M.D. UNIVERSITY, ROHTAK

SCHEME OF STUDIES AND EXAMINATION

B.TECH. (Minor in Computer Science and Engineering)

Scheme effective from 2022-23

COURSE CODE AND DEFINITIONS

Course Code	Definitions
L	Lecture
P	Practical
LC	Laboratory Courses
PCC	Program Compulsory Course.
PEC	Program Elective Course
OE	Open Elective

NOTE: The minor has to be a subject offered by a department other than the department that offers the major of the student or it can be a different major offered by the same department. For example, a student with the declared major in Mechanical Engineering may opt to do a minor in CSE; in which case, the student shall receive the degree B.Tech, Mechanical Engineering with a minor in CSE. A student can do Majors in chosen filed as per the career goal, and a minor may be chosen to enhance the major thus adding the diversity, breadth and enhanced skills in the field.

Advantages of Minor in Engineering:

The minors mentioned above are having lots of advantages and a few are listed below:

- **To apply the inter-disciplinary knowledge gained through a Major (Stream) + Minor.**
- **To enable students to pursue allied academic interest in contemporary areas.**
- **To provide an academic mechanism for fulfilling multidisciplinary demands of industries.**
- **To provide effective yet flexible options for students to achieve basic to intermediate level competence in the Minor area.**
- **Provides an opportunity to students to become entrepreneurs and leaders by taking business/management minor.**

- **Combination in the diverse fields of engineering e.g., Electronics (Major)+CSE(Minor) combination increases placement prospects in chip designing companies.**
- **Provides an opportunity to Applicants to pursue higher studies in an inter-disciplinary field of study.**
- **Provides opportunity to the Applicants to pursue interdisciplinary research.**
- **To increase the overall scope of the undergraduate degrees.**

MAHARSHI DAYANAND UNIVERSITY, ROHTAK

SCHEME OF STUDIES & EXAMINATIONS
B.TECH (Minor in Computer Science and Engineering)
w.e.f. 2022-2023

S. No.	Semester	Course Code	Course Title	Teaching Schedule			Internal Assesment	Examination Marks		Total	Credit	Duration of Exam
				L	T	P		Theory	Practical			
1	3rd Sem	PCC-CSE-203G	Data Structures and Algorithms	3	0	0	25	75	-	100	3	3
2	3rd Sem	LC-CSE-213G	Data Structures and Algorithms Lab using C	0	0	1	25	-	25	50	0.5	3
3	4th Sem	PCC-CSE-208G	Object Oriented Programming	3	0	0	25	75	-	100	3	3
4.	4th Sem	LC-CSE-214G	Object Oriented Programming Lab using C++	0	0	1	25	-	25	50	0.5	3
5.	5th Sem	PCC-CSE-207G	Python Programming	3	0	0	25	75	-	100	3	3
6,	5th Sem	LC-CSE-215G	Python Programming Lab	0	0	1	25	-	25	50	0.5	3
7	6th Sem	PCC-CSE-201G	Database Management System	3	0	0	25	75	-	100	3	3
8	6th Sem	LC-CSE-209G	Database Management System Lab	0	0	1	25	-	25	50	0.5	3
9	7th Sem	PCC-CSE-303G	Computer Networks	3	0	0	25	75		100	3	3
10	7th Sem	PCC-CSE-402G	Machine Learning	3	0	0	25	75		100	3	3
Total										800	20	

DataStructure&Algorithms

Coursecode	PCC-CSE-203G				
Category	ProfessionalCoreCourse				
Coursetitle	DataStructure&Algorithms				
Schemeand Credits	L	T	P	Credits	Semester3
	3	0	-	3	
Branches(B. Tech.)	ComputerScienceandEngineering (Minor)				
Class work	25 Marks				
Exam	75 Marks				
Total	100Marks				
Durationof Exam	03Hours				

Note:Examinerwillsetninequestionsintotal.Questiononewillbecompulsory.Questiononewill have6 parts of2.5markseachfromallunits andremainingeightquestionsof15markseach to besetbytakingtwoquestionsfromeachunit.Thestudentshavetoattemptfivequestionsintotal, first beingcompulsory andselectingonefromeachunit.

