St Aloysius College (Autonomous)

Mangaluru

Re-accredited by NAAC "A++" Grade

Course structure and syllabus of

B.Sc.

COMPUTER SCIENCE

Under NEP Regulations, 2020
(2021-2023 Batch)

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ESTD : 1880

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Re-accredited by NAAC with '**A++**' Grade with CGPA 3.67/4 (Cycle 4)
Recognised as Centre for Research Capacity Building under UGC-STRIDE Scheme
Recognised under DBT – BUILDER Scheme, Government of India
College with "STAR STATUS" Conferred by DBT, Government of India
Recognised by UGC as "College with Potential for Excellence"

Date: 21-02-2022

NOTIFICATION

Sub: Syllabus of **B.Sc. Computer Science**under NEP Regulations, 2020.
(As per Mangalore University guidelines)

Ref: 1. Decision of the Academic Council meeting held on 18-12-2021 vide Agenda No: 6
2. Decision of the Academic Council meeting held on 09-07-2022 vide Agenda No: 14
3. Decision of the Academic Council meeting held on 25-02-2023 vide Agenda No. 12
4. Decision of the Academic Council meeting held on 02-09-2024 vide Agenda No. 3
5. Office Notification dated 21-02-2022
6. Office Notification dated 17-08-2022
7. Office Notification dated 30-03-2023
8. Office Notification dated 26-09-2023

Pursuant to the above, the Syllabus of **B.Sc. Computer Science**under NEP Regulations, 2020 which was approved by the Academic Council at its meeting held on 18-12-2021, 09-07-2022, 25-02-2023 &2-09-2024 is hereby notified for implementation with effect from the academic year **2021-22**.

PRINCIPAL

ST ALOYSIUS COLLEGE MANGALORE 575 003 AUTONOMOUS

REGISTRAR

To:

1. The Chairman/Dean/HOD.
2. The Registrar Office
3. Library

Index

TheobjectivesoftheProgrammeare:

1. Theprimary objectiveof this program isto providea foundationof computing principlesand business practices for effectively using/managing information systems and enterprisesoftware
2. It helps students analyze the requirements for system development and exposes students tobusinesssoftwareand information systems
3. This course provides students with options to specialize in legacy application software,systemsoftwareormobileapplications
4. Toproduceoutstanding ITprofessionalswho canapply the theoretical knowledgeintopracticeintherealworldanddevelopstandaloneliveprojectsthemselves
5. To provide opportunity for the study of modern methods of information processing and itsapplications.
6. To develop among students the programming techniques and the problem-solving skillsthroughprogramming
7. To prepare students who wish to go on to further studies in computer science and relatedsubjects.
8. ToacquaintstudentstoWorkeffectivelywitharangeofcurrent,standard,OfficeProductivitysoftwareapplications.

ProgramOutcomes:

1. **Disciplineknowledge:**AcquiringknowledgeonbasicsofComputerScienceandabilitytoapplytodesignprinciplesinthedevelopmentofsolutionsforproblemsofvaryingcomplexity
2. **ProblemSolving:**Improvedreasoningwithstrongmathematicalabilitytoldentify,formulateandanalyzeproblemsrelatedtocomputerscienceandexhibitingasoundknowledgeondatastructuresandalgorithms.
3. **Design and Development of Solutions:** Ability to design and development of algorithmicsolutions to real world problems and acquiring a minimum knowledge on statistics andoptimization problems.Establishing excellentskills in applying variousdesignstrategiesforsolvingcomplexproblems.
4. **Programming a computer:** Exhibiting strong skills required to program a computer forvariousissuesandproblemsofday-to-dayapplicationswiththoroughknowledgeonprogramminglanguages ofvariouslevels.
5. **ApplicationSystemsKnowledge**:Possessingasoundknowledgeoncomputerapplicationsoftwareandabilitytodesignanddevelopappforapplicativeproblems.
6. **Modern Tool Usage:** Identify, select and use amodern scientificand IT tool or techniqueformodeling,prediction,dataanalysisandsolvingproblemsintheareaofComputerScienceandmakingthemmobilebasedapplicationsoftware.
7. **Communication:**Musthavea reasonably goodcommunicationknowledgebothinoralandwriting.
8. **ProjectManagement:**Practicingofexistingprojectsandbecomingindependenttolaunchownprojectbyidentifying agapinsolutions.
9. **EthicsonProfession,EnvironmentandSociety:**Exhibitingprofessionalethicstomaintaintheintegralityinaworkingenvironmentandalsohaveconcernonsocietalimpacts duetocomputer-basedsolutionsforproblems.
10. **LifelongLearning:**Shouldbecomeanindependentlearner.So,learntolearnability.
11. **MotivationtotakeupHigherStudies:**Inspirationtocontinueeducationstowardsadvancedstudieson ComputerScience.

Syllabus Structure of Computer Science Paper as one of the major papers and open elective papers for BSc (Computer Science).

Subject Code	sem	subject	Theory hours/week	Practical hours/week	Duration of exams	Marks and credits			
						IA	Exam	Total	Credits
G505DC1.1	I	Computer Fundamentals and Programming in C	4		03	40	60	100	4
G505DC2.1P	I	CProgrammingLab		4	02	25	25	50	2
G505OE1.1	I	OfficeAutomation	3		03	40	60	100	3
G505DC1.2	II	DataStructuresusingC	4		03	40	60	100	4
G505DC2.2P	II	DataStructuresLab		4	03	25	25	50	2
G505OE1.2	II	WebDesigning	3		03	40	60	100	3
G505DC1.3	III	object oriented Programming concepts and programming JAVA	4		03	40	60	100	4
G505DC2.3P	III	java lab		4	02	25	25	50	2
G505OE1.3	III	Internet of things	3		03	40	60	100	3
G505DC1.4	IV	Data Base Management System	4		03	40	60	100	4
G505DC2.4P	IV	DBMS lab		4	02	25	25	50	2
G505DC1.5	V	Programming in Python	4		03	40	60	100	4
G505DC2.5P	V	Python Programming Lab		4	02	25	25	50	2
G505DC3.5	V	Computer Networks	4		03	40	60	100	4
G505DC4.5P	V	Computer Networks Lab		4	02	25	25	50	2
G505DC16	VI	Web Technologies	4		03	40	60	100	4
G505DC2.6P	VI	Web Technologies Lab – Java Script, HTMS, CSS Lab		4	02	25	25	50	2
G505DC3.6	VI	Statistical Computing & R Programming	4		03	40	60	100	4
G505DC4.6P	VI	R Programming Lab		4	02	25	25	50	2

CurriculumStructure

Program:B.Sc.(Basic and Honors)Subject:Computer Science

Sem	DisciplineSpecificCoreCourses(DSC)	Hours/Week		DisciplineSpecific Elective Courses (DSE)/VocationalCourses(VC)	Hours/Week
		Theory	Lab		
1	DSC-1:ComputerFundamentalsandProgrammingin C DSC-1Lab:CProgrammingLab	4	4		
2	DSC-2:DataStructuresusingC DSC-2Lab:DatastructuresLab	4	4		
3	DSC-3: Object Oriented ProgrammingConceptsandProgramminginJAVA DSC-3Lab:JAVALab	4	4		
4	DSC-4:DatabaseManagementSystems DSC-4Lab:DBMSLab	4	4		
5	DSC-5: Programming in PYTHONDSC-6:**Computer Networks** DSC-5Lab:PYTHONProgramminglabDSC-6Lab:**Computer Networks**lab	4 4	4 4	VC-1: AnyonefromVocationalCourses,Group–1*	3
6	DSC-7:InternetTechnologies DSC-8:ComputerNetworks DSC-7Lab:JAVAScript,HTML,CSSLab DSC-8Lab:ComputerNetworksLab	3 3	4 4	VC-2: AnyonefromVocational Courses,Group–2*Internship:	3
7	DSC-9:ComputerGraphicsandVisualizationDSC-10: Design and Analysis of AlgorithmsDSC-11:SoftwareEngineering DSC-9Lab:ComputerGraphicsand Visualization LabDSC-10Lab:AlgorithmsLab	3 3 3	4 4	DSE-1: AnyonefromDiscipline SpecificElectiveCourses, Group–1** DSE-2: AnyonefromDiscipline SpecificElectiveCourses, Group–2** ResearchMethodology:	3 3 3
8	DSC-12:ArtificialIntelligenceandApplications DSC-13:ComputerOrganizationandArchitecture DSC-14:DataWarehousingandDataMining	3 3 3		DSE-3: DSE-4: AnytwofromDiscipline SpecificElectiveCourses, Group–3 ResearchProject:	3 3 6

* VocationalCourses

Group-1
• DTP,CADandMultimedia • HardwareandServerMaintenance • WebContentManagementSystems • E-Commerce • WebDesigning
Group-2
• HealthCareTechnologies • DigitalMarketing • OfficeAutomation • MultimediaProcessing • AccountingPackage

**DisciplineSpecificElectiveCourses

Group-1
• IoT • CyberLawandCyberSecurity • WebProgramming-PHPandMySQL • Clouds,Grids,andClusters • Software Testing
Group-2
• InformationandNetworkSecurity • DataCompression • DiscreteStructures • OpensourceProgramming • MultimediaComputing • BigData
Group-3
• DataAnalytics • StorageAreaNetworks • PatternRecognition • DigitalImageProcessing • ParallelProgramming • DigitalSignalProcessing

FirstSemester

CourseCode:G505DC1.1	**CourseTitle:ComputerFundamentalsandProgramminginC**

CourseCredits:4	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

CourseOutcomes(COs)

Aftercompletingthiscoursesatisfactorily,astudentwillbeableto:

- Operatedesktopcomputerstocarryoutcomputationaltasks
- Understandworkingofhardwareandsoftwareandtheimportanceofoperatingsystems
- Understandprogramminglanguages,numbersystems,peripheraldevices,networkin g,multimediaandinternetconcepts
- Read,understandandtracetheexecutionofprogramswritteninClanguage
- WritetheCcodeforagivenproblem
- PerforminputandoutputoperationsusingprogramsinC
- Writeprogramsthatperformoperationsonarrays

