studentswill |  | |
| **1** | Understand the definition of computer forensicsfundamentals. | PO1 | |
| **2** | Evaluatethedifferenttypesofcomputerforensicstechnology. | PO1,PO2 | |
| **3** | Analyzevariouscomputerforensicssystems. | PO4,PO6 | |
| **4** | Apply the methods for data recovery, evidence collectionanddataseizure. | PO4,PO5,PO6 | |
| **5** | Gain your knowledge of duplication and preservation ofdigitalevidence. | PO3,PO8 | |
| **TextBook** | | | |
| **1** | JohnR.Vacca,―ComputerForensics:ComputerCrimeInvestigation‖,3/E,FirewallMedia, NewDelhi,2002. | | |
| **ReferenceBooks** | | | |
| **1.** | Nelson,PhillipsEnfinger,Steuart,―ComputerForensicsandInvestigations‖Enfinger,Steuart, | | |

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|  | CENGAGELearning,2004. |
| **2.** | AnthonySammesandBrianJenkinson,‖ForensicComputing:APractitioner&#39;sGuide‖,SecondEdition,Springer–VerlagLondonLimited,2007. |
| **3.** | .RobertM.Slade,‖SoftwareForensicsCollecting EvidencefromtheSceneofaDigitalCrime‖,TMH2005. |
| **WebResources** | |
| **1.** | [https://www.vskills.in](https://www.vskills.in/) |
| **2.** | <https://www.hackingarticles.in/best-of-computer-forensics-tutorials/> |

**MappingwithProgrammeOutcomes:**

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| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **3** | **-** | **2** | **2** | **3** |
| **CO2** | **3** | **-** | **-** | **2** | **3** | **-** |
| **CO3** | **-** | **2** | **1** | **-** | **2** | **3** |
| **CO4** | **3** | **3** | **1** | **3** | **3** | **2** |
| **CO5** | **3** | **2** | **1** | **3** | **-** | **3** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 11 | 10 | 3 | 10 | 10 | 11 |

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | | |
| **CIA** | **External** | **Total** | |
|  | **PatternRecognition** | SpecificElective | 2 | - | - | - | | 2 | 2 | 75 | 25 | 100 | |
| **CourseObjective** | | | | | | | | | | | | | |
| LO1 | Tolearnthefundamentalsof PatternRecognitiontechniques | | | | | | | | | | | | |
| LO2 | TolearnthevariousStatisticalPatternrecognitiontechniques | | | | | | | | | | | | |
| LO3 | Tolearnthelineardiscriminantfunctionsandunsupervisedlearningandclustering | | | | | | | | | | | | |
| LO4 | TolearnthevariousSyntacticalPatternrecognitiontechniques | | | | | | | | | | | | |
| LO5 | TolearntheNeuralPatternrecognitiontechniques | | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | **No.of**  **Hours** | | | | |
| I | **PATTERNRECOGNITIONOVERVIEW**:Pattern  recognition, Classification and Description-Patterns andfeatureExtractionwithExamples-TrainingandLearningin  PR systems-PatternrecognitionApproaches | | | | | | | 6 | | | | |
| II | **STATISTICALPATTERNRECOGNITION**:  Introduction to statistical Pattern Recognition-supervisedLearningusingParametricandNon-ParametricApproaches. | | | | | | | 6 | | | | |
| III | **LINEAR DISCRIMINANT FUNCTIONS ANDUNSUPERVISEDLEARNINGANDCLUSTERING**:  Introduction-Discrete and binary Classification Problems-Techniques to directly Obtain linear Classifiers -FormulationofUnsupervisedLearningProblems-Clustering  forunsupervisedlearningandclassification | | | | | | | 6 | | | | |
| IV | **SYNTACTICPATTERNRECOGNITION**:Overviewof  Syntactic Pattern Recognition-Syntactic recognition viaparsing and other grammars–Graphical Approaches tosyntacticpatternrecognition-Learningvia grammatical  inference. | | | | | | | 6 | | | | |
| V | **NEURAL PATTERN RECOGNITION**: Introduction toNeural Networks-Feed-forward Networks and training byBackPropagation-Content AddressableMemoryApproaches  andUnsupervisedLearninginNeuralPR | | | | | | | 6 | | | | |
|  | **Total** | | | | | | | 30 | | | | |
| **CourseOutcomes** | | | | | | | **ProgrammeOutcomes** | | | | | | |
| CO | Oncompletionofthiscourse,studentswill | | | | | |  | | | | | | |
| 1 | understandtheconcepts,importance,applicationandthe  processof developingPatternrecognitionoverview | | | | | | PO1 | | | | | | |
| 2 | tohave basicknowledgeandunderstandingabout  parametricand non-parametricrelated concepts. | | | | | | PO1,PO2 | | | | | | |

