KISAN POST GRADUATE COLLEGE, BAHRAICH (UP) 271801
(An Autonomous College)

Proposed Structure of syllabus for the
PROGRAM: B.Sc.
SUBJECT: Computer Science

Syllabus developed/proposed by

S.No.	Name of BoS Member	Designation	Department	College/University
1.		Convener		
2.		University Nominee		
3.		Subject Expert		
4.		Subject Expert		
5.		Invited Member		
6.		Invited Member		

Semester wise Title of the Papers in UG					
Year	**Semester**	**Course Code**	**Paper Title**	**Theory/Practical**	**Credits**
CERTIFICATE IN ……					
FIRST	**SEM-I**	B070101T	Problem Solving using Computer	Theory	4
		B070102P	Software Lab using Python	Practical	2
	SEM-II	B070201T	Database Management Systems	Theory	4
		B070202P	Database Management Systems Lab	Practical	2
DIPLOMA IN ……					
SECOND	**SEM-III**	B070301T	Operating Systems	Theory	4
		B070302P	Operating Systems Lab	Practical	2
	SEM-IV	B070401T	Computer System Architecture	Theory	4
		B070402P	Computer System Architecture Lab	Practical	2
DEGREE IN ……					
THIRD	**SEM-V**	B070501T	Analysis of Algorithms and Data Structures	Theory	4
		B070502T	**Opt Any one of the following (Elective/ Optional):** Soft Computing	Theory	4
		B070503P	Lab on Algorithms and Data Structures with C++	Practical	2
		B070504R	Research Project-I	Project	3
	SEM-VI	B070601T	Data Communication and Computer Networks	Theory	4
		B070602T	Cyber Security & Cyber Laws	Theory	4
		B070603P	Lab on Computer Networks	Practical	2
		B070604R	Research Project-II	Project	3

Program Outcomes (POs) Students taking admission to B.Sc. program are expected to get prepared with following outcomes:		
PO1: Explaining the basic scientific principles and methods.		
PO2: Inculcating scientific thinking and awareness among the student.		
Program Specific Outcomes (PSOs)		
First Year	Certificate in ……..	To prepare students for career in computer science and its applications in professional career
Second Year	Diploma in ……..	To develop the student to cope up with the advancements in respective science field
Third Year	Degree in …….	The student will determine the appropriate level of technology for use in: a) experimental design and implementation, b) analysis of experimental data, and numerical and mathematical methods in problem solutions.

B.A./B.Sc. I (SEMESTER-I) PAPER-I
Title:

Programme : **Class: Certificate**	**Year: First**	**Semester: first**
Subject: Computer Science		
Course Code: B070101T	**Course Title:** Problem Solving using Computer	

Course outcomes:

CO1: Understand hardware components of computer system such as memory system organization, input/output devices, aware of software components of computer system, and windows operating system concepts.

CO2: : Develops basic understanding of computers, the concept of algorithm and algorithmic thinking.

CO3: Develops the ability to analyze a problem, develop an algorithm to solve it.

CO4: Develops the use of the Python programming language to implement various algorithms, and develops the basic concepts and terminology of programming in general.

CO5: Introduces the more advanced features of the Python language

Credits:	**Core / Elective**
Max. Marks: 25+75	**Min. Passing Marks:**

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures
	Part I	
I	Computer Fundamentals: Introduction to Computers: Characteristics of Computers, Uses of computers, Types and generations of Computers.	1
II	Basic Computer Organization - Units of a computer, CPU, ALU, memory hierarchy, registers, IVO devices. Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.	2
III	Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.	3
IV	Overview of Programming : Structure of a Python Program, Elements of Python	4
	Part II	

V	Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator. Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).	**5**
VI	Creating Python Programs: Input and Output Statements, Control statements (Looping- while Loop, for Loop, Loop Control, Conditional Statement-if...else, Difference between break, continue and pass).	**6**
VII	Structures: Numbers, Strings, Lists, Tuples, Dictionary, Date & Time, Modules, Defining Functions, Exit function, default arguments.	**7**
VIII	Introduction to Advanced Python: Objects and Classes, Inheritance, Regular Expressions, Event Driven Programming, GUI Programming.	**8**

1. **Suggested Readings:** P. K. Sinha & Priti Sinha , "Computer Fundamentals", BPB Publications, 2007.
2. Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
3. T. Budd, Exploring Python, TMH, 1st Ed, 2011
4. Python Tutorial/Documentation www.python.or 2010

Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012

Suggestive Digital Platforms/ Web Links: https://www.pearsoned.co.in/prc/book/anita-goel-computer-fundamentals-1e- 1/9788131733097

http://docs.python.org/3/tutorial/index.html http://interactivepython.org/courselib/static/pythonds http://www.ibiblio.org/g2swap/byteofpython/read/

This course can be opted as an elective by the students of the following subjects: "Skill Based Elective" "Elective"

Suggested Continuous Evaluation Methods (Max. Marks: 25)

S.No.	Assessment Type	Max. Marks
1.	**Assessment Type: Class Tests (Max. Marks 14) Suggested Usage:** Include all types of questions-essay, short answer, objective; Design to test all levels of domain; Exam Blue Print be prepared to ensure inclusion of all types & levels of questions and proper sampling of content; Marking Criteria made known to students; Teacher should provide written feedback selectively and discuss answers in the class; Only Role/Code numbers , not names be written to avoid bias in marking; Display of model answer copies. After Completion of Unit I and Unit II, a first class test of max. marks of 7 shall be conducted. After Completion of Unit III and IV, a second class test of max. marks of 7 shall be conducted. If any student does not appear in any one or both class test, a makeup test shall be conducted of max. marks of 5 instead of total 14 marks.	

2.	**Assessment Type: Quizzes/ Objective Tests / Recognition Type (such as MCQs; True or False; Matching; Classifying) /Recall Type -Filling Blanks; One word / Phrase Answers (Max Marks: 5)** **Suggested Usage:** Teachers be trained in construction, advantages, disadvantages and precautions while preparing different types of objective items; Go beyond factual information to High Order Thinking (HOT) Skills. It shall be "End of the class quiz".	
3.	**Assessment Type: Assignments (Max Marks: 4)** **Suggested Usage:** Some class assignments shall be given to students at the end of each Unit. Note making techniques be taught to students; Not just direct questions from notes, but application analysis and synthesis of that knowledge.	
4.	**Assessment Type: Class Interaction (Max. marks: 2)**	

Course prerequisites:None
Suggested equivalent online courses:
Further Suggestions:
Any remarks/ suggestions:

B.A./B.Sc. I (SEMESTER-I) PAPER-I
Title:

Programme : **Class:** Programme/Class: **Certificate**	**Year: First**	**Semester: First**
Subject: Computer Science		
Course Code: B070102P	**Course Title: Software Lab using Python**	
Course outcomes: CO1: To learn and understand Python programming basics. CO2: To learn and understand python looping, control statements and string manipulations. CO3: Students should be made familiar with the concepts of GUI controls and designing GUI applications. CO4: To learn and know the concepts of file handling, exception handling and database connectivity.		
Credits:2	**Core / Elective**	
Max. Marks: 25+75	**Min. Passing Marks:**	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 0-0-4		

Section: A (Simple programs)

1. Write a menu driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria :
   Grade A: Percentage >=80
   Grade B: Percentage>=70 and <80
   Grade C: Percentage>=60 and <70
   Grade D: Percentage>=40 and <60
   Grade E: Percentage<40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to display the first n terms of Fibonacci series.
5. WAP to find factorial of the given number.
6. WAP to find sum of the following series for n terms: 1 – 2/2! + 3/3!---------- n/n!
7. WAP to calculate the sum and product of two compatible matrices.