CourseContent

Content	Hours
Unit-1	
Fundamentals of Computers: Introduction to Computers –Definition of a computer,Characteristicsofcomputers,Evolutionofcomputers,Generationsofcomputers ,Classificationofcomputers.Computersystem,applicationsofcomputers. **Number Systems** – different types, conversion from one number system to another;Codingschemes–ASCIIand Unicode. **ComputerSoftware**–Categoriesofsoftware. **Computer Programming and Languages**–Machine Level, Assembly level and Highlevellanguages; Translator Programs – Assembler, Interpreter and Compiler. Developing acomputerprogram,ProgramDevelopmentCycle-Algorithm,FlowchartandPseudocodewithexamples. **IntroductiontoCProgramming:**OverviewofC;HistoryandImportanceofC;StructureofaCP rogramwithExamples;CreatingandExecutingaCProgram;Compilation processinC.	13
Unit-2	
CProgrammingBasicConcepts:CCharacterSet;Ctokens-keywords,identifiers,constants, and variables; Data types; Declaration and initialization of variables;Symbolicconstants. **COperatorsandExpressions:**Arithmeticoperators;Relationaloperators;Logicaloperators ;Assignmentoperators;Increment&Decrementoperators;Bitwiseoperators;Conditional operator;Specialoperators;OperatorPrecedenceandAssociatively.Evaluationofarithmet icexpressions;Typeconversion. **Input and output with C:** Formatted I/O functions - *printf* and *scanf,* control stings andescapesequences,outputspecificationswith*printf*functions;UnformattedI/Ofunction storeadanddisplaysinglecharacterandastring-*getchar,putchar,gets*and *puts*functions.	13

Unit-3

ControlStructures: Branching:if,if-else,nestedif,else-ifladder,switch.Looping**:**while,do-whileandforloop,nestedloops,exit,break,jumpsinloops. **Arrays**:OneDimensionalarrays-Declaration,InitializationandMemoryrepresentation;TwoDimensionalarrays-Declaration,InitializationandMemoryrepresentation. **Strings**:DeclaringandInitializingstringvariables;Stringhandlingfunctions-*strlen,strcmp,strcpyandstrcat;*Characterhandlingfunctions-*toascii,toupper,tolower, isalpha,isnumeric*etc.	13
Unit-4	
Pointers in C: Understanding pointers - Declaring and initializing pointers, accessingaddress and value of variables using pointers; Pointers and Arrays; Pointer Arithmetic;Advantagesanddisadvantagesofusingpointers. **User-Defined Functions:** Need for user defined functions; Format of C user definedfunctions; Components of user defined functions - return type, name, parameter list,functionbody,returnstatementandfunctioncall;Categoriesofuserdefinedfunctions -Withandwithoutparametersandreturntype. **User-Defined Data Types:** Structures - Structure Definition, Advantages of Structure,declaringstructurevariables,accessingstructuremembers,Structuremembersinitialization,comparingstructurevariables,ArrayofStructures;Unions-Uniondefinition;differencebetweenStructuresandUnions.	13

TextBooks:

1. PradeepK.SinhaandPritiSinha:**ComputerFundamentals**(SixthEdition),BPBPublication.
2. ITLEducationSolutionLimited,**IntroductiontoInformationTechnology**,SecondEdition2018,PearsonEducation.
3. E.Balagurusamy:**ProgramminginANSIC**(TMH),7thEdition.

ReferenceBooks:

1. Kamthane:ProgrammingwithANSIandTURBOC(PearsonEducation)
2. V.Rajaraman:ProgramminginC(PHI–EEE)
3. S.ByronGottfried:ProgrammingwithC(TMH)
4. Kernighan&Ritche:TheCProgrammingLanguage(PHI)
5. YashwantKanitkar:LetusC
6. P.B.Kottur:ProgramminginC(SapnaBookHouse)

CourseCode:G505DC1.1P	**CourseTitle:CProgrammingLab**
CourseCredits:2	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:25
ExamMarks:25	ExamDuration:2Hours

PracticeLab

Thefollowingactivitiesbecarriedoutinthelabduringtheinitialperiodofthesemester.

1. BasicComputerProficiency
   a) FamiliarizationofComputerHardware.
   b) BasicComputerOperationsandMaintenance.
   c) Do'sandDon'ts,SafetyGuidelinesinComputerLab.
2. FamiliarizationofBasicSoftware– OperatingSystem,WordProcessors,InternetBrowsers,IntegratedDevelopmentEnvironment(IDE)withExamples.
3. TypeProgramCode,DebugandCompilebasicprogramscoveringCProgrammingfundamentalsdiscussedduringtheoryclasses.

ProgrammingLab

PartA

1. Programtoreadthreenumbersandfindthebiggestofthree.
2. Programtofindtheareaofatriangleusingthreesidesoftriangle.
3. Programtocheckforprimenumber.
4. ProgramtogeneratenFibonaccinumbers.
5. Programtoreadamulti-digitnumberfindthesumofthedigits,reversethenumberandcheckitforpalindrome.
6. Programtoreadnumbersfromkeyboardcontinuouslytilltheuserpresses999andtofindthesumof onlypositivenumbers.
7. Programtoacceptstudentnameandmarksinthreesubjects.Findthetotalmarks,averageandgrade(dependingontheaveragemarks).
8. Programtofindtherootsofquadraticequation(Demonstrationofswitch Statement).
9. Programtofindlargestandsmallestelementinalistof'n'elements(Demonstrationofone-dimensionalarray).
10. Programtomultiplytwomatrices.

PartB

1. Programtoaccept'n'andfindthesumoftheseries1!+3!+5!……+n!
2. Writeuser-definedfunctionsto(a)findthelengthofastring(b)concatenatetwostrings.Callthesefunctionsinthemainprogram.
3. Programtofindwhetheragivenstringispalindromeornot(Useafunctiontoreverseastringusingpointers).
4. ProgramtotransposeamatrixoforderNxMandcheckwhetheritissymmetricornot.
5. Programtoaddtwomatricesusingpointers.
6. Programtoreadastringandtofindthenumberofalphabets,digits,vowels,consonants,spacesandspecialcharacters
7. Program to display the first 'n' Fibonacci numbers using a function to generate the n^{th} Fibonaccinumber.

8. ProgramtofindtheGCDof‘n’integersusingafunctiontocomputetheGCDoftwointegers.
9. Programtoentertheinformationofnstudents(name,registernumber,marksinthreesubjects)into an array of structures. Compute and print the result of all students. For passing, studentshouldgetatleast35ineachsubject,otherwiseresultis“FAIL”. Ifthestudentpassesandifpercentage>=70,resultisDISTINCTION;Ifpercentageis<70and>=60, result is FIRST CLASS; if percentage is < 60 and >=50, result is SECOND CLASS; otherwiseresult is PASS CLASS. Get the outputof all students in a tabular form with proper columnheadings.
10. Programtopreparethepay slipof‘n’employeesusinganarrayofstructures. Inputtheemployee name, employee number and basic pay. Calculate the DA,HRA, PF, PT, Gross Pay andNetPayasfollows:
    IfBasic<40000,DA=50%ofBasic,HRA=12%ofBasic,PF=12%ofGrossPay,PT=250.OtherwiseDA=40%ofBasic,HRA=10%ofBasic,PF=13%ofGross,PT=300.GrossPay=Basic+DA+HRAandNetPay=GrossPay–PF–PT.

EvaluationSchemeforPracticalExamination

AssessmentCriteria		**Marks**
Program-1fromPartA	WritingtheProgram	7
	ExecutionandFormatting	8
Program-2fromPartB	WritingtheProgram	8
	ExecutionandFormatting	12
PracticalRecords		10
Viva		5
Total (converted to 25)		**50**

CourseCode:G505OE1.1	**CourseTitle:OfficeAutomation**
CourseCredits:3	HoursofTeaching/Week:3
TotalContactHours:42	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

CourseOutcomes(COs):

Aftercompletingthiscoursesatisfactorily,astudentwillbeableto:

- Compareandcontrastvarioustypesofoperatingsystems
- Explainthepurposeofofficeautomation
- Describehowinformationisstoredandretriedin/fromcomputermemory
- Knowaboutvarioustypesofofficeautomationsoftwareandtheirapplications
- Createdocumentusingwordprocessingsoftware
- Designpresentationusingpresentationsoftware
- Createworksheetsusingspreadsheetsoftware
- Storeandretrievedatain/fromdatabasemanagementapplication

CourseContent

Content	Hours
Unit-1	
Computer software: Introduction, Software definition, Software categories, Installinganduninstallingsoftware,Softwarepiracy,Softwareterminologies **IntroductiontowindowsOperatingSystem**,operatingwithwindows,GUI,useofhelpfeatures, starting an application, essential accessories, creating shortcuts, windowsexplorer,controlpanel,findingfoldersandfiles,Systemutilities, **memory,network basics(LAN,WAN,Man).** MS-Office:Introduction,Officeuserinterface,MicrosoftofficeComponents. **MS-Word:** Introduction, Starting MS-Word, Microsoft word Environment working withworddocuments,workingwithtext,workingwithtableschecking spellingandgrammar,addinggraphstothedocument,mailmerge,headerandfooters,page numbers,protectthedocument,workingwithformattingtools.	12
Unit-2	
MS-Excel: Introduction, starting MS Excel, Microsoft Excel environment, Working withExcel workbook, Working with worksheet – Entering data, Excel formatting tips andTechniques,Generatinggraphs**,FormulasandFunctions**,**Insertingcharts,Sorting,PivotTables,dataextraction,addingclipart,addanimagefromafile,PrintinginExcel.**	10
Unit-3	
MS-PowerPoint: Starting MS PowerPoint, Working with PowerPoint, Creating, Savingand Printing a presentation,**Working with Animation, adding a slide to presentation,navigatingthroughapresentation,Slide-sorter,Slide-show,editingslides,WorkingwithGraphicsandMultimediainPowerPoint(InsertingPhoto,Video,andAudio).** The Internet: Basic internet terms, Internet applications**, Internet tools, Web browser,Web browser features,** Internet Explorer environment, Electronic mail, Email addressstructure,Advantagesand disadvantagesofemail.	10

Unit-4	
DatabaseFundamentals-Basicdatabaseterms,DatabaseManagementSystem. **MS-Access:IntroductiontoAccess,CreatingTablesandDatabase,DataTypeandProperties**, Adding & Deleting Field in Table, Primary Key Fields, **Queries, Forms: TheFormswizardsavingforms,Modifyingforms**,**Pages,Macro,Module,Reports,Printing Report,Forms.**	10

TextBook:

1.ITL EducationSolutionLimited, IntroductiontoInformationTechnology, SecondEdition.,Pearson

ReferenceBooks:

1. PeterNorton,IntroductiontoComputers,7thedition,TataMcGrawHillPublication,2011)
2. AnitaGoel,ComputerFundamentals,PearsonEducation,2011.
3. LindaFoulkes,LearnMicrosoftOffice2019:Acomprehensiveguidetogettingstarted withWord,PowerPoint,Excel,Access,andOutlook,PacketPublishingLimited,2020.
4. BittuKumar,MasteringMSOffice:ConciseHandbookwithScreenshots,V&SPublis hers,2017.

