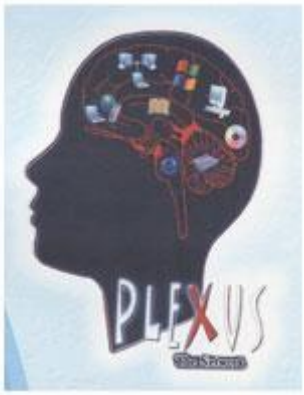
NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)

U.G.DEPARTMENT OF COMPUTER APPLICATIONS

(B.C.A)



SCHEME OF EXAMINATIONS

(With effect from 2018-2021 Batch and onwards)

NALLAMUTHU GOUNDER MAHALINGAM COLLEGE (AUTONOMOUS)
U.G.DEPARTMENT OF COMPUTER APPLICATIONS (B.C.A)
SCHEME OF EXAMINATIONS
(With effect from 2018 – 2021 batch and onwards)

I SEMESTER								
Part	Subject Code	TITLE	Duration in hours per week	Examination				Credits
				HOURS	CIA	ESE	TOTAL	
I	18UTL101/ 18UHN101 18UFR101	Tamil Paper – I/ Hindi Paper-I/ French Paper-I	6	3	25	75	100	3
II	18UEN101	English for Enrichment	6	3	25	75	100	3
		CORE PAPERS:						
III	18UBC101	Programming in C	4	3	25	75	100	4
III	18UBC102	Fundamentals of Digital Computer	4	3	25	75	100	3
III	18UBC103	Programming Lab - I: C Programming	4	3	20	30	50	2
		ALLIED:						
III	18UBC1A1	Mathematics I - Computer Oriented Numerical and Statistical Methods	4	3	25	75	100	4
IV	18HEC101	Value Education: Yoga For Physical & Mental Well Being Paper-1 : Personal Values	1	2	25	25	50	1
IV	18UHR101	Human Rights	1	2	--	50	50	2
V		Extension Activity (NSS, NCC, SPORTS)	--	--	--	--	--	--

II SEMESTER								
I	18UTL202/ 18UHN202 /18UFR202	Tamil Paper –II/Hindi Paper-II/French Paper-II	6	3	25	75	100	3
II	18UEN202	English for Enrichment Skills-II	5	3	25	75	100	3
		CORE PAPERS:						
III	18UBC204	Object Oriented Programming with C++	4	3	25	75	100	4
III	18UBC205	Computer System Architecture	3	3	25	75	100	3
III	18UBC206	Programming Lab - II: C++ Programming	4	3	20	30	50	2
		ALLIED:						
III	18UBC2A2	Marketing and HR Management	4	3	25	75	100	4
IV	18EVS201	Environmental Studies	2	2	---	50	50	2
IV	18HEC202	Value Education: Yoga For Physical & Mental Well Being Paper-II: Family Values	2	2	25	25	50	1
V		Extension Activity (NSS, NCC, SPORTS)	--	--	--	--	--	--

III SEMESTER								
Part	Subject Code	TITLE	Duration in hours per week	Examination				Credits
				HOURS	CIA	ESE	TOTAL	
		CORE PAPERS:						
III	18UBC307	RDBMS and Visual Programming	5	3	25	75	100	4
III	18UBC308	Shell Programming in Operating Systems	5	3	25	75	100	4
III	18UBC309	Data structures and Algorithms	5	3	25	75	100	3
III	18UBC310	Programming Lab - III: RDBMS & Visual Programming	4	3	20	30	50	2
III	18UBC311	Programming Lab - IV: OS -Commands and Shell Script Programming	4	3	20	30	50	2
III	18UBC312	Programming Lab - V: DTP Programming	1	2	20	30	50	1
III		**ALLIED:**						
III	18UBC3A3	Accountancy For Decision Making	4	3	25	75	100	4
IV	18HEC303	Value Education: Yoga For Physical & Mental Well Being Paper-1: Professional Values	1	2	25	25	50	1
IV	18UBC3N1	Non-Major Elective Programming Lab: Web Designing	1	2	--	50	50	2
	18UBC3N2	Non-Major Elective Programming Lab: Office Automation						
V		Extension Activity (NSS, NCC, SPORTS)	--	--	--	--	--	--