Section: B (Visual Python)

All the programs should be written using user defined functions, wherever possible.

1. Write a menu-driven program to create mathematical 3D objects
   I. curve
   II. sphere
   III. cone
   IV. arrow
   V. ring
   VI. Cylinder.

2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.
4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula m=60/(t+2), where t is the time in hours. Sketch a graph for t vs. m, where t>=0.
6. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:

   $$P(t) = (15000(1+t))/(15+ e)$$

   where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.

7. Input initial velocity and acceleration, and plot the following graphs depicting equations of motion:
   I. velocity wrt time (v=u+at)
   II. distance wrt time (s=u*t+0.5*a*t*t)
   III. distance wrt velocity (s=(v*v-u*u)/2*a)

B.A./B.Sc.I(SEMESTER-II)PAPER-I
Title:

Programme :Class: Certificate	**Year: First**	**Semester: Second**
Subject: Computer Science		
CourseCode:B070201T	**Course Title:** Database Management System	

Course outcomes:

CO1:Under standhardwarecomponentsofcomputersystemsuchasmemorysystemorganization, input/output devices, aware of software components of computer system, andwindowsoperatingsystem concepts.

CO2: : Develops basic understanding of computers, the concept of algorithm and algorithmicthinking.

CO3:Develops theabilitytoanalyzeaproblem, developan algorithmto solveit.

CO4:DevelopstheuseofthePythonprogramminglanguagetoimplementvariousalgorithms,anddevelopsthe basicconceptsand terminologyofprogrammingingeneral.

CO5: Introduces themoreadvancedfeaturesofthe Pythonlanguage

Credits:	**Core/Elective**
Max.Marks:25+75	**Min.PassingMarks:**

TotalNo.of Lectures-Tutorials-Practical (inhoursperweek):L-T-P:

Unit	**Topics**	**No. ofLectures**
	PartI	
I	Introduction:DatabaseSystemConcepts,Filesystemvs.databasesystem, Database system architecture, Data models and their types, Database schemeand instances,Data independence,DatabaseLanguagesandInterfaces	1
II	DataModelingConceptsERmodelconcepts:NotationsforERdiagram,ExtendedE-Rdiagram,ExtendedE-Rmodel,E-Rmodeldesignissues,constraints,andkeys:Weakentitysetstrongentityset,Relationshipsofhigher degree.	2
III	Relational model concepts: code rules, constraints, Relational Algebraoperations, Extended relational algebra operations, Relational Calculus,Tupleand Domain relational calculus.	3
IV	DatabaseDesignFunctionaldependencies,Normalforms,First,second,and	4

	thirdnormalforms,BCNF,Multi-valueddependenciesandFourthNormal 5form,JoinDependenciesandFifthNormalform.Python	
	PartII	
V	Transaction, Query Processing Transaction and system concepts: transactionstates, ACID properties of transactions, concurrent execution schedules andRecoverability,Serializabilityofschedules.QueryProcessingandOptimization:Measuresof Querycost,Cost,Evaluationof expression.Optimization: Transformation of relational expression, Choice ofevaluationplan.	**5**
VI	ConcurrencyControl:ConcurrencyControlTechniques:TwophaseLocking TechniquesforConcurrencyControl;TimestampinginConcurrencycontrol.	**6**
VII	Introduction to SQL Basic Structure of SQL Query, Set operators, SELECT,UNION,INTERSECT,andEXCEPT,Nestedqueries,Aggregatefunction,Nullvalues, DerivedRelations,ModificationoftheDatabase,Joinedrelations and up-datesin SQL.	**7**
VIII	DatabaseSecurityImportanceofdata,Threatsandrisks,Usersanddatabaseprivileges,AccessControl,SecurityforInternetApplications,Roleof DatabaseAdministrator.	**8**

1. **SuggestedReadings:**Henry F. Korth and Abraham Silberschatz, "Database System Concepts," SecondEdition, McGraw Hill, 1991.
2. AtulKahate, "Introduction to Database Management Systems," Pearson India,2004.
3. Raghu Ramakrishnan and Johannes Gehrike, "Database Management Systems,"Third McGraw Hill, Edition, 2003.
4. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6 Edition, Pearson Education,2013.
5. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.

Suggestive Digital Platforms/WebLinks:

Thiscoursecanbeoptedasan electivebythestudentsofthefollowingsubjects:B. Sc in Engineering and BCA

SuggestedContinuousEvaluation Methods(Max.Marks:25)

S.No.	AssessmentType	Max.Marks
1.	**Class Tests (Max. Marks14)** **Suggested Usage:** Include all types of questions-essay, short answer, objective; Design to test all levels of domain; Exam Blue Print be prepared to ensure inclusion of all types & levels of questions and proper sampling of content; Marking Criteria made known to students; Teacher should provide written feedback selectively and discuss answers in the class; Only Role/Code numbers , not names be written to avoid bias in marking; Display of model answer copies.	

	After Completion of Unit I and Unit II, a first class test of max. marks of 7 shallbe conducted. After Completion of Unit III and IV, a second class test of max. marks of 7 shallbe conducted. If any student does not appear in any one or both class test, a makeup test shall be conducted of max. marks of 5 instead of total 14 marks.	
2.	**Assessment Type: Quizzes/ Objective Tests / Recognition Type (such as MCQs; True or False; Matching; Classifying) /Recall Type -Filling Blanks; One word / Phrase Answers (Max Marks:5)** **Suggested Usage:** Teachers be trained in construction, advantages, disadvantages and precautions while preparing different types of objective items; Go beyond factual information to High Order Thinking (HOT) Skills. It shall be "End of the class quiz".	
3.	**Assessment Type: Assignments (Max Marks:4)** **Suggested Usage:** Some class assignments shall be given to students at the end of each Unit. Note making techniques be taught to students; Not just direct questions from notes, but application analysis and synthesis of that knowledge	
4.	**Assessment Type: Class Interaction (Max. marks:2)**	

Courseprerequisites:None
Suggestedequivalentonlinecourses:
FurtherSuggestions:
Anyremarks/suggestions:

Programme/Class: **Certificate**	Year: **First**	Semester: **Second**
Subject: Computer Science		
Course Code: B070202P	Course Title: Database Management Systems Lab	

Course outcomes:

Ability to:

1. Understand, analyze and apply common SQL statements including DDL, DML and DCL statements to perform differentoperations.
2. Design and implement a database schema for a givenproblem.
3. Do connectivity of PHP and MySQL to developapplications.