IISemester

CourseCode:G505DC2.2	**CourseTitle:DataStructuresusingC**
CourseCredits:4	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

CourseOutcomes(COs)

Aftercompletingthiscoursesatisfactorily,astudentwillbeableto:

- Describehowarrays,records,linkedstructures,stacks,queues,trees,andgraphsarerepresentedinmemoryandusedbyalgorithms
- Describecommonapplicationsforarrays,records,linkedstructures,stacks,queues,trees,andgraphs
- Writeprogramsthatusearrays,records,linkedstructures,stacks,queues,trees,andgraphs
- Demonstratedifferentmethodsfortraversingtrees
- Comparealternativeimplementationsofdatastructureswithrespecttoperformance
- Describetheconceptofrecursion,giveexamplesofitsuse
- Discussthecomputationalefficiencyoftheprincipalalgorithmsforsortingandsearching

CourseContent

Content	**Hours**
Unit-1	
Introduction to Data Structures: Definition, Need for Data Structures, Types of DataStructures. **Linear Data Structures:** Arrays - Definition, Declaration and storage of one-andtwo-dimensionalarrays.Sparsematrices. **Recursion**: Definition; Types of recursion; Recursion Technique Examples - Fibonaccinumbers, GCD, Binomial coefficient ${}^{n}C_{r}$, Comparison between iterative and recursivefunctions. **Sorting**:Sorting–Selectionsort,Bubblesort,Quicksort,Insertionsort;Comparisonof differentsortingtechniques.	13
Unit-2	
Searching: Introduction,Linearsearch,BinarySearch,Comparisonofdifferentsearchingtechniques. **Dynamicmemoryallocation:**StaticandDynamicmemoryallocation;Memoryallocationanddeallocation functions-*malloc*,*calloc*,*realloc*and*free.* **Linked List**: Introduction, characteristics, types of linked lists, Representation of singlylinked list in memory, Singly linked list – Operations, algorithms, Representation ofpolynomialsusing linkedlists.Circularlinked list–Operations,Doubly linkedlist-operations.Memoryallocations.	13
Unit-3	
Stacks– Arrayrepresentationofstacks,Linkedrepresentationofstacks,operations,ApplicationsofstacksRecursion,Implementationofrecursiveprocedurebystack (factorialfunctionandFibonaccisequence).	13

CourseCode:G505DC2.2	**CourseTitle:DataStructuresusingC**
CourseCredits:4	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

ArithmeticExpressions:Prefix,infixandpostfixnotation,infixtopostfixconversion,evaluationofpostfixexpression.

Queues:Arrayrepresentationofqueue,Linkedrepresentationofqueue,Typesofqueues-Simple queue,circularqueue,double-endedqueue,priorityqueue,operations onqueues.

Unit-4

Trees: Definition; Tree terminologies – node, root node, parent node, ancestors of anode, siblings, terminal and non-terminal nodes, degree of a node, level, edge, path,depth; Binarytree:Typesofbinarytrees-strictbinarytree,completebinarytree,binarysearchtree. Array representation of binary tree. Traversal of binary tree; *preorder, inorder* and*postorder*traversal; Constructionofa binary treewheninorderandpre/postordertraversalsaregiven. 13

Graphs: Terminologies,Matrixrepresentationofgraphs,Traversals:BreadthFirstSearch andDepthfirstsearch.

TextBooks

1. SartajSahni:FundamentalsofDataStructures.
2. YedidyahLangsam,MosheJ.AugensteinandAaronM.Tenenbaum,**DataStructuresUsingCandC++**,2nd Edition,PHIPublication
3. SeymourLipschutz,Schaum'sOutlinesSeries,**DataStructureswithC**,TataMcGrawHill2011

References

1. Kamathane:IntroductiontoDatastructures(PearsonEducation)
2. Y.Kanitkar:DataStructuresUsingC(BPB)
3. Kottur:DataStructureUsingC
4. PadmaReddy:DataStructureUsingC
5. SudipaMukherjee:DataStructuresusingC– 1000ProblemsandSolutions(McGrawHillEducation,2007)

CourseCode:G505DC2.2P **CourseTitle:DataStructuresLa**

CourseCredits:2 HoursofTeaching/Week:4

TotalContactHours:52 FormativeAssessmentMarks:2

ExamMarks:25 ExamDuration:3Hours

ProgrammingLab

PartA

1. Programtocomputepowerofanumberusingarecursivefunction.
2. Programtocomputethevalueof $^{n}C_{r}$ usingarecursivefunctiontofindfactorialfunction.
3. Programtoimplementdynamicarray,findsmallestandlargestelementofthearray.
4. Programtoreadthenamesofcitiesandarrangethemalphabetically.
5. Programtosortthegivenlistusingselectionsorttechnique.
6. Programtosortthegivenlistusingbubblesorttechnique.
7. Programtosortthegivenlistusingquicksorttechnique.
8. Programtosortthegivenlistusinginsertionsorttechnique.
9. Programtosearchanelementusinglinearsearchtechnique.
10. Programtosearchanelementusingrecursivebinarysearchtechnique.

PartB

1. Programtoimplementqueueusingarrays.
2. Programtoimplementstackusingarrays.
3. Programtoimplementstackusinglinkedlist.
4. WriteaProgramforconvertinganInfixExpressiontoPostfixExpression.Programshouldsupportbothparenthesized +,-,*,/,%(Remainder),^(Power)andalphanumericoperands.
5. Programtoevaluateapostfixexpression.
6. Programtoimplementalloperationsonasortedsinglylinkedlist.
7. Programtoimplementqueueusinglinkedlist.
8. Programtoimplementcircularqueueusingarray.
9. Writeamenudrivenprogramforthefollowingoperationson BinarySearchTree(BST)ofintegers:
   (a) CreateaBSTof'n'Integers
   (b) TraversetheBSTinInorder,PreorderandPostorder
   (c) SearchtheBSTforagivenelementandreporttheappropriatemessage
10. Programforthefollowingoperationsonagraph(G)ofcities:
    (a) CreateagraphofNcitiesusingAdjacencyMatrix.
    (b) Printallthenodesreachablefromagivenstartingnodeinadigraphusing BFSmethod.

EvaluationSchemeforPracticalExamination:

AssessmentCriteria	Marks
WritingtheProgram	7
ExecutionandFormatting	8
WritingtheProgram	8
ExecutionandFormatting	12
PracticalRecords	10
Viva	5
Total (converted to 25)	**50**

CourseCode:G505OE2.2	**CourseTitle:WebDesigning**
CourseCredits:3	HoursofTeaching/Week:3
TotalContactHours:42	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

CourseOutcomes(COs)

Aftercompletingthiscoursesatisfactorily,astudentwillbeableto:

- UnderstandvariousInternetrelatedterminologies
- ExplainfeaturesandevolutionofInternet
- Explaintheuseofsearchengines
- KnowtheuseofdifferenttagsavailableinHTML
- DesignwebpagesusingHTML5,CSS3,XMLandXHTML
- Implementwebsitesusinglinkedwebpages.

CourseContent

Content	Hours
Unit-1	
TheInternet: Introduction,Evolution,basicinternetterms,Gettingconnecttointernet,Interneta pplications,Dataovertheinternet. **Internet tools:** Web browser, Web browser features, Internet Explorer environment,Electronicmail,Emailaddressstructure,checkingemail,sendingemail,emailattac hment,Howemailworks,advantagesanddisadvantagesofemail. **SearchEngines:**Searching aninternet,refiningthesearch,Instant messaging,Features ofmessengers.	12
Unit-2	
OverviewofHTML5-ExploringnewfeaturesofHTML5,StructuringanHTMLDocument,CreatingandsavingHTMLdocu ment,ViewinganHTMLdocument. **Fundamentals of HTML-**Understanding Elements, Root elements, Metadata elements,Style element, Section element, Header and Footer element, Address element, BasicHTMLdatatypes,DatatypesdefinedbyRFCandIANADocumentation. **Working with Text:** Formatting Text with HTML Elements, Defining MARK element,DefiningSTRONGelement,DefiningCODEelement,DefiningSMALLelement. **OrganizingTextinHTML:**Arrangingtext,DisplayingLists.	10
Unit-3	
WorkingwithLinksandURLs-ExploringtheHyperlinks,ExploringtheURL,ExploringLinkRelations. **CreatingTables-**UnderstandingTables,Describingthetableelement. **WorkingwithImages,ColorsandCanvas-**InsertingimagesinawebpageExploringColors,IntroducingCanvas **WorkingwithForms:**ExploringFormelement,ExploringtypesoftheINPUTelement, ExploringtheBUTTONelement,ExploringtheMultiple-Choiceelements,ExploringTEXTAREAandLABELelements.	10

WorkingwithFrames:<FRAMESET>,<FRAME>tagwithattributes.	
Unit-4	
OverviewofCSS3- UnderstandingthesyntaxofCSS,ExploringCSSSelectors,InsertingCSSinanHTMLdocument. **BackgroundandColorGradientsinCSS:**ExploringBackgroundofaWebPage,ExploringColorProperties,ExploringGradientProperties,ExploringFontproperties. **WorkingwithBasicsof XML-**ExploringXML,ComparingXMLwith HTML,Describingthe StructureofanXMLdocument.	10

TextBooks:

1. ITLEducationSolutionLimited,IntroductiontoInformationTechnology,PearsonEducation,2012
2. DTEditorialServices,HTML5BlackBook (CoversCSS3,JavaScript,XML, XHTML,AJAX,PHP,jQuery),SecondEdition,DreamtechPublisher,2016

References:

1. LauraLemay&RafeColburn,MasteringHtml,CSS&JavaScript,WebPublishing,2016
2. FiruzaAibara,HTML5forBeginners,2012
3. GlennJohnson,TrainingGuide–ProgramminginHTML5withJavaScriptandCSS3(MicrosoftPressTrainingGuide), 2013

IIISemester

CourseCode: G505DC3.3	**CourseTitle:**Object Oriented Programming Concepts and Programming in JAVA
CourseCredits:4	HoursperTeachingWeek:4
CourseCode: G505DC3.3P	**CourseTitle:** JAVA Lab
TotalContactHours:52	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

Course Objectives

•To learn the concepts of Object-Oriented Programming.

•To learn the Object-oriented programming using Java.

Course outcomes:

Upon successful completion of the course the student will be able to:

•Understand the concepts of OOP and Java fundamentals.