Objectivesof the course:

1. Toimpart thebasic conceptsof datastructures andalgorithms.
2. Tounderstandconceptsaboutsearchingandsortingtechniques
3. Tounderstandbasic concepts aboutstacks, queues,lists,treesandgraphs.
4. Toenablethem to writealgorithmsforsolvingproblemswiththehelpof fundamentaldatastructures

Unit1:

Introduction: Basic Terminologies:ConceptofDataStructure,ChoiceofrightDataStructure, Algorithms,howtodesignanddevelopalgorithm,Complexityofalgorithm.Operations:insertion, deletion, traversaletc.; AnalysisofanAlgorithm,**Searching:**LinearSearchandBinarySearch Techniquesandtheir complexity analysis.

Unit2:

Stacks and Queues:Stack and itsoperations:Algorithms andtheircomplexityanalysis, Applications ofStacks: Expression Conversion and evaluation -corresponding algorithms and complexityanalysis.queue,TypesofQueue:Simple Queue,Circular Queue,PriorityQueue; Operationson eachtypes ofQueues:Algorithmsandtheiranalysis.

Unit3:

Linked Lists: Singly linkedlists: Representation in memory, Algorithms of several operations: Traversing, Searching,Insertioninto,Deletionfromlinkedlist;Linkedrepresentation ofStackandQueue,Headernodes, Doubly linkedlist:operationsonitandalgorithmicanalysis; CircularLinked Lists:alloperationstheiralgorithms and thecomplexityanalysis.

Trees: BasicTreeTerminologies,DifferenttypesofTrees:BinaryTree,ThreadedBinaryTree,Binary SearchTree,AVLTree;Treeoperationsoneachofthetreesand theiralgorithms withcomplexity analysis. Applications of BinaryTrees. BTree,B+Tree:definitions, algorithmsandanalysis.

Unit4:

SortingandHashing: Objectiveandproperties ofdifferentsortingalgorithms:SelectionSort, BubbleSort, InsertionSort,SelectionSortQuickSort, MergeSort, HeapSort;Performanceand Comparisonamongall themethods.

Graph: BasicTerminologiesand Representations,Graph search and traversal algorithms andcomplexity analysis.MinimumSpanningTree:Kruskal'sAlgorithm,Prim'sAlgorithm.

Suggested books:

"Fundamentals of Data Structures",Illustrated Edition by Ellis Horowitz, Sartaj Sahni,ComputerSciencePress.

Suggested reference books:

Algorithms,DataStructures,andProblemSolvingwith C++",IllustratedEditionbyMarkAllenWeiss,Addison-WesleyPublishingCompany
"How toSolveitbyComputer",2ndImpression by R.G. Dromey,PearsonEducation.

Course outcomes

1. Foragivenalgorithmstudentwillabletoanalyzethealgorithmstodeterminethetime andcomputation complexity andjustifythecorrectness.
2. ForagivenSearchproblem(LinearSearchandBinarySearch)studentwillableto implement it.
3. ForagivenproblemofStacks,Queuesandlinked liststudentwillabletoimplementit andanalyzethesametodetermine thetimeand computationcomplexity.
4. Studentwillabletowriteanalgorithm SelectionSort,BubbleSort,InsertionSort, QuickSort,MergeSort, HeapSortandcompare their performancein termofSpace andTimecomplexity.
5. Studentwillable toimplementGraphsearchand traversalalgorithmsand determine thetimeandcomputationcomplexity.

DataStructuresandAlgorithmsLabUsingC

Coursecode	LC-CSE-213G				
Category	Professional CoreCourse				
Coursetitle	DataStructures andAlgorithmsLabUsingC				
Schemeand Credits	L	T	P	Credits	Semester-3
	0	0	1	0.5	
Branches(B. Tech.)	ComputerScienceandEngineering (Minor)				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration ofExam	03Hours				

DataStructures LabListof practicalexercises,tobeimplementedinC Language.

1. Writeamenudrivenprogramthat implementsfollowingoperations (usingseparate functions)on alinear array:
    - Insert anew element atendaswellasat agivenposition
    - Deleteanelement fromagiven whosevalueisgivenor whoseposition isgiven
    - Tofind thelocationofagivenelement
    - Todisplaytheelementsof thelinear array
2. Writeamenudrivenprogramthat maintainsalinearlinkedlistwhoseelementsarestored inonascendingorderandimplementsthefollowingoperations(usingseparatefunctions):
    - Insert anew element
    - Deleteanexistingelement
    - Searchanelement
    - Display all theelements
3. Writeaprogramtodemonstratetheuseofstack(implemented usinglinear array)in convertingarithmetic expression frominfixnotation topostfix notation.
4. Programtodemonstratethe useofstack(implementedusinglinearlinkedlists) in evaluatingarithmeticexpression in postfixnotation.
5. Programtodemonstration theimplementation ofvarious operationson alinear queue represented usingalinear array.
6. Programtodemonstration theimplementation ofvarious operationson a circularqueue represented usingalinear array.
7. Programtodemonstration theimplementationofvarious operationson aqueue represented usingalinearlinked list (linked queue).