Credits**: 2**	Max. Marks: **25+75**	Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-4**		

Suggested Readings:

1. Paul DuBois, "MySQL Cookbook: Solutions for Database Developers and Administrators," Third Edition, O'Reilly Media,2014.
2. Frank M. Kromann, "Beginning PHP and MySQL: From Novice to Professional," Fifth Edition, Apress,2018.
3. Joel Murach and Ray Harris, "Murach's PHP and MySQL," First Edition, Mike Murach& Associates,2010.
4. Luke Welling, Laura Thomson, "PHP and MySQL Web Development," Fourth Edition, Addison-Wesley,2008.

Software Lab based on Database Management Systems

Note: PHP/MySQL may be used

List of Experiments

1. Creation of databases and execution of SQLqueries.
2. Creation of Tables using MySQL: Data types, Creating Tables (along with Primary and Foreign keys), Altering Tables and DroppingTables.
3. Practicing DML commands- Insert, Select, Update,Delete.
4. Practicing Queries using ANY, ALL, IN, EXISTS, NOT, EXISTS, UNION, INTERSECT, and CONSTRAINTS,etc.
5. Practice Queries using COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING, VIEWS Creation and Dropping.
6. Use of COMMIT, ROLLBACK andSAVEPOINT.
7. Practicing on Triggers - creation of trigger, Insertion using trigger, Deletion using trigger, Updating using trigger.

To remove the redundancies and anomalies in the above relational tables, Normalize up to Third NormalForm.

B.A./B.Sc. II (SEMESTER-III) PAPER-I
Title:

Programme : **Class: Diploma**	**Year:** Second	**Semester:** Third
Subject: Computer Science		
Course Code: B070301T	**Course Title:** Operating System	

Course outcomes:

CO1: Understand hardware components of computer system such as memory system organization, input/output devices, aware of software components of computer system, and windows operating system concepts.

CO2: : Develops basic understanding of computers, the concept of algorithm and algorithmic thinking.

CO3: Develops the ability to analyze a problem, develop an algorithm to solve it.

CO4: Develops the use of the Python programming language to implement various algorithms, and develops the basic concepts and terminology of programming in general.

CO5: Introduces the more advanced features of the Python language

Credits: **4**	**Core / Compulsory**
Max. Marks: 25+75	**Min. Passing Marks:**

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures
	Part I	
I	Introduction Operating system and functions, Classification of Operating systems: Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multithreaded Systems, Operating System Structure, System Components, Operating System Services, Kernels, Monolithic and MicrokernelSystems.	1
II	Process Management Process Concept, Process States, Process Synchronization, Critical Section, Mutual Exclusion, Classical Synchronization Problems, Process Scheduling, Process States, Process Transitions, Scheduling Algorithms Interprocess Communication, Threadsand their management, Security Issues.	2
III	CPU Scheduling Scheduling Concepts, Techniques of Scheduling, Preemptive and Non Preemptive Scheduling: First-Come-First-Serve,	3

	Shortest Request Next, Highest Response Ration Next, Round Robin, Least Complete Next, Shortest Time to Go, Long, Medium, Short Scheduling, Priority Scheduling. Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.	
IV	Memory Management Memory allocation, Relocation, Protection, Sharing, Paging, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing.	4
Part II		
V	I/O Management and Disk Scheduling I/O devices, and I/O subsystems, I/O buffering, Disk storage and disk scheduling, RAID.	**5**
VI	File System: File concept, File organization and access mechanism, File directories, and File sharing, File system implementation issues, File system protection and security.	**6**
VII	Shell introduction and Shell Scripting: What is shell and various type of shell, Various editors present in linux, Different modes of operation in vi editor,	**7**
VIII	What is shell script, Writing and executing the shell script, Shell variable (user defined and system variables) System calls, Using system calls, Pipes and Filters, Decision making in Shell Scripts (If else, switch), Loops in shell, Functions, Utility programs (cut, paste, join, tr , uniq utilities), Pattern matching utility (grep)	**8**

1. **Suggested Readings:**Abraham Silberschatz, Greg Gagne, and Peter B. Galvin, "Operating SystemConcepts," Tenth Edition, Wiley,2018.
2. William Stallings, "Operating Systems: Internals and Design Principles," Seventh Edition, Prentice Hall,Andrew S. Tanenbaum and Herbert Bos,"Modern Operating Systems," FourthEdition, Pearson,2014.
3. 2011.
4. DhanjayDhamdhere, "Operating Systems," First Edition, McGraw-Hill, 2008

Suggestive Digital Platforms/ Web Links:

This course can be opted as an elective by the students of the following subjects:

Suggested Continuous Evaluation Methods (Max. Marks:25)

S.No.	Assessment Type	Max. Marks
1.	**Assessment Type:Class Tests (Max. Marks14)** **Suggested Usage:** Include all types of questions-essay, short answer, objective; Design to test all levels of domain; Exam Blue Print be prepared to ensure inclusion of all types & levels of questions and proper sampling of content; Marking Criteria made known to students; Teacher should provide written feedback selectively and discuss answers in the class; Only Role/Code numbers , not names be written to avoid bias in marking; Display of model answer copies.	

	After Completion of Unit I and Unit II, a first class test of max. marks of 7 shallbe conducted. After Completion of Unit III and IV, a second class test of max. marks of 7 shallbe conducted. If any student does not appear in any one or both class test, a makeup test shall be conducted of max. marks of 5 instead of total 14 marks.	
2.	**Assessment Type: Quizzes/ Objective Tests / Recognition Type (such as MCQs; True or False; Matching; Classifying) /Recall Type -Filling Blanks; One word /Phrase** **Suggested Usage:** Teachers be trained in construction, advantages, disadvantages and precautions while preparing different types of objective items; Go beyond factual information to High Order Thinking (HOT) Skills. It shall be "End of the class quiz".	
3	**Assessment Type: Assignments (Max Marks:4)** **Suggested Usage:** Some class assignments shall be given to students at the end of each Unit. Note making techniques be taught to students; Not just direct questions from notes, but application analysis and synthesis of that knowledge.	
4.	**Assessment Type: Class Interaction (Max. marks:2)**	

Course prerequisites:
Suggested equivalent online courses:
Further Suggestions:
Any remarks/ suggestions:

Programme/Class: **Diploma**	Year: **Second**	Semester: **Third**
Subject: Computer Science		
Course Code: B070302P	Course Title: Operating Systems Lab	

Course outcomes:

Ability to:

1. Use of Linux operating system and able to write shellprograms.
2. Simulate and demonstrate the concepts of operatingsystems.