•Write the Java programs using the concepts of inheritance, interfaces, packages,multithreading and applets.

Content	Hours
Unit-1	
Introduction to java: Basic concepts of OOPs, Basics features of Java programming, Java program structure, Java Virtual Machine, Constants, Variables, Data Types, Operators, Control structures: if , if …else , else if ladder, switch statements Looping Structures: for, while, do…while, for-loop, command line arguments.	13
Unit-2	
Objects and Classes: Basics of objects and classes, Methods and objects, Constructors, Method Overloading, Finalizer, Visibility modifiers, Arrays in Java, built-in classes: Math, String, Character, String Buffer and their methods. **Inheritance and Polymorphism**: Inheritance, Super and Sub class, Overriding, Polymorphism, Dynamic binding, Casting objects, Abstract methods and Classes, Interfaces, Packages, Built-in packages: io, util, lang, awt.	13
Unit-3	
Event and GUI programming: Event handling in Java, Event types, Mouse and key events, GUI Basics, Panels, Frames. **Layout Managers**: Flow Layout, Border Layout, Grid Layout, GUI components: Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Menus, Dialog Box. Applet and its life cycle **Managing errors and exceptions:** types of errors, syntax of exception handling code, multiple catch statements, using finally statement, throwing our own exceptions,	13
Unit-4	
Multithreading in Java: Thread life cycle and methods, Runnable interface, Thread synchronization. **Introduction to Network Programming:** Network Basics and Remote Method Invocation (RMI) **Java Database Connectivity:** JDBC components, JDBC features, Architecture, Types of JDBC Drivers, Major Classes and Interfaces, communication with DB by using JDBC API.	13

Text Books:

1. E Balagurusamy, **Programming With Java: A Primer, 5th edition** Tata McGraw HillEducation Private Limited, 2010.

Reference books:

1. Herbert Schildt, **Java: A Beginner's Guide, 5th Edition** Tata McGraw Hill Education Private Limited,
2. Junaid Khateeb and Dr. G T Thampi, Computer Programming in Java, Dreamtech, 2011
3. Herbert Schildt, The Complete reference Java, Seventh edition, Tata McGraw Hill Publishing

CourseCredits:2	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:25
ExamMarks:25	ExamDuration:2 Hours

PartA

1. Program to read accept integers from user. Input for lower and higher limits and then compute the following:
    a) Sum of integers that are inside the range.
    b) Sum of integers that are outside the range.
2. ProgramtogeneratenFibonaccinumbers (command Line program)
3. Define a superclass "cuboid" with members length, breadth, height and all possible constructors. Derive a subclass "special cube" with a member weight and all possible constructors. Write a main class to create objects of superclass using various constructors and display those objects.
4. Write a java program to check whether the matrix is symmetric or not.
5. Write a menu driven program to perform following String operations:
    a) To search a string
    b) To reverse a string and check for palindrome.
    c) To extract a portion of characters from a string.
6. Write a menu driven program "shopping" which will allow the user to add, delete and display products using vectors.
7. Program to create an abstract class named shape that contains two integers and an empty method named Printarea().Provide three classes named Rectangle, triangle and ellipse such that each one of the classes extends the class shape .each one class contains only the method Printarea() that prints area of the given shape.
8. Program to implement inheritance:
    Student: id,name
    Studentexam (derived from student): marks of 3 subjects, total marks.
    Studentresult(derived from student Exam): percentage.
    Define appropriate methods to accept and calculate grade based on existing criteria and display details.
9. Program using interface to implement polymorphism. Define an interface with area with PI and compute methods. define 'circle' and 'rectangle' class which implements 'area'. Write a java program which uses above class.
10. Write a package 'temperature' to convert temperature from Celsius to Fahrenheit and vice versa. Create another package to find simple interest. write a program to implement these packages

Part-B

11. Java Applet Program to find maximum of three numbers.
12. Java Applet Program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits and for the + - * % operations.
13. Program to input age from user and throw user-defined exception if entered age is negative
14. Java RMI program to add two numbers.
15. Create a table "Book "with following fields Accession no, book author, book name, book publication and book price. insert 5 records to the table. Write a JDBC program to display all the information about book table.
16. Create a table "student" with following data fields student reg.no, name, marks of 3 subjects insert 5 records to the table. write a JDBC program to display information of one student.

EvaluationSchemeforPracticalExamination:

III Semester

AssessmentCriteria		Marks
Program-1fromPartA	WritingtheProgram	7
	ExecutionandFormatting	8
Program-2fromPartB	WritingtheProgram	8
	ExecutionandFormatting	12
PracticalRecords		10
Viva		5
Total (converted to 25)		**50**

CourseCode: G505OE3.3	**CourseTitle:IoT**
CourseCredits:3	HoursofTeaching/Week:3
TotalContactHours:42	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

IV Semester

Course Objectives

OBJECTIVES:

1. To introduce the concept of "Internet of Things "to the students.
2. To understand the basic ecosystems and landscape in IoT.
3. To understand the Realtime use cases in IoT
4. To know the different domains, where IoT plays a crucial role.

Course outcomes

- To become familiar with the basic concepts of IoT.
- To become familiar with IoT access techniques

Content	Hours
Unit-1	
Unit1 **Introduction to IoT:** What is IoT, IoT architecture, Characteristics of IOT systems, Prevalent IoT architectures applications, Overview of different technologies involved for IoT realization	13
Unit-2	
History of IoT: The transition from mainframes and personal computing, Planet lab and origins of distributed computing; Robotics, AI and Cyber Computing Infrastructure; M2Mcommunications; P2P networks; Universal identification and RFID; Autonomic computing, Pervasivecomputing, Ubiquitouscomputing; WirelessSensorNetworks, TheemergenceofIoT.	13
Unit-3	
IOT state of the art: The IoT ecosystem and landscape; IOT business models and its usage invarious domains; Technology Enablers for IOT – Mobility, Analytics, Cloud and Social Media;IOTplatforms; Security;Testmethodologies; Regulations andRisks.	13
Unit-4	
IoT Characteristics and use cases: Consumer and enterprise use cases **IoT DOMAINS:** Smart Home, Smart Buildings, smart cities, IoT in telecommunications, Smart manufacturing, IoT in environment monitoring, smart vehicles, IoT in healthcare, smart farming, IoTin enterprises, smart transportation,smart energy,smart retail and logistics	13

1. VijayMadisetti,ArshdeepBahga "Internet of things, A hands-onapproach"2014
2. Jean-Philippe Vasseur&Adam Dunkels"Interconnecting smart objects withIP",Morgan KaufmannPublishers,2010
3. CunoPfister, "Getting Started with the Internet of Things" , Maker MediaInc,2011
4. Adrian Mcewen and Hakim, "Designing the Internet of Things", Wileypublication,2013

TEXT BOOK :

1. Arshadeep Bhaga and Vijaya Madisetti, Internet of Things, A Hands an Approach, Universities Press, 2014.
2. Raj Kamal*, Internet of Things:* Architecture and Design Principles, Mc Graw Hill Education .

Reference Books:

1. Rob Barton, Gonzalo Salgueiro, David Hanes, IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, Cisco Press,2017.

CourseCode:G505DC4.4	**CourseTitle: Data Base Management System**
CourseCredits:4	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

Course Objectives

- To Understand the basic concepts and the applications of database systems
- To Master the basics of SQL and construct queries using SQL
- To understand the relational database design principles

Course outcomes

- To become familiar with the basic issues of transaction processing and concurrency control
- To become familiar with database storage structures and access techniques

Content	Hours
Unit-1	
Database System Concepts and Architecture History of Database Systems, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using the DBMS Approach, Database Systems versus File Systems, Data Abstraction, Three-Schema Architecture Data independence, Schemas and Instances, Data models, Database Languages, Database Users, DBA, Structure of Database Systems. The database system environment, Centralized and Client/Server Architecture for DBMS, Classification of DBMS, Entity types, attributes, keys, relationships, relationship types, roles and structural constraints, Weak entity sets, Database Abstractions-Generalization, Aggregation, Data Modeling using E-R Models.	13
Unit-2	
Relational model: Basic Concepts of relational data model, Relational model constraints and relational database schemas-Domain Constraints, Key Constraints, Relational Database Schema, Basic Relational algebra operations-SELECT, PROJECT, Set Operations, Cartesian Product, Renaming, Join Operations, Division. Design theory of Relational Database: Introduction to Relational database design, Semantics of Attributes, Problems caused by Redundancy-Anomalies, Functional dependency- Uses of Functional Dependency, Diagrammatic way of showing FDs, Closure Set Properties, Normal forms (INF, 2NF,3NF and BCNF)	13
Unit-3	
MySQL Introduction to Transaction Control Language (TCL) – Commit, Rollback, Savepoint. Creating and Using New Users, Granting, Revoking, and viewing User Privileges. Creating Database, adding tables, adding records - Single row or multiple rows at a time, Executing queries. MySQL Datatypes, The ENUM type, MySQL Operators – Arithmetic, Comparison, Logical operators, Aggregate functions, String manipulation, Date and time manipulation functions, Selecting databases for use, deleting databases, LIKE clause, The NULL and NOT NULL Modifiers, The DEFAULT Modifiers, The AUTO_INCRMENT Modifier, The UNIQUE Modifier, Primary Keys, Foreign Keys, Modifying tables – Alter, Deleting tables, Inserting, Updating, Deleting Records, Retrieving records, Aliasing table and column names, Limiting query results-limit, Sorting Query Results-Order by, Grouping Query results-Group By, Having, Joins- Inner Join ,Left Join, Right Join, Self-Join, Cross Join, Nested Queries, The IN, NOT IN, and BETWEEN Clause, sub queries, On DELETE CASCADE.	13
Unit-4	
Views in MySQL What are Views in MySQL. Advantages of Views, Disadvantages of VIEWS, Creating Views, MYSQL Updatable Views, MySQL Views with CHECK OPTION. **MySQL Stored Procedures** Stored Program, three major types of MySQL stored programs, Drawbacks of using stored procedures. Language Fundamentals- Variables, Assigning Values to Variables, Parameters, Conditional Statements, And Looping statements (Iterative Programming), Using SELECT Statements with an INTO Clause, Creating and Using Cursors, fetching a Single Row from a Cursor, Fetching an Entire Result Set, Creating Stored Functions, MySQL Error handling in stored procedure.	13

Text Book:

1. Elmasri and Navathe, Fundamentals of Database Systems, Pearson Education Asia Publication, 4lh edition. (Unit 1)
2. S.Nanda Gopalan, Data base Management Systems with oracle 9i and VB 6.0, 4th Edition, Sapna Book House Bangalore. (Unit 2)
3. Vikram Vaswani "The complete Reference MySQL "Tata McGraw-Hill Edition 2004, Eleventh reprint 2009. (Unit 3)
4. Guy Harrison with Steven Feuerstein "MySQL Stored Procedure Programming". O'REILLY (Unit 4)

Reference Book :

1. Seyed M.M. "Saied" Tahaghoghi and Hugh E. Williams "Learning MySQL" O'REILLY
2. Silberschatz and Korth , Database System Concepts, McGrawHill Publication
3. Ivan Bayross, Commercial Application Development using Oracle D2k, BPB Publications.