IV SEMESTER								
		CORE PAPERS:						
III	18UBC413	Framework Technologies	5	3	25	75	100	4
III	18UBC414	Introduction to Web Designing and Programming	5	3	25	75	100	4
III	18UBC415	Software Engineering	5	3	25	75	100	3
III	18UBC416	Programming Lab - VI: Framework Technologies	4	3	20	30	50	2
III	18UBC417	Programming Lab - VII: Web Designing	4	3	20	30	50	2
III	18UBC418	Programming Lab - VIII: PHP Programming	1	3	20	30	50	1
		ALLIED:						
III	18UBC4A4	Mathematics-II: Computer Based Optimization Techniques	4	3	25	75	100	4
IV	18HEC404	Value Education: Yoga For	1	2	25	25	50	1

		Physical & Mental Well Being Paper-IV: Social Values						
IV	18UBC4N3	Non-Major Elective Programming Lab: Open Source Software	1	2	--	50	50	2
	18UBC4N4	Non-Major Elective Programming Lab: 2-D Animation						
		Extension Activity						
V	18UNC401/ 18UNS402/ 18USG403	NSS NCC SPORTS	--	--	50	--	50	1

V SEMESTER

Part	Subject Code	TITLE	Duration in hours per week	Examination				Credits
				HOURS	CIA	ESE	TOTAL	
III	18UBC519	Object Oriented Programming Using Java Language	4	3	25	75	100	4
	18UBC520	Software Testing	4	3	25	75	100	4
	18UBC521	Elective-I	5	3	25	75	100	5
	18UBC522	Elective-II	5	3	25	75	100	5
	18UBC523	Programming Lab - IX: JAVA Programming	5	3	20	30	50	2
	18UBC524	Programming Lab - X: Software Testing	5	3	20	30	50	2
IV	18HEC505	Human Excellence-V: National Values	1	2	25	25	50	1
	18GKL501	Skill Based Subjects: General Awareness	SS	2	--	50	50	2
IV	18UBC5S1 / 18UBC5S2 / 18UBC5S3	Skill Based Elective: Software Analysis and Design E-Commerce Aptitude	1	2	--	50	50	2

VI SEMESTER

Part	Subject Code	TITLE	Duration in hours per week	Examination				Credits
				HOURS	CIA	ESE	TOTAL	
III	18UBC625	Advanced Java programming	5	3	25	75	100	4
	18UBC626	Elective-III	4	3	25	75	100	3
	18UBC627	Information Security	4	3	25	75	100	3
	18UBC628	Mobile Application Development	5	3	25	75	100	5
	18UBC629	Programming Lab- XI: Advanced Java Programming	5	3	20	30	50	2
	18UBC630	Programming Lab- XII: Mobile Application	5	3	20	30	50	2

		Development						
IV	18HEC606	Human Excellence-VI: Global Values	1	2	25	25	50	1
	18HECP03	Yoga Practical Paper-III	--	2	--	--	--	--
IV	18UBC6S4 / 18UBC6S5 / 18UBC6S6	Skill Based Elective: Software Industry Domains Multimedia and Animation Soft Skills	1	2	--	50	50	2
TOTAL MARKS							3900	140

ADD-ON COURSE: Mini Project	-	-	20	80	100	2

V SEMESTER

Elective-I:
Computer Networks
Grid Computing

Elective-II
Organizational behavior
Current Trends and Technologies

Elective-III
Data Mining and Warehousing
Cloud Computing

Bloom's Taxonomy Based Assessment Pattern

K1-Remember; **K2**- Understanding; **K3**- Apply; **K4**-Analyze; **K5**- Evaluate

1. Theory: 75 Marks

(i) TEST- I & II and ESE:

Knowledge Level	Section	Marks	Description	Total
K1 (1-5) (6-10)	A(Answer all)	10x1=10	MCQ Define	75
K2 (11-15)	B (Either or pattern)	5x5=25	Short Answers	
K3& K4 (16-21)	C(Answer 4 out of 6) 16TH Question is compulsory	4x10=40	Descriptive/ Detailed	