Credits**: 2**	Max. Marks: **25+75**	Min. Passing Marks:

Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-4**

Suggested Readings:

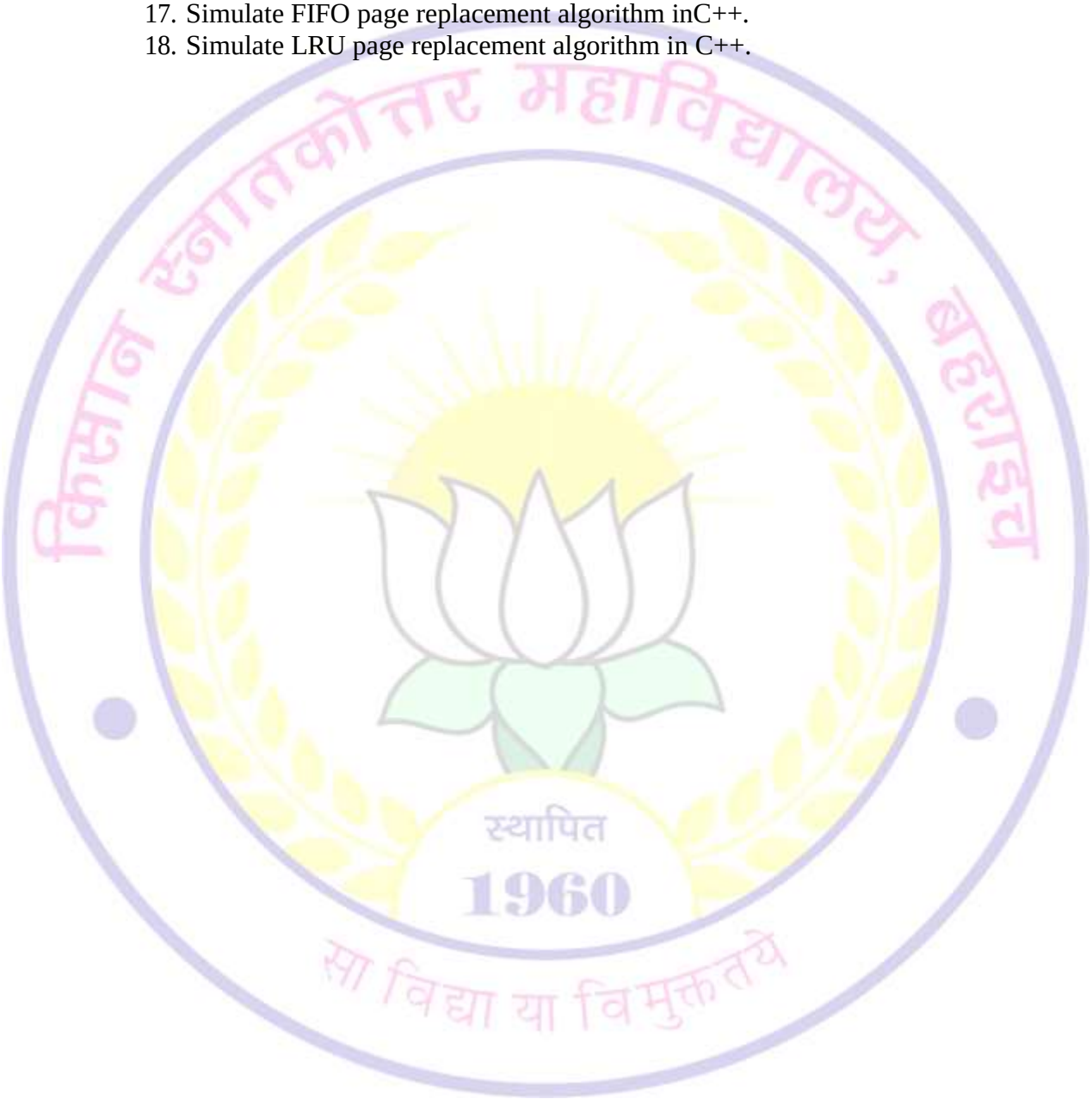
1. Sumitabh Das, "Your Unix/Linux: The Ultimate Guide," McGraw Hill,2012.
2. Richard Blum and Christine Bresnahan, "Linux Command Line and Shell ScriptingBible," Wiley,2015.
3. Stroustrup, Bjarne, Programming: Principles and Practice Using C++, AddisonWesley, USA, 2014, 2nd ed.
4. E Balagurusamy, Object Oriented Programming with C++, McGraw Hill Education(India) Pvt. Ltd., India, 2013, 6th ed.

Lab on Operating Systems

Note: Following exercises can be performed using Linux or Unix

1. Usage of followingcommands:
   ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.
2. Usage of followingcommands:
   cal, cat(append), cat(concatenate), mv, cp, man, date.
3. Usage of following
   commands: chmod, grep,
   tput(clear, highlight),bc.
4. Write a shell script to check if the number entered at the command line is prime ornot.
5. Write a shell script to modify "cal" command to display calendars ofthe specifiedmonths.
6. Write a shell script to modify "cal" command to display calendars ofthe specified range ofmonths.
7. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name isinvalid".
8. Write a shell script to display date in the mm/dd/yyformat.
9. Write a shell script to display on the screen sorted output of "who"command along with the total number of users.
10. Write a shell script to display the multiplication table anynumber,

11. Write a shell script to compare two files and if found equal asks the user todelete the duplicatefile.
12. Write a shell script to check whether the file have all the permissions ornot.
13. Simulate FCFS CPU scheduling algorithm inC++.
14. Simulate SJF CPU scheduling algorithm inC++.
15. Simulate Priority CPU scheduling algorithm inC++.
16. Simulate Round Robin CPU scheduling algorithm inC++.
17. Simulate FIFO page replacement algorithm inC++.
18. Simulate LRU page replacement algorithm in C++.



B.A./B.Sc.II(SEMESTER-IV)PAPER-I

Title:

Programme :Class: Diploma	**Year:** Second	**Semester:** Fourth
Subject: Computer Science		
CourseCode:B070401T	**CourseTitle:** Computer System Architecture	

Courseoutcomes:

CO1:Understandhardwarecomponentsofcomputersystemsuchasmemorysystemorganization, input/output devices, aware of software components of computer system, andwindowsoperatingsystem concepts.

CO2: : Develops basic understanding of computers, the concept of algorithm and algorithmicthinking.

CO3:Develops theabilitytoanalyzeaproblem, developan algorithmto solveit.