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| 3 | Tounderstand theframework offramesandbit imagesto  animations | PO4,PO6 |
| 4 | Speaksaboutthemultimediaprojectsandstagesof  requirementinphasesofproject. | PO4,PO5,PO6 |
| 5 | Understandingtheconceptofcostinvolvedinmultimedia  planning,designing,andproducing | PO3,PO8 |
| **TextBook** | | |
| 1 | RobertSchalkoff,―PatternRecognition:StatisticalStructuralandNeuralApproaches‖,John  wiley&sons. | |
| 2 | DudaR.O.,P.E.Hart&D.GStork,―PatternClassification‖,2ndEdition,J.Wiley. | |
| 3 | DudaR.O.&HartP.E.,―PatternClassificationandSceneAnalysis‖,J.wiley. | |
| 4 | BishopC.M.,―NeuralNetworksforPatternRecognition‖,OxfordUniversityPress. | |
| **ReferenceBooks** | | |
| 1. | 1.EarlGose,Richardjohnsonbaugh,SteveJost,―PatternRecognitionandImageAnalysis‖,  PrenticeHallofIndia,PvtLtd,NewDelhi. | |
| **WebResources** | | |
| 1. | <https://www.geeksforgeeks.org/pattern-recognition-introduction/> | |
| 2. | <https://www.mygreatlearning.com/blog/pattern-recognition-machine-learning/> | |

**MappingwithProgrammeOutcomes:**

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| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **3** | **1** | **2** | **-** | **2** |
| **CO2** | **2** | **2** | **2** | **3** | **3** | **1** |
| **CO3** | **3** | **2** | **-** | **3** | **2** | **3** |
| **CO4** | **3** | **3** | **3** | **2** | **3** | **3** |
| **CO5** | **2** | **3** | **1** | **2** | **3** | 2 |
| **Weightageofcoursecontributedtoeach**  **PSO** | 12 | 13 | 7 | 12 | 11 | 11 |

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

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| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **ERP** | SpecificElective | 2 | - | - | - | 2 | 2 | 25 | 75 | 100 |
| **Course Objectives** | | | | | | | | | | | |
| LO1 | Tounderstandthebasicconcepts,EvolutionandBenefitsofERP. | | | | | | | | | | |
| LO2 | Toknowthe needandRoleofERPinlogicalandPhysicalIntegration. | | | | | | | | | | |
| LO3 | Identifytheimportantbusiness functionsprovidedbytypicalbusinesssoftwaresuch  asenterpriseresourceplanningandcustomerrelationshipmanagement | | | | | | | | | | |
| LO4 | TotrainthestudentstodevelopthebasicunderstandingofhowERPenrichesthe  businessorganizationsinachievingamultidimensionalgrowth | | | | | | | | | | |
| LO5 | Toaimatpreparingthestudentstechnologicalcompetitiveandmakethemreadyto  self-upgrade withthehighertechnicalskills | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No. ofHours** | | | | | |
| I | ERP Introduction, Benefits, Origin, Evolution and Structure:ConceptualModelofERP,theEvolutionofERP,theStructureofERP,ComponentsandneedsofERP,ERP  Vendors;Benefits&LimitationsofERPPackages. | | | | | | 6 | | | | | |
| II | Need to focus on Enterprise Integration/ERP; Informationmapping;RoleofcommonsharedEnterprisedatabase;System Integration, Logical vs. Physical System Integration,Benefits & limitations of System Integration, ERP‘s Role inLogicalandPhysicalIntegration.BusinessProcessReengineering,DatawareHousing,DataMining,OnlineAnalyticProcessing(OLAP),ProductLifeCycleMan-  agement(PLM),LAP,SupplychainManagement. | | | | | | 6 | | | | | |
| III | ERPMarketplaceandMarketplaceDynamics:MarketOverview,MarketplaceDynamics,theChangingERPMarket. ERP- Functional Modules: Introduction, FunctionalModules of ERP Software, Integration of ERP, Supply chainand Customer Relationship Applications. Cloud and OpenSource,QualityManagement,MaterialManagement,  FinancialModule,CRMandCaseStudy. | | | | | | 6 | | | | | |
| IV | ERPImplementationBasics,,ERPimplementationStrategy,ERPImplementationLifeCycle,Pre-Implementationtask,RoleofSDLC/SSAD,ObjectOriented  Architecture,Consultants, VendorsandEmployees. | | | | | | 6 | | | | | |
| V | ERP&E-Commerce,FutureDirectives-inERP,ERPand | | | | | | 6 | | | | | |