8. Program toillustratetheimplementation of different operationson abinarysearchtree.
9. Program toillustratethetraversal of graphusingbreadth-firstsearch
10. Program toillustratethetraversal ofgraphusingdepth-firstsearch.
11. Program tosortanarray of integersinascendingorderusingbubblesort.
12. Program tosortanarray of integersinascendingorderusingselection sort.
13. Program tosortanarray of integersinascendingorderusinginsertionsort.
14. Program tosortanarray of integersinascendingorderusingradix sort.
15. Program tosortanarray of integersinascendingorderusingmergesort.
16. Program tosortanarray of integersinascendingorderusingquick sort.
17. Program tosortanarray of integersinascendingorderusingheapsort.
18. Program tosortanarray of integersinascendingorderusingshellsort.
19. Program todemonstratetheuseoflinearsearchtosearchagiven elementinanarray.
20. Program todemonstratetheuseof binary searchtosearchagivenelement in asorted array in ascendingorder.

ObjectOrientedProgramming

Coursecode	PCC-CSE-208G				
Category	Professional CoreCourse				
Coursetitle	Object Oriented Programming				
Schemeand Credits	L	T	P	Credits	Semester-4
	3	0	0	3	
Branches(B. Tech.)	ComputerScienceandEngineering (Minor)				
Class work	25 Marks				
Exam	75 Marks				
Total	100Marks				
Durationof Exam	03Hours				

Note:Examinerwillsetninequestionsin total.Question onewillbe compulsory. Question onewill have6parts of2.5marks eachfromall units andremainingeight questions of15marks eachtobe setbytakingtwoquestions fromeachunit.The students havetoattemptfivequestionsintotal, first beingcompulsory andselectingonefromeachunit.

CourseObjectives

1. To understand how theC++is superset of C by incorporating the Object oriented features inC language.
2. To apply thesyntax andsemantics ofC++Programming language.
3. To learn thedesigning ofC++ classes.
4. To learn how to efficiently usethe memory usingPointers and DynamicMemoryManagement.
5. To learn how to implement different types ofconstructors andthe useof destructor.
6. To learn how to implement the conceptof data abstraction and encapsulation.
7. To learn how to performdifferent types of overloading i.e. operators andfunctions.
8. To learn how inheritancehelps to reusethe code.
9. To learn how wecanimplement dynamic binding with polymorphism.
10. To learn theuseof exception handling in C++programs.
11. To learn how to design and useof generic classeswith templates.

Unit -I

Object-Oriented ProgrammingConcepts: Introduction, comparison between procedural programming paradigmand object-oriented programming paradigm,basic concepts of object- orientedprogramming—conceptsofanobjectandaclass,interfaceandimplementationofaclass,

operationsonobjects, relationshipamongobjects,abstraction,encapsulation, data hiding, inheritance,overloading,polymorphism,messaging.

Classesand Objects: Specifyingaclass,creatingclassobjects, accessingclassmembers, access specifiers,staticmembers,useofconstkeyword,friendsofaclass, emptyclasses,nestedclasses, localclasses,abstract classes,container classes,bitfieldsandclasses.

Unit -II

Inheritance: Introduction,definingderivedclasses,formsofinheritance, ambiguityinmultipleand multipathinheritance, virtualbaseclass,objectslicing,overridingmember functions,object compositionanddelegation,orderofexecutionofconstructors anddestructors.

PointersandDynamicMemoryManagement: Declaringandinitializingpointers,accessingdata throughpointers,pointerarithmetic,memoryallocation(staticanddynamic),dynamicmemory managementusingnewanddeleteoperators,pointertoanobject,thispointer,pointerrelated problems-dangling/wildpointers,nullpointerassignment,memory leakandallocationfailures. **Unit -III**

ConstructorsandDestructors: Needforconstructorsanddestructors, copyconstructor,dynamic constructors,explicitconstructors,destructors, constructorsanddestructorswithstaticmembers, initializerlists.