CourseCode:G505DSC4.4	**CourseTitle:** RDBMS LAB
CourseCredits:2	HoursofTeaching/Week:4

TotalContactHours:52	FormativeAssessmentMarks:25
ExamMarks:25	ExamDuration:2 Hours

LISTOFPROGRAMS -PARTA(MYSQL Queries)

PART-A

1. Createadatabase**Movie_Industry**underwhichCreateatable**Movie**

withthefollowingcolumns:
Tablename:Movie

COLUMN	DATATYPE	CONSTRAINTS
ID	Int	Auto_Increment
Movie_name	Text	UNIQUE
Description	ENUM	Must be Great 3D,Fiction, Boring,Fantasy,Interesting
Rating	INT	NOTNULL

Insertmultiplerecordsatoncetothetable

Alterthetable toaddthecolumnsDirectorNameandProduction
Displayallthedetailsofthemovies.

QUERIES:

1. Displayallthemovienamesinalphabeticalorderbelongto Fiction.
2. Displayallnotboringmovies,namesandratingsinformation(useIN predicate).
3. Displaythemovienameandthedescriptiondirectedby Shankar.
4. Countthenumberofmoviesunder Interestingjournal.
5. Counthow many3Dmovies aredirectedby AngLee.
6. Displaythemovienamesandtheproductionwherethedirector'snamecontains'Jackson'
7. Deleteallthe boringmovies.
8. Renamethetablenameascinema.
9. Display the movie name and director name which has 3rd highestrating.
10. Assignupdateprivilegeonlyonratingcolumnonthetablecinema
11. toJhon.

2. Create a database COMPANY under which Create a table FACULTYwith the followingcolumns

COLUMN	DATATYPE	CONSTRAINTS
FID	INT	PRIMARYKEY
FNAME	VARCHAR2	NOTNULL
DEPT	VARCHAR2	NOTNULL
BASIC	DOUBLE	GREATERTHAN10000

Insert minimum five records to the table
Alter the table to add the columns DA, HRA, PF, Net pay, IT. Calculate the DA, HRA, PF, IT, NETPAY as follows: DA=80% of BASIC, if BASIC<20000 else 70% of BASIC HRA=10% of BASIC
NETPAY=BASIC+DA+HRA
PF=2% of NETPAY and IT=5% of NETPAY
QUERIES:

1. Display all the available databases in MySQL.
2. Display the details of all faculty details.
3. Display the faculty names of computer science department.
4. Display the faculty names in alphabetical order.

5. List the highest net pay faculty in each department.
6. Display the details of all faculty whose net pay between 25000 and 35000
7. Display the name and basic of employees whose name contains 'Kumar'
8. Count the number of employees in each department
9. Create a new MySQL user account
10. Delete all employees from home science department

3. Create a table EMP_MASTER under COMPANY database with the following columns:

COLUMN	**DATATYPE**	**CONSTRAINTS**
ENO	INT	PrimaryKey
ENAME	VARCHAR	NOTNULL
DEPTNO	INT	NOTNULL
JOB_TITLE	ENUM	Must be 'Sales Rep','Marketing' , 'AdministrativeAssistant'
SALARY	DOUBLE	NOTNULL
COMMISSION	DOUBLE	
JOIN_DATE	DATE	NOTNULL

QUERIES:

1. Show all the tables available in company database.
2. Modify eno column as primary key.
3. Display the employee's name, department and their job title with a second highest salary.
4. List the names of employees whose names are five character long
5. Display the employee details and sort the results as per job title 'Marketing', 'Sales Rep', 'Administrative Assistant'.
6. Find all the department that have at least 2 Sales Rep.
7. Display the no of employees joined in the year 2014.
8. Display the first 4 records of the emp_master table.
9. who don't earn commission ,10% increase in salary and commission that is 15% of their salary?
10. Assign SELECT and INSERT privileges on the table emp_master to Harry.

4. Create the following tables under College database with the following columns:

Table Name: Faculty

COLUMN	DATA TYPE	CONSTRAINTS
Fid	Int	Primary Key
Fname	Varchar	NOT NULL
Qualification	Varchar	NOT NULL
DepId Int	Foreign key References Department (DeptId)	

Table Name : Department

COLUMN	DATA TYPE	CONSTRAINTS
DeptId	Int	Primary Key
Dname Varchar	NOT NULL	

QUERIES:

1.Display the department name where there is no Ph.D qualified faculty.

2.Perform cross join between Faculty and Department tables the result should contain department no 1.

3.Find department name of each faculty (use inner join)
4.Create a view that contain Faculty Name and Corresponding Department Name.
5.Display how many faculties are there in each department.
6.Find the names of the faculty working in IT Department.
7. Display the department name where there is no Faculty enrolled.
8. Perform left join between department and faculty tables display the faculty name, department name.

5. Table Name: Sailors

COLUMN	DATA TYPE	CONSTRAINTS
Sid	Int	Primary Key
Sname	Varchar	NOT NULL
Rating	Int	NOT NULL
Age	Int	NOT NULL

Table Name: Boats

COLUMN	DATA TYPE	CONSTRAINTS
Bid	Int	Primary Key
Bname	Varchar	NOT NULL
Color	Varchar	NOT NULL

Table Name: Reserves

COLUMN	DATA TYPE	CONSTRAINTS
Sid	Int	Foreign key References Sailors (Sid)
Bid	Int	Foreign key References Boats (Bid)
Day	Date	NOT NULL

QUERIES:

1. Find all information of sailors who have reserved boat number 101.
2. Find the name of boat reserved by Brutus.
3. Find the names of sailors who have reserved a red boat, and list in the order of age.
4. Find the names of sailors who have reserved at least one boat.
5. Find the ids and names of sailors who have reserved two different boats on the same day.
6. Find the name and the age of the youngest sailor.
7. Perform left outer join between sailors and reservation tables display the sid, sname, bid in ascending order.
8. Find the average age of sailors for each rating level.

6. Create the following tables under LIBRARY database with the following columns:

Table Name: Book

COLUMN	DATA TYPE	CONSTRAINTS
Book_id	Int	Primary Key
Title	Varchar	NOT NULL, UNIQUE
Publisher_Name	Varchar	NOT NULL
Pub_Year	Year	NOT NULL

Table Name: Book_Lending

(Book_id, Card_No)-is Composite Primary Key.

COLUMN	DATA TYPE	CONSTRAINTS
Book_id	Int	Foreign key References Book (Book_id) On Delete Cascade
Card_NO	Int	NOT NULL
Date_Out	Date	NOT NULL
Due_Date	Date	NOT NULL

Table Name: Book_Copies

(Book_id, Branch_name)-is Composite Primary Key.

COLUMN	DATA TYPE	CONSTRAINTS
Book_id	Int	Foreign key References Book (Book_id) On Delete Cascade
Branch_name	Varchar	NOT NULL
No_of_Copies	Int	NOT NULL

QUERIES:

1. Display the particulars of borrowers and the book name who have borrowed books from Jan 2021 to March 2021.
2. Create a view of all books and its number of copies that are available in the library.
3. Display branch wise available books name and total no of copy available and list in the order of branch name.
4. Display the particulars of borrowers and the book name who have borrowed more than 3 books, but from Feb 2021 to April 2021.
5. Create a view table, which consist of book title, publication and year of publication. (year wise latest books first)
6. Display how many books are available under the 'PEARSON' Publication.
7. Display the branch name which has less than 35 books as a whole.
8. Delete Book_id 1 from book table and show that all the relevant data of the same bookid got deleted from book_lending, book_copies tables;

V Semester

CourseCode:G505DC5.5	**CourseTitle: Programming in Python**
CourseCredits:4	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

Course Objectives

After the successful completion of the course, the student will be able to:

- Setup python to develop simple applications
- Understand the basic concepts in Python Programming
- Learn how to write, debug and execute Python programs
- Understand and demonstrate the use of advanced data types such as tuples, dictionaries and lists, Tuples and Sets
- Design solutions for problems using object-oriented concepts in Python
- Use and apply the different Python Libraries for Data Analysis and Data Visualization.
- Extend the knowledge of python programming to build successful career in software development.

Course Outcomes (COs)

- To become familiar with the basic programming with python.
- To become familiar with data visualization, database structure and libraries in python

Content	Hours
Unit–1	
Introduction to Features and Applications of Python; Flavors of python. Thrust Areas of python. **Python Basics:** Identifiers, Keywords, Statements and Expressions, Variables Operators, Precedence and Association, Data Types, Indentation, Comments, reading input, print output, Type Conversions, type() functions and special operators. Python Libraries; Importing Libraries with Examples. Format Specifiers; Escape Sequences; mathematical functions and random functions. **Python Control Flow:** Types of Control Flow, Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement, range () and exit () functions. **Exception Handling:** Types of Errors; Exceptions, Exception Handling using try, except and finally. Python Functions: types of functions, built in functions, python user defined functions, types of function arguments, anonymous functions, recursion	13
Unit–2	
Strings: Creating and Storing Strings; Accessing String Characters; the str () function, Operations on Strings- Concatenation, Comparison, Slicing and Joining, String Methods, formatting strings. **Lists:** Creating Lists, Operations on Lists, Built-in Functions on Lists, list methods, del statement **Dictionaries:** Creating Dictionaries, Operations on Dictionaries, Built-in Functions on Dictionaries, Dictionary Methods. **Tuples and Sets:** Creating Tuples, Operations on Tuples, Built-in Functions on Tuples, Tuple Methods; **Creating Sets** Operations on Sets, Built-in Functions on Sets, Set Methods, frozen set.	13
Unit–3	
Object Oriented Programming: Classes and Objects; Creating Classes and Objects; Constructor Method; Classes with Multiple Objects, Inheritance- Single and Multiple Inheritance, Multilevel and Multipath Inheritance; Encapsulation- Definition, Private Instance Variables; Polymorphism. **Pandas-** Introduction to Pandas, Series and Data Frames, Creating Data Frames from Excel Sheet and .csv file, Dictionary and Tuples. Operations on Data Frames. **Data Analysis:** NumPy- Introduction to NumPy, Array Creation using NumPy, Operations on Arrays;	13
Unit-4	
Data Visualization: Introduction to Data Visualization; Matplotlib Library; DifferentTypes of Charts using Pyplot- Line chart, Bar chart and Histogram and Pie chart.	13
Database Connectivity: Types of databases used with Python, Using MySQL from Python, Retrieving and Inserting, updating and deleting data in a table, Creating Database tables through Python.	