CO4:DevelopstheuseofthePythonprogramminglanguagetoimplementvariousalgorithms,anddevelopsthe basicconceptsand terminologyofprogrammingingeneral.

CO5: Introduces themoreadvancedfeaturesofthe Pythonlanguage

Credits:	**Core/Elective**
Max.Marks:25+75	**Min.PassingMarks:**

TotalNo.of Lectures-Tutorials-Practical (inhoursperweek):L-T-P:

Unit	**Topics**	**No. ofLectures**
	PartI	
I	Data Representation and basic Computer Arithmetic: Number systems,complements,fixedandfloatingpointrepresentation,characterrepresentation,addition, subtraction,magnitudecomparison.	1
II	Logicgatesandcircuits:logicgates,booleanalgebra,combinationalcircuits, circuitsimplification,introductiontoflip-flopsandsequentialcircuits,decoders,multiplexers,registers, counters.	2
III	BasicComputerOrganizationandDesign:Computerregisters,bussystem, instruction set, timing and control, instruction cycle, memoryreference,input-output and interrupt.	3
IV	CentralProcessingUnit:Registerorganization,arithmeticandlogicalmicro-operations,stackorganization,Hardwiredvs.microprogrammedcontrol. Pipelinecontrol:Instructionpipelines,pipelineperformance,superscalar	4

	processing,Pipelining,RISC&CISC	
PartII		
V	ProgrammingtheBasicComputer:Instructionformats,addressingmodes, instructioncodes,assemblylanguage	**5**
VI	ProgrammingtheBasicComputer:Instructionformats,addressingmodes, instructioncodes,assemblylanguage	**6**
VII	Input-outputOrganization:Peripheraldevices,I/Ointerface,Modesofdata transfer:Programmed, InterruptDrivenandDirectMemoryAccess.	**7**
VIII	Parallelprocessing:Processor-levelparallelism,multiprocessorarchitecture	**8**

SuggestedReadings:

1. M. Mano, "Computer System Architecture", Pearson Education, New Jersey,2017,Third Edition.
2. W. Stallings, "Computer Organization and Architecture Designingfor Performance",Prentice Hall of India, 2015, TenthEdition.
3. M. Mano, "Digital Design", Pearson Education, New Jersey, 2018, SixthEdition.

SuggestiveDigitalPlatforms/WebLinks:

Thiscoursecanbeoptedasan electivebythestudentsofthefollowingsubjects:

SuggestedContinuousEvaluation Methods(Max.Marks:25)

S.No.	AssessmentType	Max.Marks
1.	**Assessment Type: Class Tests (Max. Marks14) Suggested Usage:** Include all types of questions-essay, short answer, objective; Design to test all levels of domain; Exam Blue Print be prepared to ensure inclusion of all types & levels of questions and proper sampling of content; Marking Criteria made known to students; Teacher should provide written feedback selectively and discuss answers in the class; Only Role/Code numbers , not names be written to avoid bias in marking; Display of model answer copies. After Completion of Unit I and Unit II, a first class test of max. marks of 7 shallbe conducted. After Completion of Unit III and IV, a second class test of max. marks of 7 shallbe conducted. If any student does not appear in any one or both class test, a makeup test shall be conducted of max. marks of 5 instead of total 14 marks.	
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3.	**Assessment Type: Assignments (Max Marks:4)** **Suggested Usage:** Some class assignments shall be given to students at the end of each Unit. Note making techniques be taught to students; Not just direct questions from notes, but application analysis and synthesis of that knowledge.	
	Assessment Type: Class Interaction (Max. marks:2)	

Courseprerequisites:
Suggestedequivalentonlinecourses:
FurtherSuggestions:
Anyremarks/suggestions:

Programme/Class: **Diploma**	Year: **Second**	Semester: **Fourth**
Subject: **Computer Science**		
Course Code: B070402P	Course Title: Computer System Architecture Lab	

Course outcomes:

An ability to understand:

CO1 The functions of various hardware components and their buildingblocks
CO2 Boolean algebraic expressions to digitaldesign
CO3 And implementation of different sequential and Combinationalcircuits
CO4 computer buses and input/outputperipherals
CO5 memory hierarchy and design of primarymemory

Credits: **2**	Max. Marks: **25+75**	Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-4**		

Practical: 60 Lab Periods

Memory 4096 words 16 bits per word	Instruction format 0 3 4 15 Opcode | Address

Basic Computer Instructions

Memory Reference	Register Reference	Input-Output

1. Create a machine based on the following architecture:
   Register Set

IR	**DR**	**AC**	**AR**	**PC**	**FGI**	**FGO**	**S**	**I**	**E**
0 15	**0 15**	**0 15**	**011**	**011**	**1 Bit**	**1 Bit**	**1 bit**	1 Bit	

Symbol	Hex		Symbol	Hex	Symbol	Hex
AND	0xxx		CLA	E800	INP	F80 0
ADD	2xxx		CLE	E400	OUT	F40 0
ISZ	Cxxx		INC	E020		

AND_I	1xxx	Indirect Addressing	SPA	E010		
ADD_I	3xxx		SNA	E008		
LDA_I	5xxx		SZA	E004		
STA_I	7xxx		SZE	E002		
BUN_I	9xxx		HLT	E001		
BSA_I	Bxxx					
ISZ_I	Dxxx					

Refer to Chapter-5 of Morris Mano for description of instructions.

ii) Create the micro operations and associate with instructions as given in the chapter (except interrupts). Design the register set, memory and the instruction set. Use this machine for the assignments of thissection.

iii) Create a Fetch routine of the instructioncycle.

iv) Simulate the machine to determine the contents of AC, E, PC, AR and IR registers in hexadecimal after the execution of each of following register referenceinstructions:

a. CLA
b. CLE
c. CMA
d. CME
e. CIR
f. CIL
g. INC
h. SPA
i. SNA
j. SZA
k. SZE
l. HLT

Initialize the contents of AC to $(A937)_{16}$, that of PC to $(022)_{16}$ and E to 1.

5. Simulate the machine for the following memory-reference instructions with I= 0 and address part = 082. The instruction to be stored at address 022 in RAM. Initialize the memory word at address 082 with the operand B8F2 and AC with A937. Determine the contents of AC, DR, PC, AR and IR in hexadecimal after theexecution.

a. ADD
b. AND
c. LDA
d. STA
e. BUN
f.BSA
g.ISZ

6. Simulate the machine for the memory-reference instructions referred in above question with I= 1 and address part = 082. The instruction to be stored at address 026 in RAM. Initialize the memory word at address 082 with the value 298. Initialize the memory word at address 298 with operand B8F2 and AC with A937. Determine the contents of AC, DR, PC, AR and IR in hexadecimal after theexecution.