2. Theory: 50 Marks

Knowledge Level	Section	Marks	Description	Total
K1	A(Answer all)	10x1=10	MCQ/Define	50
K2, K3 & K4	B (Answer 5 out of 8)	5 x 8=40	Descriptive/ Detailed	

3. Practical Examinations:

Knowledge Level	Section	Marks	Total
K3	Practicals & Record work	60	100
K4		40	
K5			

IV

Components of Continuous Assessment

Components		Calculation	CIA Total
Test 1	75	$\frac{75+75+25}{7}$	25
Test 2	75		
Assignment/Seminar	25		

Programme Outcomes

PO1:

To make the grade of the students to meet the requirements of corporate industry, society and business to race worldwide.

PO2:

Analyze and apply latest technologies to solve problems in the areas of computer applications and to synthesize computing systems through quantitative and qualitative techniques in order to achieve better decisions.

Programme Specific Outcomes

PSO1:

To apply new techniques and technologies to bring out innovative and novelistic solution this emerges continuous professional development for the growth of the society.

PSO2:

To prepare successful graduates to their chosen career track.

PSO3:

To offer the students about computing principles and corporate practices in software solutions, outsourcing services in both public and private sectors.

PSO4:

To develop skills to work effectively with a range of audiences and to function on multidisciplinary teams to accomplish a common goal.

PSO5:

To employ in professional career or to get post graduate education in the fields of Information Technology and management education.

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 101	Title	Batch:	2018-2021
Hrs/Week:	4	PROGRAMMING IN C	Semester	I
			Credits	04

Course Objective

To understand the basic concepts of programming language and develop well-structured programs using 'C' language. To develop programming skills in order to meet the day to day IT demands.

Course Outcomes (CO)

K1	CO1	To recollect the structured programming concepts.
K2	CO2	To understand the branching statements and looping statements.
K3	CO3	To apply programming concepts such as Arrays, Functions, Structures, Pointers, etc.
K4	CO4	To analyze the File concepts and usage of storing the data in files.

Units	Content	Hrs
Unit I	Overview of C-Introduction-Importance of C-Basic Structure of C Program- Character Set- Tokens-Keywords and Identifiers-Constants-Variables - Data Types-Declaration of Variables-Assigning Values to Variables-Defining Symbolic Constants-Operations & Expressions-Arithmetic Operators-Relational – Logical- Assignment- Increment & Decrement- Conditional Operator-Bitwise and Special Operator-Arithmetic Expressions-Evaluation of Expressions-Precedence of Arithmetic Operators-Type Conversions in Expressions-Operator Precedence and Associativity-Mathematical Functions.	10
Unit II	Managing I/O operations-Reading a character-Writing a Character-Formatted Input-Formatted Output-Decision Making and Branching- Decision Making with IF Statement-Simple IF Statement-IF…ELSE-Nesting of IF…ELSE Statements-ELSE…IF LADDER-Switch Statement-?:-GOTO Statement-Decision Making and Looping-WHILE Statement-DO Statement-FOR Statement-JUMP IN LOOPS.	10
Unit III	Arrays-One Dimensional Array-Two Dimensional Arrays-Initializing Two Dimensional Arrays-Multi	12

	Dimensional Arrays-Handling of Character Strings-Declaring and Initializing String Variables- Reading Strings from terminal-Writing Strings to Screen-Arithmetic Operations on Characters-Putting Strings Together-Comparison of Two strings-String Handling Functions-Table of Strings-User Defined Functions- Need for User Defined Functions-Form of C Functions- Return Values and their Types-Calling a Function-Category of Functions-No Arguments and No Return Types-Argument but No Return Types-Arguments with Return Values-Handling of Non-Integer-Functions-Nesting of Functions-Recursion-Function with Arrays-Scope and Life Time of Variables in Functions-*ANSI C Functions.*	
Unit IV	Structures and Unions-Structure Definition-Giving Values to members-Structure Initialization- Comparison of Structure Variables-Arrays of Structures-Arrays with Structures - Structures and Functions-Unions-Size of Structures-Bitwise Fields-Pointers-Understanding Pointers-Accessing the Address of Variables-Declaring and Initializing Pointers-Increments and Scale Factor-Pointer and Arrays-Pointer and Character Strings- Pointers and Functions-Pointers and Structures-Points on Pointers.	10
Unit V	File Management in C-Defining and Opening a File-Closing a File-I/O Operation on Files-Error Handling during I/O Operations-Random Access Files-File Inclusion-*Compiler Control Directives.*	10
	Total Contact Hrs	**52**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. E.Balagurusamy, *Programming in ANSI C,* Tata McGraw-Hill publications, Fourth Edition, 2007(Unit 1 to 5).