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|  | Internet,Criticalsuccessandfailurefactors,IntegratingERP  intoor-ganizationalculture.UsingERPtool:eitherSAPorORACLEformattocasestudy. |  | |
|  | **Total** | **30** | |
| **CourseOutcomes** | | |
| **Course**  **Outcomes** | Oncompletionofthiscourse,studentswill; | |
| **CO1** | UnderstandthebasicconceptsofERP. | PO1,PO2,PO6 |
| **CO2** | IdentifydifferenttechnologiesusedinERP | PO2,PO3,PO8 |
| **CO3** | Understandandapplytheconceptsof ERP Manufacturing  PerspectiveandERP Modules | PO1,PO3,PO7 |
| **CO4** | Discussthebenefitsof ERP | PO2,PO6 |
| **CO5** | ApplydifferenttoolsusedinERP | PO1,PO3,PO8 |
| **ReferenceText:** | | |
| 1. | EnterpriseResourcePlanning–AlexisLeon,TataMcGrawHill. | |
| **References:** | | |
| 1. | Enterprise ResourcePlanning–DiversifiedbyAlexisLeon,TMH. | |
| 2. | EnterpriseResourcePlanning–RaviShankar&S.Jaiswal,Galgotia | |
| **WebResources** | | |
| 1. | [1.https://www.tutorialspoint.com/management\_concepts/enterprise\_resource\_pla](https://www.tutorialspoint.com/management_concepts/enterprise_resource_planning.htm)  [nning.htm](https://www.tutorialspoint.com/management_concepts/enterprise_resource_planning.htm) | |
| 2. | [1.https://www.saponlinetutorials.com/what-is-erp-systems-enterprise-resource-](https://www.saponlinetutorials.com/what-is-erp-systems-enterprise-resource-planning/)  [planning/](https://www.saponlinetutorials.com/what-is-erp-systems-enterprise-resource-planning/) | |
| 3. | 1.<https://www.guru99.com/erp-full-form.html> | |
| 4. | 2.<https://www.oracle.com/in/erp/what-is-erp/> | |

**MappingwithProgrammeOutcomes:**

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| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **1** | **3** | **2** | **1** | **3** | **2** |
| **CO2** | **3** | **2** | **-** | **1** | **2** | **-** |
| **CO3** | **2** | **3** | **2** | **2** | **3** | **2** |
| **CO4** | **1** | **-** | **2** | **1** | **-** | **2** |
| **CO5** | **3** | **3** | **-** | **1** | **3** | **-** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 10 | 11 | 6 | 7 | 11 | 6 |