7. Modify the machine created in Practical 1 according to the following instructionformat:

Instruction format

	0	2 3	4 15
Opcode	I		Address

a. The instruction format contains a 3-bit opcode, a 1-bit addressing mode and a 12-bit address. There are only two addressing modes, I = 0 (direct addressing) and I = 1 (indirectaddressing).

b. Create a new register I of 1bit.

c. Create two new microinstructions as follows:

i. Check the opcode of instruction to determine type of instruction (Memory Reference/Register Reference/Input-Output) and then jumpaccordingly.

Check the I bit to determine the addressing mode and thenjumpaccordingly.

B.A./B.Sc.III(SEMESTER-V)PAPER-I
Title:

Programme: **Class:** Bachelorin Science	**Year:** Third	**Semester:** Fifth
Subject: Computer Science		
CourseCode:B070501T	**Course Title:** Analysis of Algorithm and Data Structures	

Course outcomes:

CO1: Understand hardware components of computer system such as memory system organization, input/output devices, aware of software components of computer system, and windows operating system concepts.

CO2: : Develops basic understanding of computers, the concept of algorithm and algorithmic thinking.

CO3:Developstheabilitytoanalyzeaproblem,developanalgorithmtosolveit.

CO4: Develops the use of the Python programming language to implement various algorithms, and develops the basic concepts and terminology of programming in general.

CO5: IntroducesthemoreadvancedfeaturesofthePythonlanguage

Credits:	**Core/Elective**
Max.Marks:25+75	**Min.PassingMarks:**

TotalNo.ofLectures-Tutorials-Practical(inhoursperweek):L-T-P:

Unit	Topics	No. of Lectures
	PartI	
I	Introduction: Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm, Algorithm Design Techniques: Iterative techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms..	7
II	SortingTechniques:Elementarysortingtechniques-BubbleSort,Insertion Sort,MergeSort,AdvancedSortingtechniques-HeapSort,QuickSort,Sorting in Linear TimeBucket Sort, Radix Sort and Count Sort	8
III	SearchingTechniquesandComplexityAnalysis::LinearandBinary search, Medians & Order Statistics.	7
IV	ArraysArrays:SingleandMulti-dimensionalArrays,SparseMatrices;	7

Part II		
V	Stacks and Queues : Implementing stack using array and linked list, Prefix, Infix and Postfix expressions, Utility and conversion of these expressions from onetoanother;ArrayandLinkedrepresentationofQueue,De-queue,Priority Queues	8
VI	LinkedLists:Singly,DoublyandCircularLists,representationofStackand QueueasLinkedLists.	8
VII	Recursion:DevelopingRecursiveDefinitionofSimpleProblemsandtheir implementation;AdvantagesandLimitationsofRecursion;	**7**
VIII	Trees:IntroductiontoTreeasadatastructure;BinaryTrees,BinarySearch Tree,(Creation,andTraversalsofBinarySearch	**8**

1. **SuggestedReadings:**Cormen T.H., Leiserson Charles E., Rivest Ronald L., Stein Clifford, Introduction to Algorithms, PHI Learning Pvt. Ltd., 2009, 3rdEdition.
2. BasseSara& A.V. Gelder, Computer Algorithm: Introduction to Design and Analysis, Pearson, 2000, 3rdEdition.
3. Drozdek Adam, "Data Structures and algorithm in C++", Cengage Learning,2012, Third Edition.
4. Tenenbaum Aaron M., Augenstein Moshe J., Langsam Yedidyah, "DataStructures Using C and C++, PHI, 2009, Secondedition.
5. Kruse Robert L., "Data Structures and Program Design in C++",Pearson.

Suggestive Digital Platforms/WebLinks:

Thiscoursecanbeoptedasanelectivebythestudentsofthefollowingsubjects:

SuggestedContinuousEvaluationMethods(Max.Marks:25)

S.No.	AssessmentType	Max. Marks
1.	**Assessment Type: Class Tests (Max. Marks14)** **Suggested Usage:** Include all types of questions-essay, short answer, objective; Design to test all levels of domain; Exam Blue Print be prepared to ensure inclusion of all types & levels of questions and proper sampling of content; Marking Criteria made known to students; Teacher should provide written feedback selectively and discuss answers in the class; Only Role/Code numbers , not names be written to avoid bias in marking; Display of model answer copies.	

	After Completion of Unit I and Unit II, a first class test of max. marks of 7 shallbe conducted. After Completion of Unit III and IV, a second class test of max. marks of 7 shallbe conducted. If any student does not appear in any one or both class test, a makeup test shall be conducted of max. marks of 5 instead of total 14 marks.	
2.	**Assessment Type: Quizzes/ Objective Tests / Recognition Type (such as MCQs; True or False; Matching; Classifying) /Recall Type -Filling Blanks; One word / Phrase Answers (Max Marks:5)** **Suggested Usage:** Teachers be trained in construction, advantages, disadvantages and precautions while preparing different types of objective items; Go beyond factual information to High Order Thinking (HOT) Skills. It shall be "End of the class quiz".	
3.	**Assessment Type: Assignments (Max Marks:4)** **Suggested Usage:** Some class assignments shall be given to students at the end of each Unit. Note making techniques be taught to students; Not just direct questions from notes, but application analysis and synthesis of that knowledge.	
4.	**Assessment Type: Class Interaction (Max. marks:2)**	

Courseprerequisites:

Suggestedequivalentonlinecourses:

FurtherSuggestions:

Anyremarks/suggestions:

Programme/Class: **Bachelor of Science**	Year: **Third**	Semester: **Fifth**
Subject: **Computer Science**		
Course Code: B070503P	Course Title: **Lab on Algorithm and Data Structures with C++**	

Course outcomes:

CO 1: Optimize the solution with respect to time complexity & memory usage
CO 2: Assess how the choice of data structures and algorithm design methods impacts the performance of programs.
CO 3: Choose the appropriate data structure and algorithm design method for a specified application.
CO 4: Solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees and writing programs for these solutions

Credits: **2**	Max. Marks: **25+75**	Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-4**		

Practical List of on Analysis of Algorithms and Data Structures with C++:

1. Write a program that uses functions to perform thefollowing:
   a) Create a singly linked list ofintegers.
   b) Delete a given integer from the above linked list.
   c) Display the contents of the above list afterdeletion.

2. Write a program that uses functions to perform thefollowing:
   a) Create a doubly linked list ofintegers.
   b) Delete a given integer from the above doubly linkedlist.
   c) Display the contents of the above list afterdeletion.

3. Write a program that uses stack operations to convert a given infix expression intoits postfix Equivalent, implement the stack using anarray.

4. Write program to implement a double ended queueusing
   i) arrayand
   ii) doubly linked listrespectively.

5. Write a program that uses functions to perform thefollowing:
   a) Create a binary search tree ofcharacters.
   b) Traverse the above Binary search tree recursively inPostorder.

