

**Siddharth University, Kapilvastu,
Siddhartnagar**



**Proposed Syllabus
of
Computer Application
as Major for
B.Sc./B.A. Programme
in
Choice Based Credit System (CBCS)
Based on
National Education Policy-2020
(Common Minimum Syllabus for all U.P. State Universities and
Colleges)
2021**

CHOICE BASED CREDIT SYSTEM

Program: B.Sc./B.A.

Subject: Computer Application

Type(Major/Minor): Major

Year wise structure of B.Sc./B.A. Computer Application Syllabus

This course shall be offered in B.Sc./B.A. programme as a major subject along with two other major subjects and combinations available for the students of B.Sc./B.A. programmes. Computer Application shall be one major subject along with other two major subjects which may be opted by the students as per the combinations offered by the University /College under CBCS.

Year	Semester	Course Code	Paper Title	Theory/Practical	Credits
1	I	B0CA101T	Computer Fundamentals and IT Tools	Theory	4
1	I	B0CA102P	Lab Based on Office Tools	Practical	2
1	II	B0CA201T	Problem Solving using C Programming	Theory	4
1	II	B0CA202P	Lab Based on C Programming	Practical	2
2	III	B0CA301T	Python and R Programming	Theory	4
2	III	B0CA302P	Lab Based on Python and R	Practical	2
2	IV	B0CA401T	Data base Management System	Theory	4
2	IV	B0CA402P	Lab Based on DBMS	Practical	2
3	V	B0CA501T	Object Oriented Programming Using C++	Theory	4
3	V	B0CA502T	System Analysis and Design	Theory	4
3	V	B0CA503P	Lab Based on C++	Practical	2
3	V	B0CA504R	Research Project-I	Project	3
3	VI	B0CA601T	Internet and Web Technology	Theory	4
3	VI	B0CA602T	Cyber Forensics and Cyber Laws	Theory	4
3	VI	B0CA603P	Lab Based on Web Technology	Practical	2
3	VI	B0CA604R	Research Project-II	Project	3

Year wise Structure of B.Sc./B.A. for subject Computer Application

Type of Award	Subject : Computer Application										Total Credits of the Subject
	Year	Sem.	Paper-I Theory	Credit	Paper-II Theory	Credit	Paper-III Practical	Credit	Research Project	Credit	
Certificate in Computer Application	1	I	Computer Fundamentals and IT Tools	4	NIL	0	Lab Based on Office Tools	2	NIL	0	6
	1	II	Problem Solving using C Programming	4	NIL	0	Lab Based on C Programming	2	NIL	0	6
Diploma in Computer Application	2	III	Python and R Programming	4	NIL	0	Lab Based on Python and R	2	NIL	0	6
	2	IV	Data base Management System	4	NIL	0	Lab Based on DBMS	2	NIL	0	6
Bachelor of Science	3	V	Object Oriented Programming Using C++	4	System Analysis and Design	4	Lab Based on C++	2	Research Project-I	3	13
	3	VI	Internet and Web Technology	4	Cyber Forensics and Cyber Laws	4	Lab Based on Web Technology	2	Research Project-II	3	13
Total Credits=											50

Practical Evaluation & Assessment			
Internal Assessment	Marks	External Assessment	Marks
Class Interaction.	5	Viva Voce	25
Quiz 1	10	Execution/Demonstration	20
Quiz 2	10	Write up/theory work/Research Orientation assignment	20
		Practical Record File	10
Total	25		75

Syllabus for B.Sc./B.A. : Subject: Computer Application

Programme/Class: Certificate		Year: First	Semester: First
Subject: Computer Application			
Course Code: B0CA101T		Course Title: Computer Fundamentals and IT Tools	
Course outcomes:			
CO 1: 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.			
CO 2: Develops basic understanding of computers and its applications.			
CO3: Develops the ability to work with computers using various networks/Internet.			
CO4: Makes proficient in using various application software to solve real-world problems.			
CO5: Introduces the more advanced features of the IT.			
Credits: 4		Core Compulsory	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0			
Unit	Topic	No. of Lectures	
I	Computer and its characteristics, applications of computer, digital and analog computer, Generation of computer, Computer Types: Mainframe computer, Super computer, Mini Computer. Memory: memory hierarchy, memory types, Units of Measurement of Storage. Hard disk drives, Floppy disk, Magnetic Tapes, Optical Disks: CD, DVD, input and output devices: Keyboard, Mouse, Joystick, scanner, OCR, OMR, web camera, monitor, printer and its types.	8	
II	Software and its types (System Software, Application Software, firmware Software's) Computer Languages and its types (Machine Language, Assembly Language, High Level Language: Merits and demerits of computer languages), Translators: Compiler, Linker, Interpreter, Loader, Computer Virus and its types (Trojan, Malware, Spyware), Antivirus Software, Software Piracy and its types, Preventing Software Piracy. Operating System and its types, Functions of Operating System, Windows Operating System and its features, Desktop elements: Icons, My Computer, Recycle Bin, Taskbar, Network Places, Documents, Anatomy of window: title bar, menu bar, tool bar, control buttons, scroll bars, document area and status bar. Control panel, disk formatting, defragmentation, Disk Clean-Up, magnifier, Narrator, On-Screen Keyboard	7	
III	Number System: Decimal, Binary, Octal, Hexadecimal, Conversion of one number system to another, Arithmetic Operations: Addition, Subtraction, Multiplication, Complement methods: r's and (r - 1)'s complement, Fixed point & floating point representation of numbers.	8	
IV	Introduction to Computer Network, Data Communication, Components of Data Communication, Data Transmission Mode,	7	

	LAN, MAN, WAN , LAN Topologies: Ring, Bus, Star, Mesh and Tree Topologies, Internet, Intranet, IP Address, DNS, Web page, Website, Browsers, URL, e-mail, Applications of Internet.	
V	Operating System and its types. Functions of Operating System, Windows Operating System and its features, Desktop elements: Icons, My Computer, Recycle Bin, Taskbar, Network Places, Documents, Anatomy of window: title bar, menu bar, tool bar, control buttons, scroll bars, document area and status bar. Control panel, disk formatting, defragmentation, Disk Clean-Up, magnifier, Narrator, On-Screen Keyboard	7
VI	Introduction to Word Processing, Microsoft word screen, file menu, edit menu, view menu, insert menu, format menu, tools menu table menu, alignment of text, applying fonts, working with wizards, size of text, font of the text, color of the text, autocorrect, auto format, working with tables, mail-merge feature, header footers and page numbers, using bulleted and number lists, inserting a picture file, inserting a clip art, inserting auto shapes, inserting word art, inserting a drawing.	8
VII	Understanding Microsoft Excel for windows, understanding spreadsheets, file menu, edit menu, view menu, insert menu, format menu, tools menu, data menu, creating a Worksheet in Excel for windows, copying formula, formulas that make decisions, functions in Excel, sum function, average function, function wizard, functions in Excel, Date and time functions, logical functions, creating charts in Excel, creating graphs, modifying chart, adding data to a chart	8
VIII	Introduction of PowerPoint for windows, file menu, edit menu, view menu, insert menu, format menu, tools menu, slide show menu, creating presentation by AutoContent Wizard, creating a new presentation entering the text, moving the text, reordering slides, duplicating slides, deleting slides, making slide shows, adding effects, adding animation, creating your own animation.	7

Suggested Readings:

1. P. K. Sinha & Priti Sinha , "Computer Fundamentals", BPB Publications, 2007.
2. Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
3. Peter Norton, " Introduction to computers". Sixth Edition Tata McGraw Hill , 2007.
4. Joyce Coax, Joan Preppernau, Steve Lambert and Curtis Frye, "2007 Microsoft® Office System step by step", Microsoft Press, 2008.
5. R. K. Taxali, "PC Software for Windows", Tata McGraw Hill Publishers Pvt. Ltd.
6. V. Rajaraman, "Fundamentals of Computers", PHI.
7. Introduction to Information Technology, IITL Education Solution Ltd., Pearson Education India , 2012

Suggestive digital platforms web links:

1. <https://www.pearsoned.co.in/prc/book/anita-goel-computer-fundamentals-1e-1/9788131733097>
2. http://fmis.ap.gov.in/fileBkp2/13/computer_fundamentals%20by%20sinha%20&%20sinha.pdf

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

“Skill Based Elective”
“Elective” , “Open to all”

Suggested Continuous Evaluation Methods: Max. Marks: 25

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:

None

Programme/Class: Certificate	Year: First	Semester: First
Subject: Computer Application		

Course Code: B0CA102P	Course Title: Lab Based on Office Tools
Course outcomes:	
CO 1: To learn and understand handling of computer.	
CO 2: To learn and understand Windows environment and its characteristics.	
CO 3: Students should be made familiar with text processing, tabulation, mathematical and logical operations on data, chart creation.	
CO 4: To learn and know about office tools(MS-Office)	
CO 5: Develops the ability to work with Internet	
Credits: 2	Core Compulsory
Max. Marks: 25+75	Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical (in hours per week): 0-0-4	
Suggested Readings:	
<ol style="list-style-type: none"> 1. P. K. Sinha & Priti Sinha , "Computer Fundamentals", BPB Publications, 2007. 2. Peter Norton, " Introduction to computers", Sixth Edition Tata McGraw Hill , 2007. 3. Joyce Coax, Joan Preppernau, Steve Lambert and Curtis Frye, "2007 Microsoft® Office System step by step", Microsoft Press. 2008. 4. R. K. Taxali, "PC Software for Windows", Tata McGraw Hill Publishers Pvt. Ltd. 5. V. Rajaraman, "Fundamentals of Computers", PHI. 6. Introduction to Information Technology, IITL Education Solution Ltd., Pearson Education India , 2012 	
Suggestive digital platforms web links:	
<ol style="list-style-type: none"> 1. http://fmis.ap.gov.in/fileBkp2/13/computer_fundamentals%20by%20sinha%20&%20sinha.pdf 2. https://www.pearsoned.co.in/pre/book/anita-goel-computer-fundamentals-1e-1/9788131733097 	
In this course the students shall be exposed to various practical problems based on the Windows environment, Office tools using document preparation, spreadsheet, presentation (ppt) handling packages, uses of internet, web browsers, email, etc. and the Teacher-in-Charge shall design 20-30 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory.	

Programme/Class: Certificate		Year: First	Semester: Second
Subject: Computer Application			
Course Code: B0CA201T		Course Title: Problem Solving using C Programming	
Course outcomes:			
CO 1: Appreciate and understand the working of a digital computer.			
CO 2: Analyze a given problem and develop an algorithm to solve the problem.			
CO3: Improve upon a solution to a problem.			
CO4: Use the 'C' language constructs in the right way.			
CO5: Design, develop and test programs written in C Language.			
Credits: 4		Core Compulsory	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0			
Unit	Topic	No. of Lectures	
I	Computer Based Problem Solving: Introduction, Characteristics of a Good Program, Procedure for Problem Solving, Algorithm: Algorithm and its characteristics, Algorithm Development, Advantages of Algorithms, Flow Chart: Symbols used in Flow-Charts, Advantages and Limitations of Flowcharts, History of C language, Structure of C program, compiling and running a C program, Errors: syntax, run time, linker and logical errors, C-Preprocessor, Header, File inclusion.	8	
II	Character Set, Keywords and Identifiers, Constants, Data Types, Variables, qualifiers. Format of C program, Arithmetic, Relational and Logical Operators, Assignment Operators, Increment and Decrement Operators, Operator Precedence and Associativity.	7	
III	Formatted Input and Output function, escape sequences, Simple if Statement, if... else Statement, Nesting of if... else Statements, Switch Statement, Conditional Operator, goto Statement, loops: for, while and do- while loops, break and continue statement.	8	
IV	Functions: Introduction, using functions, Function declaration, prototype, Function definition, function call, return statement, Passing parameters, Scope of variables, Storage Classes, Recursive Functions	7	
V	Arrays: Introduction, Declaration of Arrays, Accessing elements of the Array, Storing Values in Array, Calculating the length of the Array, Types of Arrays: one dimensional array, two dimensional Arrays, Strings: Introduction, String Operations, String and Character functions. Functions using Manipulation of String	8	
VI	Pointers: Understanding Computer Memory, Introduction to Pointers, declaring Pointer Variables, Passing Arguments to Functions using Pointer, Pointer and Arrays, Passing Array to Function, Dynamic Memory Allocation	7	
VII	Structures in C: Introduction, Defining a Structure, Declaring Structure Variables, Array with Structures, Structures within Structures, Structure contains Pointers, Self Referential Structures,	7	

	User Defined Data Types, typedef vs #define, 8 Enumerated Data Types, Difference between enum and typedef Statement, Union	
VIII	File Handling in C: Introduction, Type of Files, Working with Files, File Operations, Functions for Getting Data by Traversing in the File : fseek(), ftell(), rewind(), Using Command Line Argument in File. Introductory Idea of Data Structure in C - Basic concept of data representation, algorithm design and data structure. Overview of arrays, linked list, stack and queue.	8

Suggested Readings:

1. Byron Gottfried, "Programming with C", Forth Edition, Tata McGraw Hill, 2018.
2. B.W. Kernighan & D.M. Ritchie, "The C Programming Language," Second Edition, 2015, Prentice Hall of India
3. Yashavant Kanetkar "Let us C", 16th Edition, BPB Publication, 2018
4. Ashwini Kr Srivastava & Vijay Kumar "A Textbook of C Programming with Computer's Basics", Neelkamal Parakshan, 2018
5. E. Balaguruswami, "Programming with ANSI-C" Forth Edition, 2008, Tata McGraw Hill.

Suggestive digital platforms web links:

1. https://www.google.co.in/books/edition/Let_us_C_16th_Edition/QIV8DwAAQBAJ?hl=en&gbpv=1&dq=3.%09Yashwant+kanitakar+lat+us+c&printsec=frontcover

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“Skill Based Elective”
“Elective”, “Open to all”

Suggested Continuous Evaluation Methods: Max. Marks: 25

1. Assessment Type: Class Tests (Max. Marks 14)

Suggested Usage:

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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:

None

Programme/Class: Certificate	Year: First	Semester: Second
Subject: Computer Application		
Course Code: B0CA202P	Course Title: Lab Based on C Programming	
Course outcomes:		
CO 1: To learn how to solve common types of computing problems.		
CO 2: To learn and understand data types and control structures of C.		
CO 3: solve mathematical problems by using programming features of C.		
CO 4: Learn to write good portable C programs.		
Credits: 2	Core Compulsory	
Max. Marks: 25+75	Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 0-0-4		
Suggested Readings:		
1. Yashavant Kanetkar "Let us C", 16th Edition, BPB Publication, 2018		
2. Ashwini Kr Srivastava & Vijay Kumar "A Textbook of C Programming with Computer's Basics", Neelkamal Parakshan, 2018.		
3. Byron Gottfried, "Programming with C", Forth Edition, Tata McGraw Hill, 2018.		
Suggestive digital platforms web links:		
1. https://www.pearsoned.co.in/prc/book/anita-goel-computer-fundamentals-1e-1/9788131733097		
List of Experiments:		
1. Write a program in C to find area of a circle.		
2. Write a program in C to calculate the expression: $((a*b)/c)-(a+b-c)$.		
3. Write a program in C for conversion of Temperature from Celsius to Fahrenheit.		
4. Write a program in C for checking given year is Leap-year or not.		
5. Write a program in C for finding greatest number between given any three numbers.		
6. Write a Program in C to display Monday to Sunday by first letter press through keyboard using switch & case statement.		
7. Write a program in C for generating Fibonacci Series up to 10 terms using for loop.		
8. Write a program in C for finding Factorial of any positive integer using while loop.		
9. Write a program in C for generating ODD Numbers from 1 to 100 using do-while loop.		
10. Write a program in C to check whether the given number is Prime or Not.		
11. Write a program in C to find average marks obtained by a batch of the 10 student's in a test using 'single – dimensional array'.		
12. Write a program in C for Find Transpose of a Matrix using 'multi–dimensional array'.		
13. Write a program in C for addition of two matrices using 'multi–dimensional array'.		
14. Write a program in C for multiplication of two matrices using 'multi–dimensional array'.		
15. Write a program to for multiplication of two given positive integer using function.		
16. Write a program in C for finding Factorial of any positive integer using 'recursion'.		
17. Write a program in C to find sum of given any n integers using malloc() and free() function.		
18. Write a program in C for concatenation of two strings using strcat() function.		
19. Write program in C for finding length of any string.		
20. Write program in C to read and print employee's record using structure.		

Programme/Class: Diploma		Year: Second	Semester: Third
Subject: Computer Application			
Course Code: B0CA301T		Course Title: Python and R Programming	
Course outcomes:			
CO 1: Develops the use of the Python and R programming language to implement various algorithms, and develops the basic concepts and terminology of programming in general.			
CO 2: Make familiar about the basic constructs of programming such as data, operations, conditions, loops, functions etc.			
CO3: Able to apply the problem solving skills for creating, debugging and testing a software application using the Python and R programming language.			
CO4: 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): 4-0-0			
Unit	Topic	No. of Lectures	
I	Introduction to Python Programming: History, features, Installing Python, Running Python program, Debugging: Syntax Errors, Runtime Errors, Semantic Errors, Experimental Debugging, Formal and Natural Languages, The Difference Between Brackets, Braces and Parentheses, Python Interpreter, Python shell, Indentation. Atoms, Identifiers , Basic Data Types such as numbers, strings, etc.	8	
II	Variables and Expressions: Values and Types, Variables, Variable Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode, Order of Operations. Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).	8	
III	Creating Python Programs: Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments, Errors and Exceptions. Standard Libraries	7	
IV	Iteration and Recursion: Conditional execution, Alternative execution, Nested conditionals, The return statement, Recursion, Stack diagrams for recursive functions, Multiple assignment, The while statement, Tables, Two-dimensional tables	7	
V	Introduction to R , Data types in R: numeric/character/logical; real/integer creation of new variables, vectors, matrices, accessing elements of a vector or matrix, import and export of files.	7	
VI	Operators (Arithmetic operator, Relational operator, Logical, Assignment etc.), Control constructs : if command, if else command,, for loop, repeat loop, while loop. Introduction to function in R.	8	
VII	Vector matrix operations: matrix operations such as addition, subtraction, multiplication, matrix inverse, solution of linear equation.	7	
VIII	Graphics in R: the plot command, simple mathematical function plots,	8	

histogram, bar-plot, points, lines, segments, arrows, pie diagram, graphical parameters, adding a legend. Insertion sorting. Basic statistics using R: measures of central tendency and dispersion, correlation, regression.

Suggested Readings:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Allen Downey, Jeffrey Elkner, Chris Meyers. How to think like a computer scientist: learning with Python / 1st Edition, 2012.
3. Ch Satynarayana, M Radhika Mani, ands B N Jagadeesh, Python Programming, Universities Press, 2018
4. Albert, J, & Rizzo, M. : R by Example, Springer, 2012
5. Michael J. Crawley: The R Book, 2nd Edition, Wiley, 2012

Suggestive digital platforms web links:

1. <http://docs.python.org/3/tutorial/index.html>
2. <http://interactivepython.org/courselib/static/pythonds>
3. [http:// https://www.r-project.org](http://https://www.r-project.org)

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“Skill Based Elective”

“Elective” , “Open to all”

Suggested Continuous Evaluation Methods: Max. Marks: 25

1. Assessment Type: Class Tests (Max. Marks 14)

Suggested Usage:

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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:

None

Programme/Class: Diploma	Year: Second	Semester: Third
Subject: Computer Application		
Course Code: B0CA302P	Course Title: Lab Based on Python and R	
Course outcomes:		
CO 1: To learn and understand Python and R programming basics.		
CO 2: To learn and understand various python statements and string manipulations.		
CO3: To learn and understand 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 Compulsory	
Max. Marks: 25+75	Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 0-0-4		
Suggested Readings:		
<ol style="list-style-type: none"> 1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 2. (http://greenteapress.com/wp/thinkpython/) 3. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011. 4. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013. 5. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press , 2013 Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012. 		
Suggestive digital platforms web links:		
<ol style="list-style-type: none"> 1. https://www.pearsoned.co.in/prc/book/anita-goel-computer-fundamentals-1e-1/9788131733097 2. http://docs.python.org/3/tutorial/index.html 3. http://interactivepython.org/courselib/static/pythonds 4. http://www.ibiblio.org/g2swap/byteofpython/read/ 		
List of Experiments:		
<ol style="list-style-type: none"> 1. Write a program in Python to find area of a rectangle. 2. Write a program in Python to find compound interest. 3. Write a program in Python for conversion of Temperature from Fahrenheit to Celsius. 4. Write a program in Python for finding greatest number between given any three numbers. 5. Write a program in Python for checking the given number is even or odd. 6. Write a program in Python for generating Fibonacci Series up to 10 terms using loop. 7. Write a function in Python that takes an integer input and calculates the factorial of that number. 8. Write a program in Python to check whether the given number is Prime or Not. 9. Write a recursive function in Python to print the factorial for a given number. . 10. Write a program in Python to calculate the sum and product of two compatible matrices. 11. Write a program in Python to read n integers and display them as a histogram. 		