Books for Reference

1. Yashavant Kanetkar, *Let Us C,* BPB Publications, *3rd Edition, 1999*
2. Yashavant Kanetkar, *Test Your C Skills*, BPB Publications, First Indian Edition, 1997.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M
CO2	S	S	H	M	M
CO3	S	S	S	M	H
CO4	H	H	S	L	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	**BCA**	**Programme Title:**	**Bachelor of Computer Applications**	
Course Code:	**18 UBC 102**	**Title**	**Batch:**	**2018-2021**
Hrs/Week:	**4**	**FUNDAMENTALS OF DIGITAL COMPUTER**	**Semester**	**I**
			Credits	**03**

Course Objective

To provide a comprehensive introduction to digital logic design leading to the ability to understand number system representations and Boolean algebra, combinational logic and IO devices.

Course Outcomes (CO)

K1	CO1	To recollect the knowledge about binary number system, Boolean algebra and binary codes.
K2	CO2	To get the idea about combinational systems composed of standard combinational modules, such as multiplexers, flip-flops, demultiplexers and decoders.
K3	CO3	To analyze and design sequential systems composed of standard sequential modules, such as counters and registers.
K4	CO4	To review the various Input and Output devices such as printers, keyboards, mouse, etc.

Units	Content	Hrs
Unit I	Flowchart and Number Systems: Logic and Flowcharting - Flowcharting-Flowcharting Symbols-Program Specification Analysis - Program Specification - Introduction- Input-Output - Throughput. Number system – Digital Computers and Digital Systems – Binary Numbers – Number Based Conversions – Octal and Hexadecimal Numbers – Complements – Binary Codes.	10
Unit II	Boolean Algebra: Boolean Algebra and Logic Gates-Basic Definition – Axiomatic Definition of Boolean Algebra – Basic Theorems and Properties of Boolean Algebra – Boolean Functions – Other Logic Operations – Digital Logic Gates – IC Digital Logic Families – Semiconductor Memory – Bipolar MDS – ROM – RAM – PROM – EPROM.	10
Unit III	Combinational Logic: Introduction – Adders – Full Adder – Half Adder- Subtractor – Half Subtractor - Full Subtractor – Multilevel NAND circuits – Multilevel NOR Circuits – Binary Parallel Adder – Decimal Adder – *BCD Adder* – Decoders – Encoder – Multiplexers – De Multiplexers.	12

Unit IV	Introduction – Flip Flops – Triggers of Flip Flops – Flip Flops Excitation Table – Design Procedure – Design Counters – Registers, Counters and Memory Unit. Registers – Shift Registers – Ripple Counters – Synchronous Counters – Timing Sequence.	10
Unit V	Input-Output Devices**:** Punched Tape, Tape Readers – Punched Cards – Card Readers – Alphanumeric Codes – Character Recognition – MICR – OCR –Output Equipment - Printers – CRT Output Devices – Magnetic tape – Output Offline Operation – Error Detecting and Error Correcting Codes – Keyboards – Terminals – Floppy Disks – Magnetic tape – *Tape Cassettes & Cartridges.*	10
	Total Contact Hrs	**52**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. M.Morris Mano – *Digital Logic and Computer Design* – Prentice Hall Of India, 1998. (1 to 4).
2. Thomas C.Bartee- *Digital Computer Fundamentals,* Tata McGraw-Hill, Sixth Edition, 1991
3. J. Maynard, *Computer Programming*, International Edition (Unit 5).