6. Write a program that uses functions to perform thefollowing:
   a) Create a binary search tree ofintegers.
   b) Traverse the above Binary search tree non recursively ininorder.

7. Write program for implementing the following sorting methods to arrange a list of integers in ascendingorder:
    a) Insertionsort
    b)
    c
)
8. Write program for implementing the following sorting methods to arrange a listof integers in ascendingorder:
    a) Quicksort
    b) Selectionsort

9. Write program to implement Insertion Sort (The program should report the numberof comparisons)

10. Write program implement Merge Sort(The program should report the numberof comparisons)

11. Write program implement Heap Sort (The program should report the numberof comparisons)

12. Write program implement Randomized Quick sort (The program shouldreport the number ofcomparisons)

13 Write program for creation and traversal of Binary Search Tree.

B.A./B.Sc.I(SEMESTER-I)PAPER-I
Title:

Programme: **Class:** Bachelor in Science	**Year:**Third	**Semester:** Fifth
Subject: Computer Science		
CourseCode:B070502T	**Course Title:** Soft Computing	
Courseoutcomes: CO1:Understandhardwarecomponentsofcomputersystemsuchasmemorysystemorganization, input/output devices, aware of software components of computer system, andwindowsoperatingsystem concepts. CO2: : Develops basic understanding of computers, the concept of algorithm and algorithmicthinking. CO3:Develops theabilitytoanalyzeaproblem, developan algorithmto solveit. CO4:DevelopstheuseofthePythonprogramminglanguagetoimplementvariousalgorithms,anddevelopsthe basicconceptsand terminologyofprogrammingingeneral. CO5: Introduces themoreadvancedfeaturesofthe Pythonlanguage		
Credits:	**Core/Elective**	
Max.Marks:25+75	**Min.PassingMarks:**	
TotalNo.of Lectures-Tutorials-Practical (inhoursperweek):L-T-P:		

Unit	Topics	No. ofLectures
PartI		
I	IntroductionToNeuralNetworks:NeuralNetworksNeuron,NerveStructure And Synapse, Artificial Neuron And Its Model, ActivationFunctions.	7
II	NeuralNetworkArchitecture:SingleLayerAndMultilayerFeedForward Networks,RecurrentNetworks.PerceptionAnd ConvergenceRule.SupervisedLearningNetwork&Unsupervised LearningNetwork.	8
III	BackPropogationNetworks-I:PerceptronModel,Solution,SingleLayer,Multilayer Perception Model;	7
IV	BackPropogationNetworks-II:BackPropogationLearningMethods,Effect OfLearningRuleCo-Efficient;BackPropagationAlgorithm,Applications.	8
PartII		

V	FuzzyLogicIntroduction-I:BasicConceptsOfFuzzyLogic,FuzzySetsAnd CrispSets,FuzzySetTheoryAndOperations,PropertiesOfFuzzySets	7
VI	FuzzyLogicIntroduction-II:FuzzyAndCrispRelations,FuzzyToCrisp Conversion,MembershipFunctions,InterferenceInFuzzyLogic,FuzzyIf-ThenRules, Fuzzyfications&Defuzzificataions	8
VII	GeneticAlgorithm-I:BasicConcepts,WorkingPrinciple,ProceduresOfGA, FlowChart Of GA	**7**
VIII	Genetic Algorithm-II: Genetic Representations, (Encoding), Genetic Operators,Mutation,GenerationalCycle.	**8**

SuggestedReadings:

1. S. Rajsekaran& G.A. VijayalakshmiPai, "Neural Networks,Fuzzy Logic andGenetic Algorithm:Synthesis and Applications" Prentice Hall ofIndia,2003
2. Anderson, James, "Introduction to Neural Networks", PHI Publication, Delhi,India
3. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press,USA, 2005.
4. Simon Haykin,"Neural Netowrks and Learning Machines "Prentice Hall of India,2005, Third Edition.

SuggestiveDigitalPlatforms/WebLinks:

Thiscoursecanbeoptedasan electivebythestudentsofthefollowingsubjects:

SuggestedContinuousEvaluation Methods(Max.Marks:25)

S.No.	AssessmentType	Max. Marks
1.	**Assessment Type: Class Tests (Max. Marks14)** **Suggested Usage:** Include all types of questions-essay, short answer, objective; Design to test all levels of domain; Exam Blue Print be prepared to ensure inclusion of all types & levels of questions and proper sampling of content; Marking Criteria made known to students; Teacher should provide written feedback selectively and discuss answers in the class; Only Role/Code numbers , not names be written to avoid bias in marking; Display of model answer copies. After Completion of Unit I and Unit II, a first class test of max. marks of 7 shallbe conducted. After Completion of Unit III and IV, a second class test of max. marks of 7 shallbe conducted. If any student does not appear in any one or both class test, a makeup test shall be conducted of max. marks of 5 instead of total 14 marks.	
2.	**Assessment Type: Quizzes/ Objective Tests / Recognition Type (such as MCQs; True or False; Matching; Classifying) /Recall Type -Filling Blanks; One word / Phrase Answers (Max Marks: 5)** **Suggested Usage:** Teachers be trained in construction, advantages, disadvantages	

	and precautions while preparing different types of objective items; Go beyond factual information to High Order Thinking (HOT) Skills. It shall be “End of the class quiz”.	
3.	**Assessment Type: Assignments (Max Marks:4)** **Suggested Usage:** Some class assignments shall be given to students at the end of each Unit. Note making techniques be taught to students; Not just direct questions from notes, but application analysis and synthesis of that knowledge.	
4.	**Assessment Type: Class Interaction (Max. marks: 2)**	

Courseprerequisites:

Suggestedequivalentonlinecourses:

FurtherSuggestions:

Anyremarks/suggestions:

Programme/Class: **Bachelor of Science**	Year: **Third**	Semester: **Fifth**
Subject: **Computer Science**		
Course Code: B070503P	Course Title: **Lab on Algorithm and Data Structures with C++**	

Course outcomes:

CO 1: Optimize the solution with respect to time complexity & memory usage
CO 2: Assess how the choice of data structures and algorithm design methods impacts the performance of programs.
CO 3: Choose the appropriate data structure and algorithm design method for a specified application.
CO 4: Solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees and writing programs for these solutions

Credits: **2**	Max. Marks: **25+75**	Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-4**		

Practical List of on Analysis of Algorithms and Data Structures with C++:

1. Write a program that uses functions to perform thefollowing:
   a) Create a singly linked list ofintegers.
   b) Delete a given integer from the above linked list.
   c) Display the contents of the above list afterdeletion.

2. Write a program that uses functions to perform thefollowing:
   a) Create a doubly linked list ofintegers.
   b) Delete a given integer from the above doubly linkedlist.
   c) Display the contents of the above list afterdeletion.

3. Write a program that uses stack operations to convert a given infix expression intoits postfix Equivalent, implement the stack using anarray.