Operator Overloading andTypeConversion: Overloadingoperators,rules foroverloading operators,overloadingofvarious operators, typeconversion-basic typetoclass type,classtypeto basic type,class typetoanother class type.

Virtual functions&Polymorphism:Conceptofbinding-earlybinding andlatebinding,virtual functions,purevirtual functions,abstractclasess,virtualdestructors.

Unit -IV

ExceptionHandling: Reviewoftraditional error handling, basicsofexceptionhandling,exception handling mechanism,throwing mechanism,catching mechanism,rethrowing anexception, specifyingexceptions.

TemplatesandGeneric Programming: Templateconcepts, Functiontemplates, class templates, illustrativeexamples.

TEXTBOOKS,AND/OR REFERENCEMATERIAL:

1.BjraneStroustrup,“C++Programminglanguage”,3rd edition,Pearson educationAsia(1997)
2.LaforeR.”Object orientedProgramming inC++”,4th Ed.Techmedia,NewDelhi(2002).
3.YashwantKenetkar,”Letus C++”,1stEd.,Oxford University Press(2006)
4.B.A.ForouzanandR.F.Gilberg,CompilerScience,”AstructuredapproachusingC++”Cengage Learning,New Delhi.

CourseOutcomes

After thecompletionof thecourse,thestudentswill

- Understandtheconcept of Object OrientedProgrammingthrough C++.
- Identify importanceof object orientedprogramminganddifferencebetween Procedural programmingandobject orientedprogrammingfeatures.
- beabletomake useofobjects and classesfordevelopingprograms.
- beabletousevariousobjectorientedconceptstosolvedifferent problems.
- beableto develop theprograms/Projectsusingsomeadvanced featuresofC++ Programming.

ObjectOrientedProgrammingLabUsingC++

Coursecode	LC-CSE-214G				
Category	Professional CoreCourse				
Coursetitle	ObjectOriented ProgrammingLabUsingC++				
Schemeand Credits	L	T	P	Credits	Semester4
	0	0	1	0.5	
Branches(B. Tech.)	ComputerScienceandEngineering (Minor)				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration ofExam	03Hours				

Contents:

1.[ClassesandObjects]Writeaprogramthatusesaclasswherethememberfunctionsare defined insidea class.
2.[ClassesandObjects]Writeaprogramthatusesaclasswherethememberfunctionsare defined outsideaclass.
3.[Classes andObjects]Writeaprogramtodemonstratetheuseofstaticdatamembers.
4.[ClassesandObjects]Writeaprogramtodemonstratetheuseofconstdatamembers.
5.[ConstructorsandDestructors]Writeaprogramtodemonstratetheuseofzeroargumentand parameterized constructors.
6. [Constructors andDestructors] Write a program to demonstrate the use of dynamic constructor.
7.[ConstructorsandDestructors]Writeaprogramtodemonstratetheuseofexplicitconstructor.
8.[InitializerLists]Writea programtodemonstratetheuseof initializerlist.
9.[OperatorOverloading]Writeaprogramtodemonstratetheoverloadingofincrementand decrement operators.
10.[OperatorOverloading]Writeaprogramtodemonstratetheoverloadingofbinaryarithmetic operators.
11. [Operator Overloading] Write a program to demonstrate the overloading of memory management operators.
12. [Inheritance]Writeaprogramtodemonstratethemultilevelinheritance.
13.[Inheritance]Writeaprogramtodemonstratethemultipleinheritance.
14. [Inheritance]Writeaprogramtodemonstratethevirtualderivationof aclass.
15. [Polymorphism]Writeaprogramtodemonstratetheruntimepolymorphism.
16. [ExceptionHandling]Writeaprogramtodemonstratetheexception handling.
17.[TemplatesandGenericProgramming]Writeaprogramtodemonstratetheuseoffunction template.
18.[TemplatesandGenericProgramming]Writeaprogramtodemonstratetheuseofclass template.