12. Write a program in Python to display sine, cosine, polynomial and exponential curves.

13. Application of R software

- a. For the computation of matrix addition, subtraction, multiplication, inverse, determinant etc.
- b. Plotting of mathematical functions
- c. Histogram, bar chart and pie chart
- d. Measures of central tendency
- e. Measures of dispersion
- f. Correlation and regression

Programme/Class: Diploma		Year: Second	Semester: Forth
Subject: Computer Application			
Course Code: B0CA401T		Course Title: Data base Management System	
Course outcomes:			
CO 1: Understands the basic perception of Data Base Management System.			
CO 2: Design E-R diagrams for real world applications.			
CO 3: Creating relational algebraic expressions using relational data models and languages.			
CO 4. Apply normalization transaction properties and concurrency control to design database.			
CO 5: Makes proficient in using SQL software to solve real-world problems.			
Credits: 4		Core Compulsory	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0			
Unit	Topic		No. of Lectures
I	Introduction: Database System Concepts, File system vs. database system, Database system architecture, Data models and their types, Data base scheme and instances, Data independence, Database Languages and Interfaces.		7
II	Data Modeling Concepts: ER model concepts: Notations for ER diagram. Extended E-R diagram, Extended E-R model, E-R model design issues. constraints, and keys: Weak entity set strong entity set, Relationships of higher degree.		8
III	Relational model concepts: code rules, constraints, Relational Algebra operations, Extended relational algebra operations, Relational Calculus, Tuple and Domain relational calculus.		7
IV	Database Design: Functional dependencies, Normal forms, First, second, and third normal forms, BCNF, Multi-valued dependencies and Fourth Normal form, Join Dependencies and Fifth Normal form.		8
V	Operating System and its types, Functions of Operating System, Window s Operating System and its features, Desktop elements: Icons, My Computer, Recycle Bin, Taskbar, Network Places, Documents, Anatomy of window: title bar, menu bar, tool bar, control buttons, scroll bars, document area and stat us bar. Control panel, disk formatting, defragmentation, Disk Clean-Up, magnifier, Narrator, On-Screen Keyboard		7
VI	Introduction to Word Processing, Microsoft word screen, file menu, edit menu, view menu, insert menu, format menu, tools menu table menu, alignment of text, applying fonts, working with wizards, size of text, font of the text, color of the text, autocorrect, autoformat, working with tables, mailmerge feature, header footers and page numbers, using bulleted and number lists, inserting a picture file, inserting a clip art, inserting autosshapes, inserting word art, inserting a drawing.		8
VII	Understanding Microsoft Excel for windows, understanding spreadsheets, file menu, edit menu, view menu, insert menu, format menu, tools menu, data menu, creating a Worksheet in Excel for windows, copying formula, formulas that make decisions, functions in		8

	Excel, sum function, average function, function wizard, functions in Excel, Date and time functions, logical functions, creating charts in Excel, creating graphs, modifying chart, adding data to a chart	
VIII	Introduction of PowerPoint for windows, file menu, edit menu, view menu, insert menu, format menu, tools menu, slide show menu, creating presentation by AutoContent Wizard, creating a new presentation entering the text, moving the text, reordering slides, duplicating slides, deleting slides, making slide shows, adding effects, adding animation, creating your own animation.	7

Suggested Readings:

1. Bipin Desai, " An Introduction to Database Systems", Galgotia Publications Pvt. Ltd.
2. Abraham Silberschatz, Henry F. Korth and S. Sudarshan, "Database System Concept", McGraw - Hill, 7th Edition, 2020.
3. R. Elmasri, S.B. Navathe, Database Systems Models, Languages, Design and application Programming, 6 Edition, Pearson Education, 2013.
4. C.J. Date, "An Introduction to Database Systems", Pearson, 8th edition, 2003
5. P. Rob, C. Coronel, Database System Concepts by, Cengage Learning India, 2008
6. MySQL : Reference Manual
7. Bayross, Ivan, "SQL, PL/SQL: The programming language of Oracle ". BPB publications, 2009.
8. Scott Urman, Ron Hardman and Michael McLaughlin, "Oracle Database 10g PL/SQL Programming", Tata McGraw-Hill, 8th Edition, 2008.

Suggestive digital platforms web links:

1. <https://lc.fie.umich.mx/~rodrigo/BD/An%20Introduction%20to%20Database%20Systems%208c%20By%20C%20J%20Date.pdf>
2. https://pdfweek.com/downloads/sql%20by%20ivan%20bayross%20pdf?_cf_chl_managed_tk__=pmd_03WFyJJQxIWrqSFqeaQ697O.dPXT0GgF5UNCgUZ_xpg-1629642422-0-gqNtZGzNAuWjcnBszQh9
3. <https://dev.mysql.com/doc/refman/8.0/en/>

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

“Skill Based Elective”

“Elective” , “Open to all”

Suggested Continuous Evaluation Methods: Max. Marks: 25

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:

None

Programme/Class: Diploma	Year: Second	Semester: Forth
Subject: Computer Application		
Course Code: B0CA402P	Course Title: Lab Based on DBMS	
Course outcomes:		
CO 1: Understand, analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations.		
CO 2: To learn and understand DBMS environment and its characteristics.		
CO 3: To learn and know about SQL		
CO 4: Develops the ability to work with database.		
Credits: 2	Core Compulsory	
Max. Marks: 25+75	Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 0-0-4		
Suggested Readings:		
<ol style="list-style-type: none"> 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. 		
Suggestive digital platforms web links:		
<ol style="list-style-type: none"> 1. https://www.oracle.com/in/database/technologies/appdev/plsql.html 2. https://dev.mysql.com/doc/refman/8.0/en/ 3. http://www.luciopanasci.it/Ebooks/MySQL%20Cookbook,%203rd%20Edition.pdf 		
In this course the students shall be exposed to various practical problems based on the DBMS & SQL environment and the Teacher-in-Charge shall design 10-20 problems. The students shall be required to systematically work out the solution of those problems and implement in the computer laboratory.		

Programme/Class: Bachelor in Science		Year: Third	Semester: Fifth
Subject: Computer Application			
Course Code: B0CA501T		Course Title: Object Oriented Programming Using C++	
Course outcomes:			
CO 1: Describe the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.			
CO 2: Demonstrate the use of various OOPs concepts with the help of programs.			
CO3: Understand dynamic memory management techniques using constructors, destructors, etc.			
CO4: Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.			
CO5: Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming.			
Credits: 4		Core Compulsory	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0			
Unit	Topic		No. of Lectures
I	Principles of Object Oriented Programming (OOP): Basic Concepts of OOP, Comparison of procedural programming and OOP, Advantages of OOP, OOP Languages, Definitions: .Class, Objects, Concepts of inheritance and encapsulation, Operator overloading, Dynamic binding. Over view of OOP using C++, Basic Program construction: main and functions, Program statements, class declaration, comments++ compilation.		8
II	Elements of C++ Language: Tokens and identifiers: Character set and symbols, Keywords. C++, identifiers. Variables and constants: Integers & characters, Constants and symbolic constants, Dynamic initialization of variables, Reference variables, Enumerated variables, Data Types: Basic data types, Arrays and strings, User defined data types; Operators: Arithmetic, relational operators and operator precedence, Logical operators, Manipulators, type conversions and type cast operators, Console I/O : cin, cout functions, Control statements: The if statement, if else; else... if; switch statements, Loops: for and while do statements, Break, continue, go to.		7
III	Functions: Simple functions: Declaration of functions. Calling functions, Function definition, Passing arguments and returning values: Passing constants and variables, Pass by value. Return statement, types of functions. Passing and returning structure variables: Reference variables and arguments: Overloaded functions. Inline functions, Default arguments, returning by reference.		8
IV	Classes and Objects: Declaration of classes and objects in C++, Class definition. Declaration of members, objects as date time, Objects as function arguments. Array of objects, Returning objects from function, Structures and classes.		7