4. Write program to implement a double ended queueusing
   i) arrayand
   ii) doubly linked listrespectively.

5. Write a program that uses functions to perform thefollowing:
   a) Create a binary search tree ofcharacters.
   b) Traverse the above Binary search tree recursively inPostorder.

6. Write a program that uses functions to perform thefollowing:
   a) Create a binary search tree ofintegers.
   b) Traverse the above Binary search tree non recursively ininorder.

7. Write program for implementing the following sorting methods to arrange a list of integers in ascendingorder:
    a) Insertion sort
    b)
    c
8. Write program for implementing the following sorting methods to arrange a listof integers in ascendingorder:
    a) Quicksort
    b) Selectionsort

9. Write program to implement Insertion Sort (The program should report the numberof comparisons)

10. Write program implement Merge Sort(The program should report the numberof comparisons)

11. Write program implement Heap Sort (The program should report the numberof comparisons)

12. Write program implement Randomized Quick sort (The program shouldreport the number ofcomparisons)

13. Write program for creation and traversal of Binary SearchTree.

B.A./B.Sc. III (SEMESTER-VI) PAPER-I
Title:

Programme :Class: Bachelor in Science	**Year:** Third	**Semester:** Six
Subject: Computer Science		
Course Code: B070602T	**Course Title: Cyber Security & Cyber Laws**	

Course outcomes:

CO1: Understand hardware components of computer system such as memory system organization, input/output devices, aware of software components of computer system, and windows operating system concepts.

CO2: : Develops basic understanding of computers, the concept of algorithm and algorithmic thinking.

CO3: Develops the ability to analyze a problem, develop an algorithm to solve it.

CO4: Develops the use of the Python programming language to implement various algorithms, and develops the basic concepts and terminology of programming in general.

CO5: Introduces the more advanced features of the Python language

Credits:	**Core / Elective**
Max. Marks: 25+75	**Min. Passing Marks:**

Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:

Unit	Topics	No. of Lectures
	Part I	
I	Introduction to Signals Data and Information, Data communication, Characteristics of data communication, Components of data communication, Data Representation, Data Flow, Simplex, Half Duplex, Full Duplex, Analog and Digital Signals, Periodic and Aperiodic signals, Time and Frequency Domain, CompositeSignals	7
II	Basic concepts of Networks: Components of data communication, standards and organizations, Network Classification, Network Topologies ; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.	8
III	Physical Layer : Cabling, Network Interface Card, Transmission Media Devices- Repeater, Hub, Bridge, Switch, Router, Gateway.	7

IV	Data Link Layer Designing issues, Framing and Data Link Control, Error detection schemes (parity, checksums, CRCs), Error correction schemes (Hamming codes, binary convolution codes), Data link layer protocols (Simplest, Stop & Wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, Sliding Window), MAC sublayer (Ethernet, ALOHA, CSMA family, Contention-free access/Token Ring).	8
Part II		
V	Transport Layer Transport layer services, Connection establishment and teardown, TCP, UDP, Congestion Control, Quality of Service, Domain Name System, World Wide Web.	8
VI	Linked Lists: Singly, Doubly and Circular Lists, representation of Stack and Queue as Linked Lists.	8
VII	Application Layer : Application layer protocols and services – Domain name system, HTTP, WWW, telnet, FTP, SMTP	**7**
VIII	Network Security : Common Terms, Firewalls, Virtual Private Networks	**7**

1. **Suggested Readings:**Michael E. Whitman and Herbert J. Mattord, "Principles of Information Security,"Sixth Edition, Cengage Learning, 2017.
2. Douglas J. Landoll, "Information Security Policies, Procedure, and Standards:A Practitioner's Reference," CRC Press,2016.
3. Harold F. Tipton, and Micki Krause, "Hand book of information security management,"Sixth Edition, Archtech Publication,2007.

4.William Stallings, "Cryptography and Network Security: Principles and Practice," Sixth Edition, Pearson, 2014.

Suggestive Digital Platforms/ Web Links:

This course can be opted as an elective by the students of the following subjects:

Suggested Continuous Evaluation Methods (Max. Marks:25)

S.No.	Assessment Type	Max. Marks
1.	**Assessment Type: Class Tests (Max. Marks14)** **Suggested Usage:** Include all types of questions-essay, short answer, objective; Design to test all levels of domain; Exam Blue Print be prepared to ensure inclusion of all types & levels of questions and proper sampling of content; Marking Criteria made known to students; Teacher should provide written feedback selectively and discuss answers in the class; Only Role/Code numbers , not names be written to avoid bias in marking; Display of model answer copies.	

	After Completion of Unit I and Unit II, a first class test of max. marks of 7 shallbe conducted. After Completion of Unit III and IV, a second class test of max. marks of 7 shallbe conducted. If any student does not appear in any one or both class test, a makeup test shall be conducted of max. marks of 5 instead of total 14 marks.	
2	**Assessment Type: Quizzes/ Objective Tests / Recognition Type (such as MCQs; True or False; Matching; Classifying) /Recall Type -Filling Blanks; One word / Phrase Answers (Max Marks: 5)** **Suggested Usage:** Teachers be trained in construction, advantages, disadvantages and precautions while preparing different types of objective items; Go beyond factual information to High Order Thinking (HOT) Skills. It shall be "End of the class quiz".	
3.	**Assessment Type: Assignments (Max Marks:4)** **Suggested Usage:** Some class assignments shall be given to students at the end of each Unit. Note making techniques be taught to students; Not just direct questions from notes, but application analysis and synthesis of that knowledge.	
4.	**Assessment Type: Class Interaction (Max. marks: 2)**	

Course prerequisites:

Suggested equivalent online courses:

Further Suggestions:

Any remarks/ suggestions:

Programme/Class: **Bachelor of Science**	Year: **Third**	Semester: **Six**
Subject: **Computer Science**		
Course Code: B070603P	Course Title: Lab on Computer Networks	

Course outcomes:

CO1	Understand and explain the concept of Data Communication and networks, layered architecture and theirapplications.
CO2	Analyze and Set up protocol designing issues for Communicationnetworks.
CO3	Evaluate data communication link considering elementary concepts of datalink layer protocols for error detection andcorrection.
CO4	Apply various network layer techniques for designing subnets and supernetsand analyze packet flow on basis of routingprotocols.
CO5	Estimate the congestion control mechanism to improve quality of serviceof networking application

Credits: **2**	**Core Compulsory**
Max. Marks: **25+75**	Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical (in hours per week): **0-0-4**	

Software Lab based on Computer Networks:

Implement the concepts of Computer Networks such as:

1. Simulate ChecksumAlgorithm.
2. Simulate CRCAlgorithm
3. Simulate Stop & WaitProtocol.
4. Simulate Go-Back-NProtocol.
5. Simulate Selective RepeatProtocol.