PythonProgramming

Coursecode	PCC-CSE-207G				
Category	ProfessionalCoreCourse				
Coursetitle	Python Programming				
Schemeand Credits	L	T	P	Credits	Semester5
	3	0	0	3	
Branches(B. Tech.)	ComputerScienceandEngineering (Minor)				
Class work	25 Marks				
Exam	75 Marks				
Total	100Marks				
Durationof Exam	03Hours				

Note:Examinerwillsetninequestionsintotal.Questiononewillbecompulsory.Questiononewill have6 parts of2.5markseachfromallunits andremainingeightquestionsof15markseach to besetbytakingtwoquestionsfromeachunit.Thestudentshavetoattemptfivequestionsintotal, first beingcompulsory andselectingonefromeachunit.

Objectivesof the course:

- Toimpart thebasic conceptsof Python programming.
- Tounderstandsyntax of Pythonlanguage
- Tocreatedynamic applicationsin Python language.
- Toimplement objectorientedconcepts usingPython language

Detailedcontents:

Unit1:Introduction: Installing Python;basic syntax, interactiveshell,editing,saving,andrunningascript; data types;variables,assignments;numerical types;arithmeticoperatorsandexpressions; Loops andselectionstatements,Control statementsStringmanipulations:subscriptoperator, indexing, slicingastring; text files:reading/writingtextandnumbers from/toa file;creatingandreadinga formattedfile

Unit2:Lists,dictionary andDesignwithfunctions: Basiclistoperators,replacing,inserting, removinganelement;searchingandsortinglists;dictionaryliterals,adding,andremovingkeys,accessingandreplacing values;traversing dictionaries.Hidingredundancy,complexity; arguments andreturn values;Programstructureanddesign.Recursivefunctions.

Unit3:**Simplegraphics andimageprocessing**:Simplegraphics,Turtleoperations,Manipulatingturtlescreen,Drawingtwodimensionalshapes, examininganobjectattributes,Takingarandom walk,ColorandRGBscheme,Image processing:Imagemanipulationoperations, propertiesof images,imagemodule,copying, blurring andreducingimage.Graphical UserInterfaces: Terminal basedandGUI basedprograms,SimpleGUI-BasedPrograms,Windows andWindowComponents, InputandOutputwithEntryFields, DefiningandUsing InstanceVariables,OtherUsefulGUI Resources.

Unit 4: ObjectOriented concepts: Classesand OOP:classes,objects,attributesand methods; definingclasses;design withclasses,datamodelling;persistentstorage ofobjects,Inheritance, polymorphism,operatoroverloading; abstractclasses;exception handling, tryblock.

Multithreading:ThreadsandProcesses,Sleeping Threads,Producer,Consumer, and Synchronization, TheReaders andWriters Problem,SharedCell Class,Thread-SafeClass

Course outcomes

•Foragivenconceptualproblemstudentwillabletoanalyzetheproblemandwritea programin python withbasic concepts.
•ForagivenproblemofStringsandtexts,studentwillabletoanalyzetheproblemandwrite a programinpythonwithbasic concepts involvingstringsandtexts.
•Theknowledgeoflistanddictionarywillenablestudenttoimplementinpythonlanguage andanalyzethesame.
•Studentwillabletowriteaprogramusingfunctionstoimplementthebasicconceptsof object orientedprogramminglanguage

Suggested books:

"Fundamentals of Python: First Programs"KennethLambert, Course Technology, CengageLearning,2012
Suggested reference books:

"IntroductiontoComputerScienceUsingPython:AComputationalProblem-SolvingFocus",ByCharles Dierbach,JohnWiley &Sons,December2012

Coursecode	LC-CSE-215G				
Category	Professional CoreCourse				
Coursetitle	PythonProgrammingLab				
Schemeand Credits	L	T	P	Credits	Semester-5
	0	0	1	0.5	
Branches(B. Tech.)	ComputerScienceandEngineering (Minor)				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration ofExam	03Hours				

Objectives

- Towrite, test,anddebugsimplePython programs.
- Toimplement Python programs with conditionalsandloops.
- Use functions forstructuringPythonprograms.
- Representcompounddata usingPythonlists,tuples,anddictionaries.
- Readandwritedatafrom/tofilesin Python.

ListofPrograms

1.Compute theGCD of twonumbers.
2.Find thesquareroot ofanumber(Newton‘s method)
3.Exponentiation(powerof anumber)
4.Find themaximumofalist of numbers
5.LinearsearchandBinary search
6.Selectionsort,Insertionsort
7.Mergesort
8.First nprime numbers
9. Multiply matrices
10. Programsthat takecommandlinearguments(wordcount)
11. Find themost frequent words inatextread fromafile
12. Simulateellipticalorbits inPygame
13. Simulatebouncingball usingPygame

Course Outcome:

- Write,test,anddebugsimplePython programs.
- Implement Python programs withconditionalsandloops

- DevelopPythonprograms step-wisebydefiningfunctions andcallingthem.
- UsePython lists,tuples,dictionariesforrepresentingcompounddata.
- Readandwritedatafrom/tofilesin Python.