V	Constructors and Destructors: Basic constructors, Parameterized constructors. Constructors with default arguments. Dynamic initialization of objects, use of copy constructor, shallow copying and deep copying, Dynamic constructors. Destructors, constraints on constructors and destructors.	7
VI	Operator Overloading: Overloading unary operators: Operator keyword, Arguments and return values. Laminations of increment operators, overloading binary operators. Arithmetic operators Examples: Addition of polar coordinates and concatenation of strings Multiple overloading, Comparison" operators, Arithmetic assignment operators. Data and type conversions: Conversion between basic types, Conversion between objects and basic types, conversion between objects of different classes, Constraints on type conversion.	8
VII	Derived Classes and Inheritance: Derived, classes and base class: Defining a derived class, accessing the bases class members, the protected access specifier. Derived class constructors. Overriding the member functions, Class hierarchies: Abstract base class. Constructors and member functions, Inheritance: Public and private inheritance, Access combinations and usage of access specifiers, Classes and structures. Multiple inheritance: Member functions in multiple, inheritance, constructors in multiple inheritance, Ambiguity in multiple inheritance.	8
VIII	Exception Handling: Use of exception handling, Try block, Catch handler, Throw statement, Exception specification.	7

Suggested Readings:

1. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publication 1994.
2. E. Balagurusamy,"Object Oriented Programming with C++", TMH Publication.
3. B. Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.
4. Ira Pohl, "Object Oriented Programming using C++", Pearson Education, Second Edition Reprint
5. B. Stroustrup, "The C++ Programming language", Third edition, Pearson Education, 2004.
6. J. Rumbaugh, "Object Oriented Modeling and Design", Prentice Hall
7. Booch, Maksimchuk, Engle, Young, Conallen and Houston, "Object Oriented Analysis and Design with Applications", Pearson Education.
8. S. B. Lippman, Josee Lajoie, Barbara E. Moo, "C++ Primer", Fourth Edition, Pearson Education 2005.
9. Timthy Budd, "An Introduction to Object Oriented Programming with C++," Addition-Wesley.
10. Kip R. Irvine," C++ and Object-Oriented Programming," Prentice Hall.

Suggestive digital platforms web links:

1. <http://www.lmpt.univ-tours.fr/~volkov/C++.pdf>
2. <https://www.certiology.com/tutorials/c-plus-plus-tutorial.html>

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

“Skill Based Elective”
“Elective” , “Open to all”

Suggested Continuous Evaluation Methods: Max. Marks: 25

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:

None

Programme/Class: Bachelor in Science		Year: Third	Semester: Fifth
Subject: Computer Application			
Course Code: B0CA502T		Course Title: System Analysis and Design	
Course outcomes:			
CO 1: An understanding of the analysis and development techniques required as a team member of a medium-scale information systems development project.			
CO 2: An understanding of the ways in which an analyst's interaction with system sponsors and users play a part in information systems development			
CO 3: Makes experience in developing information systems models.			
CO 4: Makes experience in developing systems project documentation.			
Credits: 4		Core Compulsory	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0			
Unit	Topic	No. of Lectures	
I	Basic Concept of Systems: The System: Definition and Concepts; Elements of a System: Input, Output Processor, Control, Feedback, Environment, Boundaries and Interface; Characteristics of a System: Types of systems -Physical and Abstract System, Open and Closed Systems, Man-made Systems; Information and its categories.	8	
II	Information System and System Analyst: Information systems : TPS, OAS, MIS, DSS, ESS; System Analyst: Role and need of system analyst, System Analyst as an agent of change.	7	
III	System Development Life Cycle: Introduction to SDLC, Various phases: study, analysis, design, development, testing, implementation, maintenance; System documentation: Types of documentation and their importance.	7	
IV	System Planning and Information Gathering: Initial Investigations, Identification of user needs, Project Identification and Selection; Needs of Information Gathering, Determination of requirements, Information gathering tools: interviews, group communication, questionnaires, presentations and site visits. Feasibility Study: Definition, Importance of feasibility study, Types of feasibility study, System selection plan and proposal, Prototyping, Cost-Benefit Analysis: Tools and Techniques.	8	
V	Tools for System Analysis: Data Flow Diagram (DFD), Logical and Physical DFDs, Developing DFD; System Flowcharts and Structured charts, Structured English, Decision trees and Decision tables.	8	
VI	System Design: Module specifications, Module Coupling and cohesion, Top-	7	

	down and bottom-up design; Logical and Physical design, Structured design.	
VII	Input and Output: Input design: Input data, Input media and devices; Output design; Form Design: Classification of forms, Requirements of Form design.	7
VIII	System Implementation and Maintenance: Need of System Testing, Types of System Testing, Quality Assurance; System Conversion, Conversion methods, procedures and controls. System evaluation and performance. Maintenance activities and issues. System Security, Security Threats, Risk Analysis, Control measures. System Audit, Disaster Recovery Planning.	8

Suggested Readings:

1. Elias M. Awad, "Systems Analysis and Design", Second Edition, Galgotia Publications, 2010.
2. Arunesh Goyal, "SYSTEMS ANALYSIS AND DESIGN" Prentice Hall India, 2011.
3. Kenneth Kendall, Julie Kendall, "Systems Analysis and Design", 9th edition, Pearson, 2013.
4. Pankaj Jalote : An Integrated Approach to Software Engineering; Springer

Suggestive digital platforms web links:

1. https://www.saigontech.edu.vn/faculty/huynq/SAD/Systems_Analysis_Design_UML_5th%20ed.pdf

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

“Skill Based Elective”
“Elective” , “Open to all”

Suggested Continuous Evaluation Methods: Max. Marks: 25

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:

None

Programme/Class: Bachelor in Science	Year: Third	Semester: Fifth
Subject: Computer Application		
Course Code: B0CA503P	Course Title: Lab Based on C++	
Course outcomes:		
CO 1: To strengthen problem solving ability by using the characteristics of an object-oriented approach.		
CO 2: To learn and understand various C++ statements.		
CO3: To learn and understand object oriented programming and C++ concepts.		
CO4: To learn and understand the concepts of GUI controls and designing GUI applications.		
Credits: 2	Core Compulsory	
Max. Marks: 25+75	Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 0-0-4		
Suggested Readings:		
<ol style="list-style-type: none"> 1. E. Balagurusamy, "Object Oriented Programming with C++", TMH Publication. 2. R.Lafore. "Object Oriented Programming in C-H-, Fourth Edition.2001 Techmedia, 3. S.B.Lippman, "C" Primer;"third Edition, 1998 Addison Wesley. 4. W.Savitch, "Problem Solving with C++", Second Edition, 1999 Pearson Education. 5. B.Stroustrup, "The Elements of C++ Programing," Third Edition, 2000 Addison Wesley. 6. K.V. Venugopal, R. Kumar and T, Tavishankar," Mastering C++, First Edition. 		
Suggestive digital platforms web links:		
<ol style="list-style-type: none"> 1. http://www.lmpt.univ-tours.fr/~volkov/C++.pdf 2. https://www.certiology.com/tutorials/c-plus-plus-tutorial.html 		
List of Experiments:		
<ol style="list-style-type: none"> 1. Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user. 2. With the help of OOP's write a C++ program for finding area of Circle. 3. Write a C++ program for calculate simple interest, values accepted from keyboard using class and object. 4. Write a C++ program to find the sum of individual digits of a positive integer. 5. Using OOP's write a program C++ input a statement "INDIA IS GREAT " reverse the words (AIDNI SI TAERG) 6. Write a program C++ input a statement calculate number of spaces between the words. 7. Write a C++ program for checking given year is leap year or not using class & object. 8. Using OOP's write a program C++ input a statement calculate number of spaces between the words. 9. Write a program Illustrating Class Declarations, Definition, and Accessing Class Members. 10. Write a C++ program for finding area of triangle using function. (function name is area()). 11. Write a C++ program for finding factorial of a given number using recursion. 12. Write a C++ Program to find both the largest and smallest number in a list of integers using array. 		