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

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| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **RoboticsandIts**  **Applications** | Specific  Elective | 2 | - | - | - | 2 | 2 | 25 | 75 | 100 |
| **CourseObjective** | | | | | | | | | | | |
| LO1 | Tounderstandtheroboticsfundamentals | | | | | | | | | | |
| LO2 | Understandthesensorsandmatrixmethods | | | | | | | | | | |
| LO3 | UnderstandtheLocalization:Self-localizationsandmapping | | | | | | | | | | |
| LO4 | TostudyabouttheconceptofPathPlanning,Visionsystem | | | | | | | | | | |
| LO5 | Tolearnabouttheconceptofrobotartificialintelligence | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | **No.of**  **Hours** | | | | |
| I | Introduction:Introduction,briefhistory,componentsofrobotics, classification, workspace, work-envelop, motion ofrobotic arm, end-effectors and its types, service robot and itsapplication,ArtificialIntelligenceinRobotics. | | | | | | 6 | | | | |
| II | Actuatorsandsensors:Typesofactuators,stepper-DC-servo-andbrushless motors-modelof a DC servo motor-typesoftransmissions-purposeofsensor-internalandexternal sensor-common sensors-encoders tachometers-straingaugebasedforcetorquesensor-proximityanddistancemeasuringsensors  Kinematics of robots: Representation of joints and frames,framestransformation,homogeneousmatrix,D-Hmatrix,Forward and inverse kinematics: two link planar (RR) andspherical robot (RRP). Mobile robot Kinematics: Differentialwheelmobilerobot | | | | | | 6 | | | | |
| III | Localization: Self-localizations and mapping - Challenges inlocalizations–IRbasedlocalizations–visionbasedlocalizations–Ultrasonicbasedlocalizations-GPSlocalizationsystems. | | | | | | 6 | | | | |
| IV | PathPlanning:Introduction,pathplanning-overview-road  map path planning-cell decomposition path planning | | | | | | 6 | | | | |

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|  | potential fieldpathplanning-obstacleavoidance-case studies  Vision system: Roboticvisionsystems-imagerepresentation-objectrecognition-andcategorization-depthmeasurement-imagedatacompression-visualinspection-softwareconsiderations | |  |
| V | Application:Arielrobots-collisionavoidancerobotsforagriculture-mining-exploration-underwater-civilian-andmilitary applications-nuclear applications-spaceApplications-Industrialrobots-artificialintelligenceinrobots-application of robots in material handling-continuousarc welding-spot welding-spray painting-assembly operation-cleaning-etc. | | 6 |
|  | **Total** | | 30 |
| **CourseOutcomes** | | **ProgrammeOutcomes** | | |
| CO | Oncompletionofthiscourse,studentswill |  | | |
| 1 | Describethedifferentphysicalformsofrobot  architectures. | PO1 | | |
| 2 | Kinematicallymodelsimplemanipulatorand mobile  robots. | PO1,PO2 | | |
| 3 | Mathematicallydescribeakinematicrobotsystem | PO4,PO6 | | |
| 4 | Analyzemanipulationand navigationproblemsusingknowledgeofcoordinateframes,kinematics,  optimization,control,anduncertainty. | PO4,PO5,PO6 | | |
| 5 | Programroboticsalgorithmsrelatedtokinematics,  control,optimization,anduncertainty. | PO3,PO8 | | |
| **TextBook** | | | | |
| 1 | RicharedD.Klafter.ThomasAchmielewskiandMickaelNegin,RoboticEngineeringandIntegratedApproach,PrenticeHallIndia-Newdelhi-2001 | | | |
| 2 | SaeedB.Nikku,Introductiontorobotics,analysis,controland applications,Wiley-India,2 nd  edition2011 | | | |
| **ReferenceBooks** | | | | |
| 1. | Industrial robotic technology-programming and application by M.P.Groover et.al,  McGrawhill2008 | | | |
| 2. | RoboticstechnologyandflexibleautomationbyS.R.Deb,THH-2009 | | | |
| **WebResources** | | | | |
| 1. | <https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_robotics.htm> | | | |
| 2. | <https://www.geeksforgeeks.org/robotics-introduction/> | | | |

**MappingwithProgrammeOutcomes:**

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| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **2** | **2** | **2** | **1** | **3** | **-** |
| **CO2** | **2** | **2** | **2** | **3** | **1** | **3** |
| **CO3** | **3** | **2** | **3** | **2** | **1** | **3** |
| **CO4** | **3** | **3** | **2** | **2** | **2** | **1** |
| **CO5** | **3** | **2** | **1** | **3** | **3** | **3** |
| **Weightageofcoursecontributed to eachPSO** | 13 | 11 | 10 | 11 | 10 | 10 |