TextBooks:

1. Introduction to Python Programming, Gowrishankar S et al.,2019, CRC Press
2. Programming in python, Dr Pooja Sharma BPB publication.

ReferenceBooks:

1. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2nd Edition, 2015, Green Tea Press. Freely available online @ https://www.greenteapress.com/thinkpython/thinkCSpy.pdf
2. Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Fabio Nelli, 2015, Apress®
3. Advance Core Python Programming, Meenu Kohli, 2021, BPB Publications
4. 5Core PYTHON Applications Programming, Wesley J. Chun, 3rd Edition, 2012, Prentice
5. Hall
6. Automate the Boring Stuff, Al Sweigart, 2015, No Starch Press, Inc.

   Data Structures and Program Design Using Python, D Malhotra et al., 2021, Mercury
7. Learning and Information LLC

CourseCode:G505DC5.5P	**CourseTitle: Python Lab**
CourseCredits:2	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:25
ExamMarks:25	ExamDuration:2:30minutes

Part-A

1. A cashier has currency notes of denominations 100, 500, and 2000. Write Program to display the total number of currency notes of each denomination the cashier will have to give to the customer.
   Note: Display an error message if the input is not matching with the specified denomination.
2. Write a program to Check if a number belongs to the Fibonacci Sequence
3. Write a Python program to accept the issue date and return date and calculate the fine as below.

   For first 5 days the fine is 50 paise, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled.

   1. *Assume the due date as 15 days from the date of issue*
4. Create a list with random numbers. Receive a Number from keyboard and report position of all occurrence of this number and count frequency of this number.
5. write a python function program to Count all letters, digits, and special symbols from a given string also find sum of all integer numbers and print letters in uppercase.
6. Program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
7. Perform following operations with tuple
   1. program to populate tuple with user entered items.
   2. create a tuple with list of items
   3. concatenate tuples.
   4. unpack values to a variable.
8. Write a python dictionary program to input roll numbers and their names of students of your class and store them in the dictionary as the key-value pair. Perform the following operations on the dictionary:
   a) Display the Roll numbers and name for all students.
   b) Add a new key-value pair in this dictionary and display the modified dictionary
   c) Delete a particular student's record from the dictionary

d) Modify the name of an existing students.'''

9. write a python dictionary programs to count number of times each word appears in a sentence.
10. write a python program to perform following set operations Union, intersection, difference, add, update, remove, pop and clear

PART-B

11. Program to read the students marks and calculates the result using class and constructors.
12. There exists a CSV file student.csv with following columns (regno, name, python, networks, pythonlab, networklab, total, average) of n students.
    Write commands to do the following using panda's library.
    a) Display the top 10 rows
    b) Display the students list in the order regno in descending order
    c) Display the maximum mark
    d) filter the student data
13. write a python program to create a numpy array and perform addition, subtraction, multiplication and transpose of arrays.

14. Given the school result data, analyses the performance of the students on different parameters, e.g. subject wise or class wise.x-axis is showing the subject and y -axis shows the markers in each subject. draw line graph, pie chart and bar graph for the given data.
15. Write a menu drive program perform the following operations on Employee table
    a) Insert employee record
    b) Update Salary of all employees.
    c) Display the records'''
16. Write a program to design a shopping cart with the following options
    a) Add item to the cart
    b) view cart
    c) delete item from the cart

V Semester

CourseCode:G505DC6.5	CourseTitle: computer networks
CourseCredits:4	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

Course Objectives

After the successful completion of the course, the student will be able to:

- Define various data communication components in networking.
- Describe networking with reference to different types of models and topologies.
- Understand the need for Network and various layers of OSI and TCP/IP reference model.
- Explain various Data Communications media.
- Describe the physical layer functions and components CO6 Identify the different types of network topologies and Switching methods.
- Describe various Data link Layer Protocols.
- Identify the different types of network devices and their functions within a network.
- Analyze and interpret various Data Kink Layer and Transport Layer protocols.
- Explain different application

Course Outcomes (COs)

- To become familiar with the basic programming with network.
- To familiar with network concepts, communication and design of networks.

Content	Hours
Unit–1	
Computer Network: Definition, Broadcast, Point-To-Point Networks, Multicasting, Unicasting. **Introduction:UsesofComputerNetworksandits Applications**-BusinessApplications,HomeApplications,MobileUsers,SocialIssues. **NetworkTopologies**: Bus, Star, Ring, Mesh **Network Hardware**-Local Area Networks, Metropolitan AreaNetworks,WideAreaNetworks,andInternetworks. **Network Software** - Connection-oriented vs. Connectionless service, Service Primitives. **ReferenceModels**-TheOSIReferenceModel,TheTCP\IPReferenceModel, AComparisonoftheOSIandTCPReference Models.	13
Unit–2	
ThePhysicalLayer:**TransmissionMedia**-TwistedPair,CoaxialCableand FiberOptics. **WirelessTransmission**-RadioTransmission,MicrowaveTransmission,Infrared,LightTransmission. Switching – Circuit switching, Packet switching, Message switching. **The Data Link Layer: Data** link layer design issues-ServicesProvidedtotheNetworkLayer,Framing,ErrorControl,andFlowControl. ErrorDetectionandCorrection-Error CorrectingCodes -Hamming Codes, Error Detecting Codes-CRC. Elementary Data Link Protocols-AnUnrestrictedSimplexProtocol,ASimplexStop-and-WaitProtocol for an Error-Free Channel, A Simplex Protocol for aNoisy Channel.	13
Unit–3	
TheNetworkLayer: Networklayerdesignissues-Store-and-Forward Packet Switching, Services	13

Provided to the TransportLayer. RoutingAlgorithms-Flooding,DistanceVectorRouting,LinkStateRouting, BroadcastRouting,MulticastRouting. Networking Devices: Hub, Switch, Router. The network layer in the Internet-The IP Version 4Protocol, IP Address, IP Version 6		
Unit-4		
The Transport Layer: The Transport Service-Services ProvidedtotheUpperLayers. ElementsofTransportProtocols-Addressing,ConnectionEstablishment,connectionRelease,Error control and Flow Control. The Internet Transport Protocols-(TCP and UDP) Connection oriented protocol TCP and connectionless protocol UDP. **Application Layer Protocols:** DNS, DHCP, WWW, HTTP, HTTPs, FTP, SMTP, POP, IIMAP	13	

TextBook

1. Computer Networks, Andrew S. Tanenbaum, 5th Edition, PearsonEducation,2010.

References:

1. DataCommunication&Networking,BehrouzaAForouzan,3rdEdition,TataMcGraw Hill,2001.
2. DataandComputerCommunications,WilliamStallings,10thEdition,PearsonEducation,2017.
3. DataCommunicationandComputerNetworks,BrijendraSingh,3rdEdition,PHI,2012.
4. DataCommunication&Network,Dr.Prasad,WileyDreamtech.

http://highered.mheducation.com/sites/0072967757/index.htmls

CourseCode:G505DC6.5P	**CourseTitle: computer network Lab**
CourseCredits:2	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:25
ExamMarks:25	ExamDuration:2:30minutes

Part A (Using Cisco Packet Tracer)

1. Demonstrate creating a LAN network with a Star Topology in Cisco Packet Tracer.
   i) Using a Hub.
   ii) Using a Switch
2. Demonstrate connecting 2 different LAN's using 1 router having 2 networks with 3 systems each. Specify static IP address to all the devices using Static Route Configuration.
3. Demonstrate connecting 4 different LAN's using 2 routers having 4 networks with 2 systems each. Specify static IP address to all the devices using Static Route Configuration.
4. Demonstrate mesh topology using 5 routers
5. Demonstrate hybrid topology linked by 3 routers having 4 networks
   (a) Bus Topology
   (b) Mesh Topology
   (c) Ring Topology
   (d) Star Topology
6. Connect 4 different networks using 4 routers. Show simulation from network 1 to 4 and from network 3 to 1
7. Connect 2 different networks using 1 router and configure router as DHCP Server.
8. Connect 2 different networks using 1 router and configure it using a server as DHCP Server

Part B (using Java Programming)

9. Implement a one-way communication system in Java using sockets, where a client sends a message to a server.
10. Implement bidirectional communication between a client and a server in Java using socket programming.
11. Implement a server program that receives the file name from the client and sends back the contents of the requested file if present.
12. Write a java program to perform Cyclic Redundancy Check by sending and verifying the transmitted data.
13. Write a java program to accept Classful Addressing by taking the IP address (Dotted-Decimal notation) as input and print the corresponding class, network id and host id.
14. Simulate stop and wait protocol for a noisy channel.
15. Write a java program to implement ping command and trace the route.