13. Write a C++ program to sort a list of numbers in ascending order.
14. Write a C++ program for generating Fibonacci series up to 10 terms using constructor.
15. Write a C++ Program to illustrate default constructor.
16. Write a C++ Program to illustrate parameterized constructor.
17. Write a C++ Program to illustrate copy constructors.
18. Write a C++ program to demonstrate the Operator Overloading.
19. Write a C++ program to demonstrate the Function Overloading.
20. Write a C++ Program to demonstrate friend function and friend class.
21. Write a C++ Program that illustrates single inheritance.
22. Write a C++ Program that illustrates multiple inheritance.
23. Write a C++ Program that illustrates multi level inheritance.
24. Write a C++ program containing a possible exception. use a try block to throw it and a catch block to handle it properly.
25. Write a C++ program to demonstrate the catching of all exceptions.

Programme/Class: Bachelor in Science		Year: Third	Semester: Sixth
Subject: Computer Application			
Course Code: B0CA601T		Course Title: Internet and Web Technology	
Course outcomes:			
CO 1: Obtain knowledge on Internet technologies.			
CO 2: To learn about different kinds of Network protocols that is suited to different kinds of applications.			
CO3: Develops the ability to work with internet using various domains, search engines, and many social media platform			
CO4: To understand the basics of HTML.			
CO5: Introduces the more advanced features of the WebPages.			
Credits: 4		Core Compulsory	
Max. Marks: 25+75		Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0			
Unit	Topic		No. of Lectures
I	Computer Networks: Introduction to computer network, data communication, components of data communication, data transmission mode, data communication measurement, LAN, MAN, WAN, wireless LAN, internet, intranet, extranet.		8
II	Network Models: Client/ server network and Peer-to-peer network, OSI, TCP/IP, layers and functionalities.		7
III	Transmission Media: Introduction, Guided Media: Twisted pair, Coaxial cable, Optical fiber. Unguided media: Microwave, Radio frequency propagation, Satellite.		7
IV	LAN Topologies: Ring, bus, star, mesh and tree topologies. Network Devices: NIC, repeaters, hub, bridge, switch, gateway and router.		8
V	Internet Terms: Web page, Home page, website, internet browsers, URL, Hypertext, ISP, Domain Names, Web server, download and upload, online and offline.		7
VI	Internet Applications: www, telnet, ftp, e-mail, social networks, search engines, Video Conferencing, e-Commerce, m-Commerce, VOIP, blogs.		7
VII	Introduction to Web Design: Introduction to hypertext markup language (html), Document type definition, creating web pages, lists, hyperlinks, tables, web forms, inserting images, frames, hosting options and domain name registration. Customized Features: Cascading style sheet (CSS) for text formatting and other manipulations.		8
VIII	Web Publishing - Website planning, Publishing Tools, The Front Page Solution. Internet Security - Need, Web Search engine, web meta searcher, web search Agents, E-mail Threats, Firewall, Firewall Architecture, Choosing a suitable Firewall.		8
Suggested Readings:			
1. Jeffrey C. Jackson Web Technology : A Computer Science Perspective -Pearson Education 2012.			
2. Raj Kamal , Internet and Web Technologies, TATA McGraw Hill 2012Dr. Anita Goel,			

Computer Fundamentals, Pearson Education, 2010.

3. Burdman, Jessica, Collaborative Web Development Addison Wesley
4. Xavier, C, Web Technology and Design, New Age International
5. Ivan Bayross, Web Enabled Commercial Application Development Using HTML, DHTML, javascript, Perl CGI , BPB Publications, 2009.
6. B.A. Forouzan, Data Communications and networking, 3rd Edition, TMH
7. W. Stallings, Data Computer Communications, 5th Edition, PHI
8. Ramesh Bangia, "Internet and Web Design" , New Age International.

Suggestive digital platforms web links:

1. https://www.tutorialspoint.com/internet_technologies/index.htm
2. <https://matfuvit.github.io/UVIT/predavanja/literatura/TutorialsPoint%20HTML.pdf>

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

“Skill Based Elective”

“Elective” , “Open to all”

Suggested Continuous Evaluation Methods: Max. Marks: 25

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:

None

Programme/Class: Bachelor in Science	Year: Third	Semester: Sixth
Subject: Computer Application		
Course Code: B0CA602T	Course Title: Cyber Forensics and Cyber Laws	
Course outcomes:		
CO 1: Impart education with domain knowledge effectively and efficiently in par with the expected quality standards for Digital and Cyber Forensic Science professional.		
CO 2: Identify & Evaluate Information Security threats and vulnerabilities in cyber world and apply security measures to real time scenarios.		
CO3: Ability to engage in life-long learning and adopt fast changing technology to prepare for professional development..		
CO4: Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection.		
Credits: 4		Core Compulsory
Max. Marks: 25+75		Min. Passing Marks:
Total No. of Lectures-Tutorials-Practical (in hours per week): 4-0-0		
Unit	Topic	No. of Lectures
I	Introduction to Cyber forensics: Information Security Investigations, Corporate Cyber Forensics, Scientific method in forensic analysis, investigating large scale Data breach cases. Analyzing malicious software.	7
II	Types of Computer Forensics Technology, Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised Internet Tracing Methods, Security and Wireless Technologies, Avoiding Pitfalls with Firewalls Biometric Security Systems..	8
III	Types of Computer Forensics Systems: Internet Security Systems, Intrusion Detection Systems, Firewall Security Systems, Storage Area Network Security Systems, Network Disaster Recovery Systems, Public Key Infrastructure Systems, Wireless Network Security Systems, Satellite Encryption Security Systems, Instant Messaging (IM) Security Systems, Net Privacy Systems, Identity Management Security Systems, Identity Theft, Biometric Security Systems ,Router Forensics. Cyber forensics tools and case studies.	7
IV	Ethical Hacking: Essential Terminology, Windows Hacking, Malware, Scanning, Cracking. Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of	8

	Collection.	
V	Controlling Contamination: The Chain of Custody, Reconstructing the Attack, The digital crime scene, Investigating Cybercrime, Investigating Web attacks, Investigating network Traffic , Identification of Data: Timekeeping, Forensic Identification and Analysis of Technical Surveillance Devices, Reconstructing Past Events.	7
VI	Basic of law, Understanding cyber space, Defining cyber law, Scope and jurisprudence , Concept of jurisprudence, Overview of Indian legal system, Introduction to IT Act 2000, Amendment in IT Act. intellectual property rights. copyright laws, patent laws, software license.	8
VII	Cyber Crimes – Types of cyber crimes –against individuals institution, and states-various offenses and punishments, digital signature-concepts of public key and private key, certification authorities and their role, creation and authentication of digital signature.	8
VIII	E-contracting: Salient features of E-contracts, formation of E-contracts and types, E-governance, E-governance models, E-commerce- salient features and advantages.	7

Suggested Readings:

1. John Vacca, "Computer Forensics: Computer Crime Scene Investigation", Laxmi Publications, First edition, 2015.
2. Ravi Kumar & B Jain, "Cyber Forensics - Concepts and Approaches", ICFAI University Press, 2006.
3. Paar. Christof, Pelzl. Jan, "Understanding Cryptography: A Textbook for Students and Practitioners", Springer, 2010
4. Ali Jahangiri, Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers & IT Security Experts, 2009, ISBN-13: 978-0984271504
5. Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series: Computer Forensics), 2010, ISBN-13: 978-1435483521.
6. Barkha, U Rama Mohan, "Cyber Law & Crimes", Asia Law House; 3rd edition 2017.
7. Vivek Sood, "Cyber Laws Simplified", McGraw Hill, Fourth Edition, 2014