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

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| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | | **Credits** | **Inst.Hours** | **Marks** | | | |
| **CIA** | **External** | **Total** | |
|  | **SimulationandModeling** | SpecificElective | 2 | - | - | - | | 2 | 2 | 25 | 75 | 100 | |
| **Course Objectives** | | | | | | | | | | | | | |
| LO1 | Generates computer simulation technologies andtechniques,lays thegroundworkforstudents to comprehend computer simulation requirements, and implements and tests avariety of simulation and data analysis libraries and programmes. This course focuses onwhatisrequiredtocreatesimulationsoftwareenvironmentsratherthanjustsimulations  usingpre-existingpackages | | | | | | | | | | | | |
| LO2 | Discusstheconceptsofmodellinglayersof criticalinfrastructurenetworksinsociety. | | | | | | | | | | | | |
| LO3 | Createtoolsforviewingandcontrollingsimulationsandtheirresults. | | | | | | | | | | | | |
| LO4 | UnderstandtheconceptofEntitymodelling,Pathplanning | | | | | | | | | | | | |
| LO5 | TolearnabouttheAlgorithmsandModelling. | | | | | | | | | | | | |
| LO1 | **Details** | | | | | | **No.ofHours** | | | | | |
| I | IntroductionToModeling&Simulation–WhatisModeling and Simulation– Complexity Types – ModelTypes – Simulation Types – M&S Terms and DefinitionsInput Data Analysis – Simulation Input Modeling – InputData Collection- DataCollection Problems - –InputModelingStrategy-Histograms-Probability  Distributions-SelectingaProbabilityDistribution. | | | | | | 6 | | | | | |
| II | RandomVariateGeneration–RandomNumbers–RandomNumberGenerators–Generalprinciples–InverseTransformMethod–AcceptanceRejectionMethod–CompositionMethod–RelocateandRescaleMethod - Specific distributions-Output Data Analysis –Introduction-TypesofSimulationWithRespecttoOutput Analysis - Stochastic Process and Sample Path -SamplingandSystematicErrors-Mean,StandardDeviation and Confidence Interval - Analysis of Finite-Horizon Simulations - Single Run - Independent  Replications-SequentialEstimation–Analysisof | | | | | | 6 | | | | | |

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|  | Steady-StateSimulations-RemovalofInitializationBias  (Warm-upInterval)-Replication-DeletionApproach-Batch-MeansMethod. |  |
| III | ComparingSystemsviaSimulation–Introduction–ComparisonProblems-ComparingTwoSystems-Screening Problems - Selecting the Best - Comparisonwith a Standard - Comparison with a Fixed PerformanceDiscrete Event Simulations – Introduction - Next-EventTime Advance - Arithmetic and Logical Relationships -Discrete-EventModelingApproaches–Event-  SchedulingApproach–ProcessInteractionApproach. | 6 |
| IV | Entity Modeling – Entity Body Modeling – Entity BodyVisualization–EntityBodyAnimation–EntityInteraction Modeling–Building Modeling DistributedSimulation–HighLevelArchitecture(HLA)–FederationDevelopmentandExecutionProcess(FEDEP)–SISORPRFOMBehaviorModeling–GeneralAIAlgorithms-DecisionTrees-NeuralNetworks - Finite State Machines - Logic Programming -ProductionSystems–PathPlanning-Off-LinePathPlanning - Incremental Path Planning - Real-Time PathPlanning–ScriptProgramming-ScriptParsing-Script  Execution. | 6 |
| V | OptimizationAlgorithms–GeneticAlgorithms–SimulatedAnnealingExamples:SensorSystemsModeling–HumanEyeModeling–OpticalSensor  Modeling–RadarModeling. | 6 |
|  | **Total** | **30** |
| **CourseOutcomes** | | | |
| **Course**  **Outcomes** | Oncompletionofthiscourse,studentswill; | **ProgrammeOutcomes** | |
| **CO1** | IntroductionToModeling&Simulation,InputData  AnalysisandModeling. | PO1 | |
| **CO2** | RandomVariateandNumberGeneration.Analysisof  Simulationsandmethods. | PO1,PO2 | |