DatabaseManagementSystem

Coursecode	PCC-CSE-201G				
Category	ProfessionalCoreCourse				
Coursetitle	DatabaseManagementSystem				
Schemeand Credits	L	T	P	Credits	Semester6
	3	0		3	
Branches(B. Tech.)	ComputerScienceandEngineering (Minor)				
Class work	25 Marks				
Exam	75 Marks				
Total	100Marks				
Durationof Exam	03Hours				

Objectivesof the course

- Tounderstandthedifferentissuesinvolvedinthedesignandimplementationofadatabase system.
- Tostudythephysicalandlogicaldatabasedesigns,databasemodeling,relational,hierarchical, andnetwork models
- Tounderstandanduse datamanipulation language to query,update,andmanageadatabase
- TodevelopanunderstandingofessentialDBMSconceptssuchas:databasesecurity,integrity, concurrency,distributeddatabase,andintelligentdatabase,Client/Server(DatabaseServer),DataWareho using.
- To design and buildasimpledatabase system and demonstratecompetencewith the fundamentaltasks involved withmodeling,designing,andimplementingaDBMS.

Note:Examinerwillsetninequestionsintotal.Questiononewillbecompulsory.Questiononewill have6 parts of2.5markseachfromallunitsandremainingeightquestionsof15markseach to besetbytakingtwoquestionsfromeachunit.Thestudentshavetoattemptfivequestionsintotal, first beingcompulsory andselectingonefromeachunit.

Unit: 1

Database system architecture: Data Abstraction, Data Independence, Data Definition Language(DDL),DataManipulationLanguage(DML).**Data models:** Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit: 2

Relationalquerylanguages: Relationalalgebra,Tupleanddomainrelationalcalculus,SQL3,DDL andDMLconstructs,Opensourceand Commercial DBMS- MYSQL, ORACLE, DB2,SQL server.
Relationaldatabasedesign: Domainanddatadependency,Armstrong'saxioms,Normalforms, Dependency preservation,Losslessdesign.

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence,Join strategies,Queryoptimizationalgorithms.

Unit: 3

Storage strategies:Indices,B-trees,hashing,

Transactionprocessing: Concurrencycontrol,ACIDproperty,Serializabilityofscheduling,Locking andtimestampbasedschedulers, Multi-versionandoptimisticConcurrencyControlschemes, Databaserecovery.

Unit: 4

Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC

models,Intrusion detection,SQL injection.

Advanced topics: Object oriented and object relational databases, Logical databases, Web

databases,Distributed databases,Datawarehousinganddatamining.

Suggested books:

"DatabaseSystemConcepts",6thEdition by AbrahamSilberschatz,HenryF. Korth,S.Sudarshan,McGraw-Hill.

Suggested reference books

"Principlesof DatabaseandKnowledge–BaseSystems",Vol1 byJ. D. Ullman,ComputerSciencePress.

"Fundamentalsof DatabaseSystems",5thEditionby R. Elmasriand S. Navathe,PearsonEducation

"Foundationsof Databases",Reprint by SergeAbiteboul,RichardHull,VictorVianu,Addison-Wesley

CourseOutcomes

- Foragivenquerywriterelationalalgebraexpressionsforthatqueryandoptimizethe developed expressions
- Foragivenspecification oftherequirement,design the databasesusingER methodand normalization.
- Foragivenspecification,constructtheSQLqueriesforOpensourceandCommercial
- DBMS-MYSQL,ORACLE,andDB2.
- Foragivenquery optimizeits executionusingQuery optimizationalgorithms
- For agiven transaction-processing system, determine the transaction atomicity, consistency, isolation,anddurability.
- Implementtheisolationproperty,includinglocking,timestampingbasedonconcurrency controlandSerializability ofscheduling.