TextBook:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech

References:

1. Java Server Pages – Hans Bergsten, SPD O'Reilly
2. Java Script, D.Flanagan, O'Reilly, SPD
3. Beginning Web Programming-Jon Duckett WROX.
4. Web Applications : Concepts and Real World Design, Knuckles, Wiley-India
5. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

VI Semester

VI Semester

CourseCode:G505DC7.6	**CourseTitle: Web Technologies**
CourseCredits:4	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

Course Outcomes (COs)

After the successful completion of the course, the student will be able to:

- Understand basics of web technology
- Recognize the different Client-side Technologies and tools like, HTML, CSS, JavaScript
- Learn Java Servlets and JDBC
- Web Technology for Mobiles and Understand web security

Content	Hours
Unit–1	
Introduction and Web Design: Introduction to Internet, WWW and Web 2.0, Web browsers, Web protocols and Web servers, Web Design Principles and Web site structure, client-server technologies, Client side tools and technologies, Server side Scripting, URL, MIME, search engine, web server-Apache, IIS, proxy server, HTTP protocol. Introductions to HTML. HTML5 Basics tags, Formatting tags in HTML, HTML5 Page layout and Navigation concepts, Semantic Elements in HTML, List, type of list tags, tables and form tags in HTML, multimedia basics, images, iframe, map tag, embedding audio and video clips onwebpage.	13
Unit–2	
Introduction to XML: XML Syntax, XML Tree, Elements, Attributes, Namespace, Parser, XSLT DOM, DTD, Schema. Introduction to CSS, CSS syntax, CSS selectors, CSS Background Cursor, CSS text fonts, CSS-List Tables, CSS Box Modeling, Display Positioning, Floats, CSS Gradients, Shadows, 2D and 3 Transform, Transitions, CSS Animations.	13
Unit–3	
IntroductiontoJavaScript: JavaScriptDatatypeandVariables,JavaScript Operators, Conditional Statements, Looping Statements,JavaScript Functions, Number, Strings, Arrays, Objects in JavaScript,Window and Frame objects, Event Handling in JavaScript, ExceptionHandling,Form Object andDOM,JSON, BrowserObjectModel.	13
Unit-4	
Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, reading initialization parameters, Handling HTTP Request & Responses, Using Cookies and sessions, connecting to a database using JDBC. Web Security: Authentication Techniques, Design Flaws in Authentication, Implementation Flaws in Authentication, Securing Authentication, Path Traversal Attacks. Injecting into Interpreted Contexts, SQL Injection, NoSQL Injection, XPath Injection, LDAP Injection, XML Injection, HTTP Injection, Mail Service Injection. Types of XSS, XSS in Real World, Finding and Exploiting XSS Vulnerabilities, Preventing XSS Attacks.	13

VI Semester

CourseCode:G505DC8.6	**CourseTitle**: Statistical Computing & R Programming
CourseCredits:4	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:40
ExamMarks:60	ExamDuration:3Hours

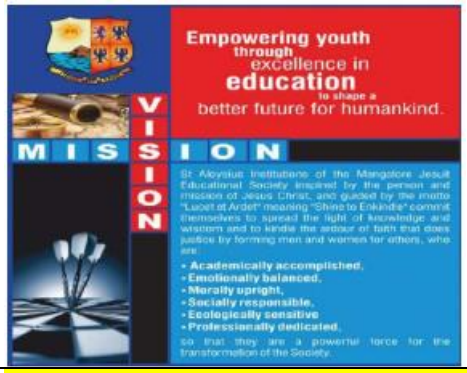
Course Outcomes (COs)

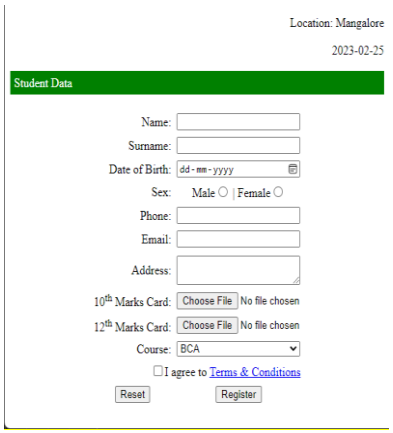
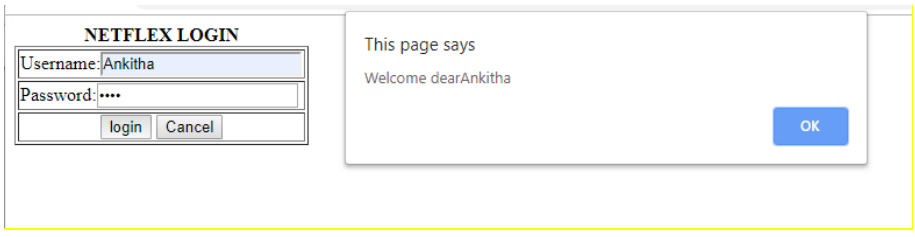
- After the successful completion of the course, the student will be able to:
- • CO1. Explore fundamentals of statistical analysis in R environment.
- • CO2. Describe key terminologies, concepts and techniques employed in Statistical Analysis.
- • CO3. Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.
- • CO4. Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.
- • CO5. Understand, Analyze, and Interpret Correlation Probability and Regression to analyze the underlying relationships between different variables.

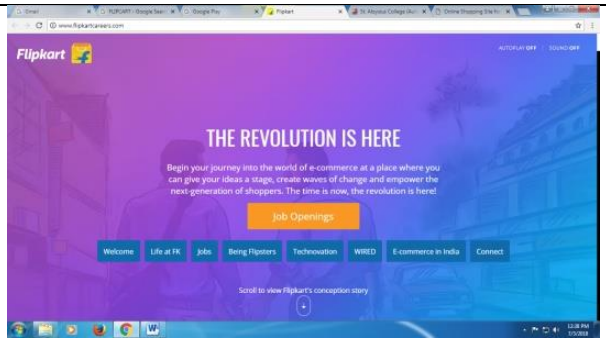
Content	Hours
Unit–1	
Introduction of the language, numeric, arithmetic, assignment, and vectors, Matrices and Arrays, Non-numeric Values, Lists and Data Frames, Special Values, Classes, and Coercion, Basic Plotting	13
Unit–2	
Reading and writing files, Programming, Calling Functions, Conditions and Loops: stand- alone statement with illustrations in exercise, stacking statements, coding loops, Writing Functions, Exceptions, Timings, and Visibility. Basic Data Visualization.	13
Unit–3	
Descriptive Statistics: Types of Data, Nominal, Ordinal, Scale and Ratio, Measures of Central Tendency, Mean, Mode and Median, Percentailes, Quartiles, Measures of Variability, Mean Absolute Deviation Range, Inter-Quartile-Range, Standard Deviation, Z-Scores. Coefficient of Variation, Measure of shaper-Skewness and Kurtosis, Bar Chart, Pie Chart and Box Plot, Histogram, Frequency Polygon, Stem and Leaf Diagram. **Probability, Probability and Sampling Distribution**: Methods of assigning probability, Structure of probability, Marginal, union, joint and conditional probabilities. Discrete Probability Distributions: Binomial, Poisson, Continuous Probability Distribution, Normal Distribution, Uniform Distribution.	13
Unit–4	
Statistical Inference and Hypothesis Testing: Types of Hypotheses, and Sample, Null and Alternate Hypothesis, Level of Significance, Type I and Type II Errors, One Sample t-Test, One Sample Proportion Test, Paired Sample t-Test, One Way Analysis of Variance and Chi Square Test. **Correlation and Regression**: Analysis of Relationship, Positive and Negative Correlation, Perfect Correlation, Karl Pearson Coefficient of Correlation, Correlation Matrix, Scatter Plots, Simple Regression Analysis.	13

Text Books:
1. Tilman M. Davies, “The book of R: A first course in programming and statistics”, San Francisco, 2016.
2. Ken Black, Business Statistics, New Delhi, Wiley, 2013.
References:
1. Vishwas R. Pawgi, “Statistical computing using R software”, Nirali prakashan publisher, e1 edition, 2022.
2. https://www.youtube.com/watch?v=KlsYCECWEWE
3. https://www.geeksforgeeks.org/r-tutorial/
4. https://www.tutorialspoint.com/r/index.html

CourseCode:G505DC6.5P	**CourseTitle:**Web Technologies Lab – Java Script, HTMS, CSS Lab
CourseCredits:2	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:25
ExamMarks:25	ExamDuration:2:30minutes

Web Technologies		
Sl.No	**Title**	**Page .No**
1.	**Design the following web page using FOLLOWING HTML5 tags <IMG>,<P><TEXT FORMATTING TAGS >,<a> tags** 	
2.	**Exercise on Ordered list, Unordered list and definition list. Design the Following:** COMPUTER I HARDWARE 1. Central Processing Unit ▪ ALU ▪ CU ▪ MU 2. RAM 3. ROM 4. I/O Devices ▪ Input devices ▪ Output devices II SOFTWARE 1. System Software ▪ Compiler ▪ Editor ▪ Interpreter 2. Application Software ▪ MS office 3. Operating System HARDWARE Physical components of a computer that we can touch is called as Hardware SOFTWARE Software is a program which allows the user to perform some specific tasks	
3	DesignatimetableusingIDandclassselectorusinginternal HTML Tags	

	<table><tr><td>Days</td><td>9:00 - 9:55</td><td>10:00 - 10:55</td><td>11:00 - 11:55</td><td>11:55 - 12:55</td><td>1:00 - 1:55</td><td>2:00 - 2:55</td><td>3:00 - 3:55</td><td>4:00 - 4:55</td></tr><tr><td>Monday</td><td>Ani & MM</td><td>Hindi</td><td>Python</td><td>Lunch</td><td>Eng</td><td colspan="2">Python Lab</td><td></td></tr><tr><td>Tuesday</td><td>CN</td><td>Python</td><td>Eng</td><td>Lunch</td><td>Hindi</td><td>Ani & MM</td><td>OE</td><td></td></tr><tr><td>Wednesday</td><td colspan="2">Ani & MM Lab</td><td>OE</td><td>Lunch</td><td>CN</td><td>VE</td><td colspan="2">Sports</td></tr><tr><td>Thrusday</td><td>OST</td><td>CN</td><td colspan="2">Python Lab</td><td>Lunch</td><td>Hindi</td><td>FC</td><td></td></tr><tr><td>Friday</td><td>Eng</td><td>Python</td><td>Hindi</td><td>Ani & MM</td><td>Lunch</td><td>OE</td><td colspan="2">ECCC</td></tr><tr><td>Saturday</td><td colspan="2">Ani & MM Lab</td><td>OST</td><td>FC</td><td colspan="4"></td></tr></table>	
4	DesignthefollowingwebpageusingHTML5tags. 	
5	Design the following web page using HTML5 tags. Use hyperlink and external style sheet files to apply the common back ground color, common font style, size and color to the paragraphs and headings of all the pages 	
6	Write a javascript code to validate the login page using javascript code. 	
7	Design the following web page using HTML5 tags	

		
8	Write a Servlet Program to read the System Time and greet the User and change the background colour according to the users option.	
	Part-B	
9	Create a web page containing simple calculator which should have basic arithmetic (+,-,*,/) operation on two floating point numbers and show result.	
10	Develop and demonstrate a HTML file that includes JavaScript script that uses functions for the following problems: • Accept a string as input and the function to be used to print the position of first vowel as output in a label. • Accept a number as input and the function to be used to print the reversed no. in a label	
11	Design a mock login page and style it using CSS3. Initially login page should look like the following screen shot  And while mouse is hovered on SUBMIT button it should look like 	
12	Write a Servlet Program to Design a Shopping Page and to display the data.	
13	Design HTML page to create a dropdown Menu inside a Navigation Bar using Style Sheet.	
14	Design a responsive HTML page to implement local link within the current web page.	
15	Write a Servlet Program to find the new user and the Repeated User of	

	the web site using Cookies.	
16	Write a JDBC program to perform the following operations on a * Book table of Library database(Book_Id, Book_Title, Book_Author, Publication, * Book_Price, Book_Copies) MENU 1. Add a New Book 2. Delete a Specifies Book 3. Update the Book Info a. Book Price b. No of Copies 4. Exit	

CourseCode:G505DC6.5P	**CourseTitle:**R Programming Lab
CourseCredits:2	HoursofTeaching/Week:4
TotalContactHours:52	FormativeAssessmentMarks:25
ExamMarks:25	ExamDuration:2:30minutes

SchemeofAssessmentforTheoryExamination

QuestionPattern		Marks
Part–A		
1. Answeranny**SIX**sub-questions(6×2=12)		**12**
Sub-question	Unit	
a,b	1	
c,d	2	
e,f	3	
g,h	4	
Part–B (Answeranny**ONE**fullquestionfromeachunit–12markseach) (Combinationsofsub-questionsof3to6marks)		
Unit-1		**12**
2.		
3.		
Unit-2		**12**
4.		
5.		
Unit-3		**12**
6.		
7.		
Unit-4		**12**
8.		
9.		
Total		**60**

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INTERNSHIPS under UGC regulation, 2023.