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| **CO3** | ComparingSystemsviaSimulation | PO4,PO6 |
| **CO4** | EntityBodyModeling,Visualization,Animation. | PO4,PO5,PO6 |
| **CO5** | AlgorithmsandSensorModeling. | PO3,PO8 |
| **TextBooks** | | |
| 1. | Jerry Banks, ―Handbook of Simulation: Principles, Methodology, Advances,  Applications,andPractice‖,JohnWiley&Sons,Inc.,1998. | |
| 2. | GeorgeS.Fishman,―Discrete-EventSimulation:Modeling,ProgrammingandAnalysis‖,  Springer-VerlagNewYork,Inc.,2001. | |
| **ReferencesBooks** | | |
| 1. | AndrewF.Seila,VlatkoCeric,PanduTadikamalla,―AppliedSimulationModeling‖,  ThomsonLearningInc.,2003. | |
| **WebResources** | | |
| 1. | <https://www.tutorialspoint.com/modelling_and_simulation/index.htm> | |
| 2. | <https://www.javatpoint.com/verilog-simulation-basics> | |

**MappingwithProgrammeOutcomes:**

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| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 2 | 2 | - | 1 |
| **CO2** | 3 | 1 | 3 | 2 | 3 | 3 |
| **CO3** | 3 | 2 | - | - | 2 | 3 |
| **CO4** | 3 | - | 3 | 3 | 3 | 1 |
| **CO5** | 3 | 3 | 3 | 3 | 1 | 2 |
| **Weightageofcourse**  **contributed toeachPSO** | 15 | 9 | 11 | 10 | 9 | 10 |

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

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| **SubjectCode** | **SubjectName** | **Category** | **L** | **T** | **P** | **O** | **Credits** | | **Inst.Hours** | **Marks** | | |
| **CIA** | **External** | **Total** |
|  | **OrganizationalBehaviour** | SpecificElective | 2 | - | - | - | 2 | | 2 | 25 | 75 | 100 |
| **Learning Objectives** | | | | | | | | | | | | |
| LO1 | TohaveextensiveknowledgeonOBandthescopeofOB. | | | | | | | | | | | |
| LO2 | TocreateawarenessofIndividualBenaviour. | | | | | | | | | | | |
| LO3 | ToenhancetheunderstandingofGroupBehaviour | | | | | | | | | | | |
| LO4 | ToknowthebasicsofOrganisaitonalCultureandOrganisationalStructure | | | | | | | | | | | |
| LO5 | TounderstandOrganisationalChange,ConflictandPower | | | | | | | | | | | |
| **UNIT** | **Details** | | | | | | | **No. ofHours** | | | | | |
| I | **INTRODUCTION**:ConceptofOrganizationalBehavior(OB):Nature,ScopeandRoleofOB:Disciplinesthatcontribute to OB; Opportunities for OB (Globalization, Indianworkforce diversity, customer service, innovation and change,networkedorganizations,work-lifebalance,peopleskills,  positiveworkenvironment,ethics) | | | | | | | 6 | | | | | |
| II | **INDIVIDUALBEHAVIOUR:**   1. Learning, attitude and Job satisfaction: Concept of learning,conditioning, shaping and reinforcement. Concept of attitude,components, behavior and attitude. Job satisfaction: causation;impactof satisfiedemployeesonworkplace. 2. Motivation : Concept; Theories (Hierarchy of needs, X andY, Two factor, McClelland, Goal setting, Self-efficacy, Equitytheory);Jobcharacteristicsmodel;Redesigningjobs, 3. Personality andValues : Conceptof personality; Myers-Briggs Type Indicator (MBTI); Big Five model. Relevance ofvalues;Linkingpersonalityandvaluestotheworkplace(person-jobfit,person-organizationfit) 4. Perception,DecisionMaking:PerceptionandJudgements;   Factors;Linkingperceptiontoindividualdecisionmaking: | | | | | | | 6 | | | | | |
| III | **GROUPBEHAVIOUR**:1.GroupsandWorkTeams:Concept:FiveStagemodelofgroupdevelopment;Groupnorms, cohesiveness ; Group think and shift ; Teams; types ofteams; Creating team players from individuals and team basedwork(TBW) 2. Leadership : Concept; Trait theories;  Behavioraltheories(OhioandMichiganstudies);Contingency | | | | | | | 6 | | | | | |