DatabaseManagementSystemLab

Coursecode	LC-CSE-209G				
Category	Professional CoreCourse				
Coursetitle	DatabaseManagementSystemLab				
Schemeand Credits	L	T	P	Credits	Semester6
	0	0	1	0.5	
Branches(B. Tech.)	ComputerScienceandEngineering (Minor)				
Class work	25 Marks				
Exam	25 Marks				
Total	50Marks				
Duration ofExam	03Hours				

CourseObjectives:

- Keepabreastofcurrent developmentstocontinuetheirownprofessionaldevelopment
- ToengagethemselvesinlifelonglearningofDatabasemanagementsystemstheoriesand technologiesthisenables themtopursehigherstudies.
- Tointeract professionallywithcolleaguesorclientslocatedabroadandtheabilityto overcomechallenges thatarisesfromgeographicdistance,cultural differences,and multiplelanguagesin the contextofcomputing.
- Developteamspirit,effectiveworkhabits,andprofessionalattitudeinwrittenandoral forms,towardsthedevelopment of databaseapplications.

Contents:

i. Creation ofadatabaseandwritingSQLqueries toretrieveinformation fromthedatabase.
ii. PerformingInsertion,Deletion,Modifying,Altering,UpdatingandViewingrecordsbasedoncon ditions.
iii. Creation ofViews, Synonyms,Sequence,Indexes,Save point.
iv. Creatingan employeedatabasetoset various constraints.
v. Creatingrelationship between thedatabases.
vi. Studyof PL/SQLblock.
vii. WriteaPL/SQ blocktosatisfy someconditionsby acceptinginputfrom theuser.
viii. WriteaPL/SQ blockthathandlesalltypesof exceptions.
ix. Creation ofProcedures.
x. Creation ofdatabasetriggersandfunctions
xi. Miniproject(Application Development usingOracle/ MySQL)

a) Inventory ControlSystem
b) MaterialRequirement Processing.
c) HospitalManagementSystem.
d) Railway ReservationSystem.
e) PersonalInformationSystem.
f) Web BasedUserIdentificationSystem.
g) TimeTableManagement System.
h) HotelManagement

COMPUTER NETWORKS

Coursecode	PCC-CSE-303G				
Category	ProfessionalCoreCourse				
Coursetitle	Computer Networks				
Schemeand Credits	L	T	P	Credits	Semester7
	3	0	0	3	
Branches(B. Tech.)	ComputerScienceandEngineering (Minor)				
Class work	25 Marks				
Exam	75 Marks				
Total	100Marks				
Durationof Exam	03Hours				

CourseObjectiv es:

- Todevelopanunderstandingof modern network architecturesfromadesignand
- Performanceperspective.
- Tointroducethestudenttothemajorconceptsinvolvedinwide-areanetworks (WANs),localareanetworks (LANs) andWirelessLANs (WLANs).
- Toprovidean opportunity todoNetworkprogramming
- ToprovideaWLANmeasurement idea.

Note:Examiner willset nine questionsin total. Questionone willbecompulsory.Question one will have6 partsof2.5markseach fromall units andremainingeightquestions of15 markseachto besetby takingtwo questionsfromeachunit. Thestudentshavetoattempt fivequestionsin total,first beingcompulsory andselectingonefromeachunit.

Unit: 1

Introduction: Data communication, Components, Computernetworks anditshistorical development, distributedprocessing,Internet

NetworkModels:OSI modelandTCP/IPModel

PhysicalLayer– physical layer functions,DataRepresentation, Simplex,Half DuplexandFull DuplexTransmission, Modulationand Multiplexing,Packetand circuitswitching, Transmissionmedia,Topologies,connectionlessandconnection-oriented services.

DataLinkLayer: Datalinklayerfunctionsandservices,MACAddressing,Framing,Stopand

Wait,Goback –NARQ,SelectiveRepeat ARQ,SlidingWindowProtocol.

Unit: 2

MediumAccessControl: MAC layer functions,Randomaccess,ControlledAccessand channelization protocols.

Network Layer: Networklayerfunctionsandservices,Logicaladdressing,IPv4classful and classlessaddressing,subnetting,NAT,IPv4,ICMPv4, ARP,RARPandBOOTP,IPv6,IPv6 addressing, DHCP.

NetworkDevices: Repeater,hub,switch,routerandgateway.