INTERNSHIP GUIDELINES

NEP 2020 has devised transformative initiatives in the field of higher education. The skills required for developing employability ingenuities are fostered by introducing internship as an important component in the curriculum.

Internship is provided in two modes-

i. Internship for enhancing the employability
ii. Internship for developing the research aptitude

As per the UGC Guidelines for **"Implementation of Internship/Research Internship for Undergraduate Students**" our institution has structured the internship course under the following categories-

i. Internship for enhancing the employability

The interns may pursue their internships in varied industries perse and go beyond the clusters prescribed by the central, state, micro and local governments. An indicative list is provided by UGC which comprises of –

1. Trade and Agriculture Area
2. Economy & Banking Financial Services and Insurance Area
3. Logistics, Automotive & Capital Goods Area
4. Fast Moving Consumer Goods & Retail Area
5. Information Technology/Information Technology enabled Services & Electronics Area
6. Handcraft, Art, Design & Music Area
7. Healthcare & Life Science Area
8. Sports, Wellness and Physical Education Area
9. Tourism & Hospitality Area
10. Digitisation & Emerging Technologies (Internet of Things/Artificial Intelligence/Machine Learning/Deep Learning/Augmented Reality/Virtual Reality, etc.) Area
11. Humanitarian, Public Policy and Legal Service Area
12. Communication Area
13. Education Area
14. Sustainable development Area
15. Environment Area

16. Commerce, Medium and Small-Scale Industries Area and other areas approved by the statutory bodies of the institution from time to time.

ii. Internship for developing the research aptitude

Building of the research aptitude is a formative way to uncover facts and present the outcomes in an organised manner. Research internship aims at providing hands-on training to work on research tools, techniques, methodologies, equipment, policy framework and various other aspects in pursuing quality research.

The research interns can apply in research institute, research lab, national or internationally reputed organizations, research labs, working with faculty, mentors from distinguished fields.

INTERNSHIP STRUCTURE

- Internship is organised, executed and monitored by the Research & Development Cell (RDC) of the institution.
- Since the internship is time bound, a research supervisor is assigned to the interns for sharing expertise and follow up of their Internship Progress.
- Orientation sessions and interaction faculty-wise was initiated.
- A Nodal Officer was appointed along with four block-wise coordinators to harness the possibilities and effectively implement internship at department level.
- Internship Report Format is drafted for maintaining the uniformity in reporting ethos.
- The Nodal Officer is in charge of corresponding with the Internship Providing Organization (IPO) is any organization, HEI, philanthropy, farmer, government organization, R&D institutions, research labs, artisans, enterprises, institution/person of eminence, cooperatives, corporates providing an opportunity to the student for Internship during the programme.
- The Nodal Officers along with the block coordinators must be approached in case of any issues and will be responsible for any official registration, enrollment and upkeep of the internship programme and the students.
- Internship Supervisors/ Mentors are appointed and a lot of students are assigned to them who inturn are responsible to ensure the authenticity of the internship certificate provided and monitor the hours of the work undertaken by the interns.

- Students may apply for Internship Programme through the Nodal Officer or Online Internship Apps such as Internshala, Go Intern and so on to avail the Internship Offers.
- It is preferred to undertake internship in physical mode. Digital Mode or Group Internships are an option.
- Internship Reports must be endorsed by the Internship Supervisor/ Mentor.

ACADEMIC CREDENTIALS

- The internship as a course is mandatory for the under-graduate level fetching 2 credits each.
- For an internship, one credit of Internship means two-hour engagement per week.
- 60 – 90 Hours is mandatory to be undertaken by every student who is interning in any of the modes mentioned above.
- Hands-on training/ Orientation is mandatory before commencement of the internship/research internship programme.

EVALUATION

Report writing (15-20 pages)- Format will be sent to the Internship Mentors/ Project Guides	20 Marks
Powerpoint Presentation	10 Marks
Viva Voce (One to One)	10 marks
External Assessment (Internship)/ External Evaluation (Project Report)	10 Marks
Total	**50 Marks**
Number of Hours	**60 hours (Internship)**

EVALUATION AND ASSESSMENT COMPRISES OF-

i. Activity logbook and evaluation report of Internship Supervisor
ii. Format of presentation and the quality of the intern's report
iii. Acquisition of skill sets by the intern
iv. Originality and any innovative contribution
v. Significance of research outcomes
vi. Attendance

ANNEXURE

FORMAT OF THE INTERNSHIP REPORT

ST ALOYSIUS COLLEGE (AUTONOMOUS) MANGALURU

INTERNSHIP REPORT FORMAT

1. Title Page (1 page)

- Student Name, Class, Register Number, Name of the College
- Name of the Company
- Internship Dates (Duration – Date of commencement –Date of completion)
- Certificate from Dean/Head of Department **(1 page)**
- Declaration by the Student **(1 page)**
- Certificate from the Internship Mentor **(1 page)**
- Company Certificate with Official Logo and Authorized Signature **(1 page)**

REFER SAMPLE 1 to SAMPLE 6 ANNEXED TO THIS FORMAT (Page No. 3 - Page No. 6)

2. Table of Contents (1 page)

- Keep it in Tabular Form
- Serial Number, Particulars and Page Number (three columns)

3. Acknowledgements *(*1 page)

(Mention how they helped you and what you learnt from each person)

4. Brief Profile of the Company/entity (2 pages)

- History- Vision- Mission of the Company
- Regular Business Activities (Broad/Specific)
- Intern's role in Overall Work Scheme

5. Tasks Assigned (1 page)

- Mention in points the various tasks assigned

6. Learning Objectives (1 page)

(Example: three objectives are mentioned- any other objective kindly mention)

- Mention the following learning objectives-
  - ✓ To pursue internship in a company or an institution which gives opportunity to explore and nurture our skills.
  - ✓ To undertake experiential learning to improvise the technical and social skills.
  - ✓ To build curriculum vitae and strengthen the work experiences.
  - ✓ Any other (kindly specify)

7. Responsibilities including Job Description (7 pages)

- Internship Position in the Company (Example: Database Management Assist as Designation)
- Day Wise Report (Mention- Date, Time, Venue, Staff In-charge Name and Designation, Detailed report on daily basis)
- Mention Specific Tasks, Skills you learnt and experiences that developed you professionally.
- Mention even the talks, seminars attended, training sessions attended.
- Attach the relevant documents and certificates and evidential documents.

8. Skills and Experiences (Learning Outcomes) (1 page)

- Specific skills developed relate it to educational experiences and your career goal.
- Professional traits acquired.

9. Conclusion (1 page)

- Potentialities for future internships
- Helping the organization in better understanding of the need and interest of interns.

10. Annexure

- Attach relevant documents, certificates and photographs

Principal 22-01-2023 **Registrar**

SAMPLE 1

Title page

ST ALOYSIUS COLLEGE (AUTONOMOUS) MANGALURU

Internship Report on ---------- (area of work)

at ---------- (name of the company, place)

Submitted to St Aloysius College (Autonomous), Mangaluru in partial fulfillment of the requirements for the award of the

Degree of Bachelor of ……jh ……

B. ……..

By

(Name of the Student)

(Class and Register No)

Under the guidance of

Name and address of Internal Guide

2023 – 2024

SAMPLE 2

Certificate from the Dean/HOD

FACULTY OF ……..

ST ALOYSIUS COLLEGE (AUTONOMOUS)

LIGHT HOUSE HILL ROAD, MANGALORE – 575 003

CERTIFICATE

This is to certify that Mr./Ms …….. bearing Register number…….. has successfully completed his/her internship on ……..…….. (area of work) at ……..(name of the company and place).

This internship report is prepared after having undergone internship for the period as stipulated by the College and is submitted to St Aloysius College (Autonomous) Mangaluru, in partial fulfilment of the requirements for the award of the Degree of Bachelor of …….. during the year 2023-24.

Date: Signature with name and Designation

Place: Seal

SAMPLE 3

Declaration by the student

DECLARATION

This is to certify that this internship report has been prepared by me after undergoing internship from……..to……(duration) at …….. (name of the company and place). This report is my original work and is being submitted for the partial fulfilment of the requirements of the award of the Degree of ……..

This report has not been submitted earlier to this College or any other Universities/Institutions for the fulfilment of the requirements of the course of the study.

Date: Signature

Name of the student

Place: Register No

SAMPLE 4

Certificate from Internship Mentor

CERTIFICATE

This is to certify that …….. (Name of the student), Register Number……., of ……., has successfully completed his/her internship on…… (area of work) at …… (name of the company and place), in partial fulfilment of the requirements for the Degree of ……. The internship report has been prepared by him/her under my guidance and supervision. I further certify that no part of this report has been submitted for the award of any degree, diploma, fellowship or such other similar title.

Name and Designation of the Internship Mentor:

Date:

Place: Signature

(Internship Mentor)

SAMPLE 5

Certificate of Performance from the company in its letter head

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Mr/Ms …….. (name of the student), …….. (Reg No), student of B.Com at St Aloysius College (Autonomous) Mangaluru, has done his / her internship in our company on …….. ……., (area of work), for the purpose of partial requirements for the award of the Degree of Bachelor of Commerce. He /She has completed the internship from our company for the period from …….. to ……. (date of internship).

During his/her tenure of the internship his/her conduct and character was good.

Signature

Name and Designation

Company seal

Date:

Place:

****