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|  | theories(Fiedler,HerseyandBlanchard,Path-Goal); |  | |
| IV | ORGANISATIONALCULTURE AND STRUCTURE :  Concept of culture; Impact (functions and liability); Creatingandsustainingculture:Conceptofstructure,Prevalentorganizationaldesigns:Newdesignoptions | 6 | |
| V | ORGANISATIONALCHANGE,CONFLICTANDPOWER:  Forcesofchange;Plannedchange;Resistance;Approaches(Lewin'smodel,Organisationaldevelopment);.Conceptofconflict,Conflictprocess;Types,Functional/Dysfunctional.  Introductiontopowerandpolitics. | 6 | |
|  |  | **30** | |
|  | | |
| **Course**  **Outcomes** | OnCompletionofthecoursethestudentswill | **ProgramOutcomes** |
| **CO1** | To define OrganisationalBehaviour, Understand the  opportunitythroughOB. | PO1,PO2,PO6, PO7 |
| **CO2** | Toapplyself-awareness,motivation,leadershipandlearning  theoriesatworkplace. | PO2,PO4. PO5,PO6 |
| **CO3** | Toanalyzethecomplexitiesandsolutionsofgroupbehaviour. | PO1, PO2,PO4, PO5,  PO6 |
| **CO4** | Toimpactandbringpositivechangeinthecultureofthe  organisaiton. | PO2,PO3,PO4PO5,  PO8 |
| **CO5** | Tocreateacongenialclimateintheorganization. | PO1,PO2,PO5PO6,  PO8 |
| **ReadingList** | | |
| 1. | [NeharikaVohraStephenP.Robbins,TimothyA.Judge](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Neharika%2BVohra%2BStephen%2BP.%2BRobbins%2C%2BTimothy%2BA.%2BJudge&search-alias=stripbooks),*OrganizationalBehaviour*,  PearsonEducation,18th Edition,2022. | |
| 2. | FredLuthans,*OrganizationalBehaviour*,TataMcGrawHill,2017. | |
| 3. | RayFrench,CharlotteRayner,GaryRees&SallyRumbles,*OrganizationalBehaviour*,  JohnWiley&Sons,2011 | |
| 4. | [LouisBevoc](https://www.amazon.in/Louis-Bevoc/e/B071SKMB82/ref%3Ddp_byline_cont_ebooks_1),[AllisonShearsett](https://www.amazon.in/s/ref%3Ddp_byline_sr_ebooks_2?ie=UTF8&field-author=Allison%2BShearsett&text=Allison%2BShearsett&sort=relevancerank&search-alias=digital-text),[RachaelCollinson,](https://www.amazon.in/s/ref%3Ddp_byline_sr_ebooks_3?ie=UTF8&field-author=Rachael%2BCollinson&text=Rachael%2BCollinson&sort=relevancerank&search-alias=digital-text)*OrganizationalBehaviourReference*,  NutriNicheSystemLLC(28April2017) | |
| 5. | Dr.ChristopherP.Neck,JefferyD.Houghton andEmmaL.Murray,*Organizational*  *Behaviour:ASkill-BuildingApproach,*SAGE Publications,Inc;2ndedition(29November2018). | |
| **ReferencesBooks** | | |
| 1. | UmaSekaran,OrganizationalBehaviourText&cases,2ndedition,TataMcGrawHill  PublishingCO. Ltd | |
| 2. | GangadharRao,Narayana, V.S.PRao,OrganizationalBehaviour1987,Reprint2000,  KonarkPublishersPvt.Ltd, 1stedition | |
| 3. | S.S.Khanka,OrganizationalBehaviour,S.Chand&Co,NewDelhi. | |
| 4. | J. Jayasankar,OrganizationalBehaviour,MarghamPublications, Chennai,2017. | |

**MappingwithProgrammeOutcomes:**

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| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | **1** | **2** | **2** | **1** | **3** | **1** |
| **CO2** | **3** | **2** | **2** | **3** | **1** | **3** |
| **CO3** | **3** | **2** | **3** | **1** | **1** | **3** |
| **CO4** | **3** | **3** | **2** | **2** | **2** | **1** |
| **CO5** | **3** | **2** | **1** | **3** | **3** | **3** |
| **Weightageofcoursecontributedtoeach**  **PSO** | 13 | 11 | 10 | 10 | 10 | 11 |