Unit: 3

RoutingAlgorithms:introduction torouting,Shortest PathAlgorithm,Flooding,Hierarchical

Routing,Link Stateand DistanceVectorRouting

TransportLayer: Transportlayer functionsandservices,Processto ProcessCommunication, UserDatagram Protocol(UDP),TransmissionControlProtocol(TCP),TCPconnection management

ApplicationLayer: Applicationlayerfunctionsandservices, DomainNameSpace(DNS), EMAIL,FileTransferProtocol(FTP), HTTP,SNMP

Unit: 4

CongestionControl,Quality of Service,QoSImproving techniques.

LAN:Ethernet,TokenBus, TokenRing, MANArchitecture- DQDB, WANArchitectures-Frame

Relay,ATM,SONET/SDH

NetworkSecurity:Firewalls,securitygoals,typesofattack,Introductiontocryptography, Typesofciphers: symmetric andasymmetric keyciphers.

Suggested books:

1. DataCommunicationandNetworking,4thEdition,BehrouzA.Forouzan,McGraw-Hill.
2. DataandComputerCommunication,8thEdition,WilliamStallings,PearsonPrenticeHallIndia.

Suggested reference books:

1. ComputerNetworks,8thEdition,AndrewS.Tanenbaum,PearsonNewInternationalEdition.
2. InternetworkingwithTCP/IP,Volume1,6thEditionDouglasComer,PrenticeHallofIndia.
3. TCP/IPIllustrated,Volume1,W.RichardStevens,Addison-Wesley,UnitedStatesofAmerica.

CourseOutcomes:

• Explain thefunctionsof thedifferent layerof theOSIProtocol.
• DrawthefunctionalblockdiagramofWide-areanetworks(WANs),localareanetworks (LANs) andWireless LANs(WLANs) and describe thefunction ofeach.
• Identify and connectvarious connectingcomponents ofa computernetwork.
• ConfigureDNSDDNS, TELNET,EMAIL,FileTransferProtocol(FTP),WWW,HTTP, SNMP, Bluetooth,Firewalls usingopensourceavailablesoftwareandtools.

MACHINE LEARNING

Coursecode	PCC-CSE-402G				
Category	Professional Core Course				
Coursetitle	Machine Learning				
Scheme and Credits	L	T	P	Credits	Semester-7
	3	0	-	3	
Branches(B. Tech.)	ComputerScienceandEngineering (Minor)				
Class work	25 Marks				
Exam	75 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To learn the basic concept of machine learning and types of machine learning.
2. To design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
3. Explore supervised and unsupervised learning paradigms of machine learning.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2.5 marks each from all units and remaining eight questions of 15 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-1Introduction

Machine Learning: Definition, History, Need, Features, Block diagrammatic representation of learning machines, Classification of Machine Learning: Supervised learning, Unsupervised learning, Reinforcement Learning, Machine Learning life cycle, Applications of Machine Learning.

Unit-2Dimensionality Reduction

Dimensionality reduction: Definition,Row vector and Column vector,how to represent a dataset, how to represent a dataset as a Matrix, Data preprocessing in Machine Learning: Feature Normalization, Mean of a data matrix, Column Standardization**,** Co-variance of a Data Matrix, Principal Component Analysis for Dimensionality reduction.

Unit-3Supervised Learning

Supervised Learning: Definition, how it works. Types of Supervised learning algorithms k- Nearest Neighbours, Naïve Bayes, Decision Trees, Naive Bayes, Linear Regression, Logistic Regression, Support Vector Machines.

Unit-4Unsupervised Learning

Unsupervised Learning: Clustering: K-means. Ensemble Methods: Boosting, Bagging, Random Forests.

Evaluation: Performance measurement of models in terms of accuracy, confusion matrix, precision & recall, F1-score, receiver Operating Characteristic Curve (ROC) curve and AUC, Median absolute deviation (MAD), Distribution of errors

Suggested books

1. E. Alpaydin, Introduction to
2. Machine Learning, Prentice Hall of India, 2006.

2. T Hastie, R Tibshirani and J Friedman, The Elements of Statistical Learning Data Mining, Inference, and Prediction, 2nd Edition, Springer, 2009.

3. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2010.

Suggested reference books

1. R. O. Duda, P. E. Hart, and D.G. Stork, Pattern Classification, John Wiley and Sons, 2012.
2. Simon O. Haykin, Neural Networks and Learning Machines, Pearson Education, 2016

Course Outcomes

- Understand fundamental issues and challenges of supervised and unsupervised learning techniques.
- Extract features that can be used for a particular machine learning approach
- To compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
- To mathematically analyse various machine learning approaches and paradigms.