Suggestive digital platforms web links:

3. <http://swarm.cs.pub.ro/~mbarbulescu/cripto/Understanding%20Cryptography%20by%20Christof%20Paar%20.pdf>

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

“Skill Based Elective”
“Elective” , “Open to all”

Suggested Continuous Evaluation Methods: Max. Marks: 25

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:

None

Programme/Class: Bachelor in Science	Year: Third	Semester: Sixth
Subject: Computer Application		
Course Code: B0CA603P	Course Title: Lab Based on Web Technology	
Course outcomes:		
CO 1: Identify common design mistakes when creating a web based application.		
CO 2: To learn and understand the process of editing a web page using text editors and web page editors.		
CO 3: To cover commonly used HTML tags and discuss how this knowledge is important to a web designer		
CO 4: Develops the ability to work for creation of website.		
Credits: 2	Core Compulsory	
Max. Marks: 25+75	Min. Passing Marks:	
Total No. of Lectures-Tutorials-Practical (in hours per week): 0-0-4		
Suggested Readings:		
1. HTML5 by Mark Pilgrim O'Reilly publication		
2. Ivan Bayross, Web Enabled Commercial Application Development Using HTML, DHTML, javascript, Perl CGI , BPB Publications, 2009.		
3. Xavier, C, "Web Technology and Design" , New Age International.		
Suggestive digital platforms web links:		
1. https://www.tutorialspoint.com/internet_technologies/index.htm		
2. https://matfuvit.github.io/UVIT/predavanja/literatura/TutorialsPoint%20HTML.pdf		
3. https://wtf.tw/ref/duckett.pdf		
List of Experiments:		
1. Write an HTML code to create a Web Page for your Personal Information using text formatting tags.		
2. Write an HTML code to create a web page to display railway train timings using tables.		
3. Write an HTML code to create a sample web page to promote a product using frames and links, images.		
4. Write an HTML code to create a form for a questionnaire		
5. Write an HTML code to display your education details in a tabular format.		
6. Write an HTML code to display your CV on a web page.		
7. Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.		
8. Write an HTML code to create a login form. On submitting the form, the user should get navigated to a profile page.		
9. Write an HTML code to create a Registration Form. On submitting the form, the user		

should be asked to login with this new credentials.

10. Write an HTML code to create your Institute website, Department Website and Tutorial website for specific subject.
11. Write an HTML code to illustrate the usage of the following:
 - Ordered List
 - Unordered List
 - Definition List
12. Write an HTML code to create a frameset having header, navigation and content sections.
13. Write an HTML code to demonstrate the usage of inline CSS.
14. Write an HTML code to demonstrate the usage of internal CSS.
15. Write an HTML code to demonstrate the usage of external CSS.

Research Project Guidelines for V and VI Semester

1. Objectives of the Project

- To facilitate the student to independently formulate and solve a social, philosophical, commercial, or technological problem and present the results in written and oral form.
- To render students to the real life problems.
- To provide opportunities to students to interact with people and present them confidently.

2. Types of Project

The students are expected to work on:

- (1) Application Oriented Project or
- (2) Research Oriented Project.

However, it is not mandatory for a student to work on a real-life project. The student can formulate a project problem with the help of his Guide and submit the project proposal of the same. **Approval of the project proposal is mandatory.** If approved, the student can commence working on it, and complete it. It is upon the student to carry the same project of V semester to VI semester OR choose a new project for VI semester. Use the latest versions of the software packages for the development of the project.

3. Software and Broad Ideas of Application

- **Languages - C, C++, Java, VC++, C#, R, Python**
- **Scripting Languages - PHP, JSP, SHELL Scripts (Unix), Tcl/TK**
- **.NET Platform - F#, C#. Net, Visual C#. Net, ASP.Net**
- **Middle Ware(Component) Technologies - COM/DCOM, Active-X, EJB**
- **Front-End/GUI Tools - .Net Technologies, Java**
- **Back-End/DBMS - Oracle, SQL Plus, MY SQL, SQL Server**
- **UNIX Internals - Device Drivers, RPC, Threads, Socket programming**
- **Real time Operating Systems/Embedded Skills - LINUX, Raspberry Pi, Arduino.**
- **Application and Research Areas - Financial / Insurance / Manufacturing / Multimedia / Computer Graphics / Instructional Design/ Database Management System/ Internet / Intranet / Computer Networking-Communication Software development/ E-Commerce/ ERP/ MRP/ TCP-IP programming / Routing protocols programming/ Socket programming**

4. Eligibility of the Guide

Guide should be a regular/approved teacher of the University/College/Higher Education/Institute. Student can also do the project under the guidance of regular/approved teacher of Institute of National Importance .

5. Introduction to the Project

The student should include the details in the project diary, in which they will record the progress of their project throughout the course. The project report should be documented with scientific approach to the solution of the problem that the students have sought to address. The project report should be prepared in order to solve the problem in a methodical and professional manner, making due references to appropriate techniques, technologies and professional standards. The project report should contain enough details to enable examiners to evaluate the work. The important points should be highlighted in the body of the report, with details often referred to appendices.

6. Structure and Format of the Project

Chapter 1 to 4 should be submitted in Semester V in spiral binding and these chapters have also to be included in Semester VI report if same project is carried from V to VI semester. If different projects are taken than complete project report is to be submitted in each semester. Semester VI report has to be hard bound with golden embossing. Students will be evaluated based on the project in V and VI semester independently.

(i) Title Page:

Sample format of Title page is given below. Students should follow the given format.

(All the text should be in Times New Roman)

<TITLE OF THE PROJECT>
(NOT EXCEEDING 2 LINES, 24 BOLD, ALL CAPS)

A Project Report (12 Bold)

Submitted in partial fulfillment of the
Requirement of the award of the Degree of (Size- 12)

BACHELOR OF SCIENCE (14 BOLD, CAPS)

By (12 Bold)

Name of The Student (Size 15, title case)

Roll Number (Size- 15)

COLLEGE LOGO

DEPARTMENT NAME

FACULTY NAME (12 BOLD, CAPS)

UNIVERSITY/COLLEGE NAME (14 BOLD, CAPS)
Affiliated to University Name) (12, Title case, bold, talic)

CITY, PIN CODE(12 bold, CAPS)

UTTAR PRADESH (12 bold, CAPS)

YEAR (12 bold)

- (ii) **Original Copy of the Approval Proforma of the Project Proposal:**
 Sample Proforma of Project Proposal is given below. Students should follow the given format.

PROFORMA FOR THE APPROVAL OF PROJECT PROPOSAL

(Note: All entries of the proforma of approval should be filled up with appropriate and complete information. Incomplete proforma of approval in any respect will be rejected)

Roll no:.....

1. Name of the Student

2. Title of the Project

3. Name of the Guide

4. Teaching experience of the Guide

Signature of the Student	Signature of the Guide
Date:.....	Date:.....

Signature of the Project Coordinator
Date:.....

- (iii) **Certificate of Authenticated work:**
 Sample format of Certificate of Authenticated work is given below. Students should follow the given format.