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

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| **SubjectCode** | | | | **SubjectName** | **Category** | **L** | **T** | **P** | **S** | **Credits** | **Marks** | | | |
| **CIA** | **External** | | **Total** |
|  | | | | **UNDERSTANDINGINTERNET** | SpecificElective | 2 | - | - |  | 2 | 25 | 75 | | 100 |
| **Learning Objectives** | | | | | | | | | | | | | | |
| LO1 | | | KnowledgeofInternetmedium | | | | | | | | | | | |
| LO2 | | | Internetasamassmedium | | | | | | | | | | | |
| LO3 | | | FeaturesofInternetTechnology, | | | | | | | | | | | |
| LO4 | | | Internetassourceofinfotainment | | | | | | | | | | | |
| LO5 | | | Studyofinternetaudiencesandaboutcybercrime | | | | | | | | | | | |
| **UNIT** | | | **Contents** | | | | | | | | | | **No. Of.Hours** | |
| I | | | Theemergenceofinternetasamassmedium–theworld of‗worldwide web‘. | | | | | | | | | | **6** | |
| II | | | Featuresofinternetasatechnology. | | | | | | | | | | **6** | |
| III | | | Internetasasource ofinfotainment–classificationbasedoncontentandstyle. | | | | | | | | | | **6** | |
| IV | | | Demographicandpsychographicdescriptionsofinternet‗audiences‘–effect  ofinternetonthevaluesandlife-styles. | | | | | | | | | | **6** | |
| V | | | Presentissuessuchascybercrimeandfuture possibilities. | | | | | | | | | | **6** | |
| **TOTALHOURS** | | | | | | | | | | | | | **30** | |
| **CourseOutcomes** | | | | | | | | | | | **Programme**  **Outcomes** | | | |
| CO | | Oncompletionofthiscourse,studentswill | | | | | | | | |  | | | |
| CO1 | | Knowsthebasicconceptininternet  Conceptofmassmediumandworldwideweb | | | | | | | | | PO1, PO2, PO3,PO4,PO5,PO6 | | | |
| CO2 | | Knowstheconceptof internetasatechnology. | | | | | | | | | PO1, PO2, PO3,PO4,PO5,PO6 | | | |
| CO3 | | Understandtheconceptofinfotainmentandclassificationbasedoncontent  andstyle | | | | | | | | | PO1, PO2,PO3,  PO4,PO5,PO6 | | | |
| CO4 | | CanbeabletoknowaboutDemographicandpsychographicdescriptionof  internet | | | | | | | | | PO1, PO2,PO3,  PO4,PO5,PO6 | | | |
| CO5 | | Understandtheconceptofcybercrimeandfuturepossibilities | | | | | | | | | PO1, PO2, PO3,PO4,PO5,PO6 | | | |
| **Textbooks** | | | | | | | | | | | | | | |
| 1 | 01.Barnouw,EandKrishnaswamyS[1990]IndianFilm.NewYork,OUP. | | | | | | | | | | | | | |
| 2 | Kumar,Keval[1999]MassCommunicationinIndia.Mumbai,Jaico. | | | | | | | | | | | | | |
| 3 | **Srivastava,KM[1992]MediaIssues.SterlingPublishersPvtLtd.** | | | | | | | | | | | | | |
|  | **ReferenceBook** | | | | | | | | | | | | | |
| 1 | Acharya,RN[1987]TelevisioninIndia.ManasPublications,NewDelhi. | | | | | | | | | | | | | |

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| 2 | Barnouw,E[1974]Documentary–AHistoryofNonfiction. Oxford,OUP |
| 3 | Luthra,HR[1986] IndianBroadcasting.Ministryof I& B,NewDelhi. |
| 4 | Vasudev,Aruna[1986]TheNewIndianCinema.MacmillanIndia,NewDelhi. |
| **WebResources** | |
| 1. | <https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf> |
| 2. | <https://www.w3schools.com/html/default.asp> |

**MappingwithProgrammeOutcomes:**

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| **CO/PSO** | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** |
| **CO1** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO2** | 3 | 3 | 2 | 3 | 3 | 3 |
| **CO3** | 2 | 3 | 3 | 3 | 3 | 3 |
| **CO4** | 3 | 3 | 3 | 3 | 3 | 3 |
| **CO5** | 3 | 3 | 3 | 2 | 3 | 3 |
| **Weightage of coursecontributedtoeachPSO** | 14 | 15 | 14 | 14 | 15 | 15 |

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