UNIVERSITY/COLLEGE NAME (14 BOLD, CAPS)
(Affiliated to University Name) (13, bold, italic)
CITY NAME-PINCODE (13 bold, CAPS)

DEPARTMENT NAME (14 BOLD, CAPS)

College Logo

CERTIFICATE (14 BOLD, CAPS, underlined, centered)

This is to certify that the project entitled, "**Title ofThe Project**", is bonafied work of **NAME OF THE STUDENT** bearing **Roll No.** submitted in partial fulfillment of the requirements for the award of degree of BACHELOR OF SCIENCE in COMPUTER SCIENCE from **University Name.** (12. times new roman, justified)

Name of Internal Guide (12 bold)	Name of Coordinator
----------------------------------	---------------------

(Don't write names of lecturers or HOD)

External Examiner

Date:	College Seal
-------	--------------

(iv) **Certificate from other Institute of National Importance** (to be issued by the HEI and the photocopy of the certificate is to be attach)

(v) **Abstract**

This should be one/two short paragraphs (100-150 words total), summarizing the project work. It will not be a re-statement of the original project outline. A suggested flow is background, project aims and main achievements. From the abstract, a reader should be able to determine if the project is of interest to them and, it should present results of which they may wish to know more details.

(Project Abstract page format)

Abstract (20bold, caps, centered)

Content goes here (12, justified)

Note: Entire document should be with 1.5 line spacing and all paragraphs should start with 1 tab space.

(vi) **Acknowledgements**

This should express student's gratitude to those who have helped in the preparation of project.

ACKNOWLEDGEMENT (20, BOLD, ALL CAPS, CENTERED)

The acknowledgement should be in times new roman, 12 font with 1.5 line spacing. Justified.

(vii) **Declaration**

(Declaration page format)

DECLARATION (20 bold, centered, allcaps)

Content (12, justified)

I here by declare that the project entitled, "**Title of the Project'** done at [**name of place where projects is done**] has not been in any case duplicated to submit to any other university for the award of any degree. To the best of my knowledge other than me, no one has submitted to any other universiny.

The project is done in partial fulfilment of the requirements for the award of degree of **BACHELOR OF SCIENCE** to be submitted as [**V OR VI**] semester project as part of our curriculum.

Name and Signature of the Student

(viii) **Table of Contents**

The table of contents gives the readers a view of the detailed structure of the report. The students would need to provide section and subsection headings with associated pages. The formatting details of these sections and subsections are given below.

TABLE OF CONTENTS (20bold, caps, centered)

Should be generated automatically using word processing software.

Chapter 1: Introduction	
1.1 Background	01(no bold)
1.2 Objectives	02(no bold)
1.3 Purpose and Scope	03
1.2.1 Purpose
1.2.2 Scope	
.....	
Chapter 2: Survey of Technologies	
2.1.....	
Chapter 3: Requirements and Analysis	
3.1 Problem Definition	
3.2 Requirements Specification	
.....	
Chapter 4: System Design	
4.1 Basic Modules	
4.2 Data Design	
.....	
Chapter 5: Implementation and Testing	
.....	
Chapter 6: Results and Discussion	
.....	
Chapter 7: Conclusions	
.....	
REFERENCES	
GLOSSARY	
APPENDICES	

(ix) **List of Tables**

List of all the tables in the project along with their page numbers.

List of Tables (20 bold, centered, Title Case)

Should be generated automatically using word processing software.

(x) **List of Figures**

List of all the figures, graphs, charts etc. in the project along with their page numbers.

List of Figures (20 bold, centered, Title Case)

Should be generated automatically using word processing software.

Chapter 1: Introduction

The introduction has several parts as given below:

- **Background:** A brief detail of background and framework of project and its relation to work done in the area.
- **Objectives:** Point wise statement of the aims and objectives of the project
- **Purpose, Scope and Applicability:** The description of Purpose, Scope, and Applicability are given below:
 - **Purpose:** Describe the topic of the project on the basis of why this project is being done. How this project improve the existing system.
 - **Scope:** Describe methodology, assumptions and limitations.
 - **Applicability:** State the application of project.
- **Achievements:** Explain what kind of purpose is achieved after completion of project.
- **Organization of Report:** Summarize remaining chapters of the project report.

(Project Introduction page format)

Chapter 1

Introduction (20 Bold, centered)

Content or text (12, justified)

Note: Introduction has to cover brief description of the project with minimum 4 pages.

Chapter 2: Literature Review OR Survey of Technologies

In this chapter survey of technologies for application oriented project should demonstrate the student awareness and understanding of available technologies OR literature survey is required for research oriented project. The student should give the detail of all the related literature/technologies that are necessary to complete the project. The student should present a comparative study of all those technologies/literature.

Chapter 3: Requirements and Analysis (For Application Oriented) OR [Title of Research Working Chapter]

Chapter 4: System Design (For Application Oriented) OR [Chapter related to Research Work]

Chapter 5: Implementation and Testing

- **Implementation Approaches:** Define the plan of implementation, and the standards or standard data sets used in the implementation.
- **Coding Details and Code Efficiency:** Students not need include full source code, instead, include only the important codes (design of new data structure, algorithms, applets code, forms code etc). The program code should contain comments needed for explaining the work a piece of code does. Comments may be needed to explain why it does it, or, why it does a particular way. The student can explain the function of the code with a shot of the output screen of that program code. The student should explain how the code is efficient and how the students have handled code optimization.
- **Testing Approach**
- **Modifications and Improvements**

Chapter 6: Results and Discussion

- **Test Reports:** Student should provide the test results and reports based on the test cases to show that it works fine in different conditions of input.
- **User Documentation:** In this section, working of the software should be explained; also explain its different functions with screen shots. The user document should be like a manual.

Chapter 7: Conclusions and Future Work

The conclusions shall be summarized with in 2 or 3 pages. This chapter mainly focuses on:

- Limitations of the Proposed System OR Research
- Future Scope describes new areas of investigation and parts of the current work that was not completed due to time constraints and/or problems encountered.

(xi) References

In this, students acknowledge the work of others that they have used or adapted in their own work. Student can follow the given standard for the references for books, journals, and online material. The citation is mandatory in both the reports.

Eg.

Lipson, Charles (2011). Cite right : A quick guide to citation styles; MLA, APA, Chicago, the sciences, professions, and more (2nd ed.). Chicago [u.a.]: University of Chicago Press. p. 187. ISBN 9780226484648.

(xii) Glossary

If any acronyms, abbreviations, symbols, or uncommon terms is used in the project report then their meaning should be explained where they first occur.

(xiii) Appendices

Appendix include some further details like results, mathematical derivations, certain illustrative parts of the program code (e.g., class interfaces). user documentation etc.

7. Evaluation

- During the project work, its progress will be monitored, on fortnightly/monthly basis, by the internal guide.
- 2 copies of Project Report to be submitted to department (1 copy to be retained by department, 1 copy for student)
- End Examination shall be based on Project Report, Presentation, Viva, and Demonstration of the software.
- Project carries 3 Credit Points.

Duration (for 1 group):

Evaluation in V and VI semester separately		
Type of evaluation	Total time	Max. Marks
Presentation	10 minutes	25
Viva	10 minutes	20
Demonstration	5 minutes	20
Report checking	5 minutes	35
Total Time/Max. Marks	30 minutes	100

Format of Certificate of Evaluation Certificate of Evaluation (14 point, Times, Bold)

This is to certify that the undersigned have assessed and evaluated the project work titled "....." submitted by the following student(s).

- 1.
- 2.
- 3.

The project report has been accepted/ rejected for the partial fulfillment of B.Sc. programme.

Signature of the examiner
Name of the examiner

Stamp of the Department

8. Project Viva Voice

Student may be asked to write code for some segment of the problem during VIVA to check his coding capabilities. The project can be done in group of at most two or three students. A big project can be modularized and different modules can be assigned as separate project to different students.