Books for Reference

1. Donald P Leach, Albert Paul Malvino, Goutam Saha, *Digital Principles and Applications*, Tata McGraw-Hill, Sixth Edition, 2006

Mapping

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	H	H	L	S
CO2	M	H	H	M	H
CO3	M	H	H	L	H
CO4	H	H	S	M	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18UBC103	Title	Batch:	2018-2021
Hrs/Week:	4	Programming Lab-I: C Programming	Semester	I
			Credits	02

Course Objective

To understand the programming logic and problem solving methods using 'C' Programming.

Course Outcomes (CO)

K3	CO1	To remember the Programming concepts using branching statements and looping statements.
K4	CO2	To get the idea about Arrays, Functions, Structures, Pointers, etc.
K5	CO3	To verify the files created using C.

Mapping

1. Write a C program to check to whether the given number is Armstrong number or not.
2. Write a C program to find whether the given number is prime or not.
3. Write a C program to check the greatest among three numbers using the conditional operator.
4. Write a C program to count the number of words, characters and lines in a given text.
5. Write a C program to calculate the NCR value of the given number using functions.
6. Write a C program to sort the numbers in ascending order using arrays.
7. Write a C program to generate the Fibonacci series for the given number.
8. Write a C program to calculate the factorial value for the given number using recursion.
9. Write a C program using switch statement for the arithmetic operations.
10. Write a C program to find the roots of Quadratic equation.
11. Write a C program to find the median of n numbers.
12. Write a C program to print the Floyd's triangle.
13. Write a C program to find the reverse of a given number.
14. Write a C program to find the given string is palindrome or not.
15. Write a C program to find the addition of matrix.
16. Write a C program to find the matrix multiplication of the given number.
17. Write a C program to sort the strings in alphabetical order.
18. Write a C program to count the number of vowels in a given string.
19. Write a C program to convert upper case to lower case and lower case to upper case.
20. Write a C program to create a student file.
21. Write a C program to create a railway reservation details with train no, train name, Source, destination, date, class.
22. Write a C program to create a student file with reg no, name, mark1, mark2..
23. Write a C program to create an employee file with the fields emp no ,emp name, basic Salary, designation.
24. Write a C program to process a student detail using structures
25. Write a C program to count the number of words, characters and lines in a text.

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M
CO2	S	S	H	L	M
CO3	S	S	S	L	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 1A1	Title	Batch:	2018-2021
Hrs/Week:	4	Mathematics-I: Computer Oriented Numerical and Statistical Methods	Semester	I
			Credits	04

Course Objective

To develop appropriate Numerical Methods to solve differential equations and to provide and understand on statistical methods. To make inferences about the population based on information we get from sample taken from the population**.**

Course Outcomes (CO)

K1	CO1	To recollect the samples accuracy, locate and use good mathematical software.
K2	CO2	To understand the number representation errors and convergence properties.
K3	CO3	To apply numerical methods as the basis of procedural language such as C, C++and JAVA.
K4	CO4	To analyze the influence of data representation and computer architecture on algorithm choice and development.

Units	Content	Hrs
Unit I	Introduction - Bisection Method – Method of Successive Approximations or the Iteration Method- Method of False Position- Newton Raphson Method –Horner's Method	10
Unit II	System of Linear Algebraic Equations- Gauss Elimination- Inverse of Matrix using Gauss Elimination- Gauss Jordan – Triangularization-Gauss Jacobi and Gauss Seidal Method	11
Unit III	Interpolation and Approximation – Newton, Lagrange's Method- Numerical Differentiation and Integration- Method's Based on Interpolation-Trapezoidal Rule- *Simpson's 1/3 and 3/8th rule*.	10

Unit IV	Correlation Analysis-Meaning-*Types*-Degrees of Correlating-Scatter Diagram-Correlation Graph-Karl Pearson's Coefficient of Correlation- Rank Correlation-Coefficient of Concurrent Deviations-Methods of Least Squares.	11
Unit V	Regression Analysis-Meaning- *Types of Regression* – ons-Regression Equations from Mean-Regression Coefficients-ession Coefficients-Correlation and Regression, a Comparison.	10
	Total Contact Hrs	**52**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. P.Kandasamy, K.Thilagavathy, K.Gunavathi, Numerical Methods, S.Chand & Company Ltd, First Edition 1999 (Unit 1,2,3).
2. S.P Gupta, *Statistical Methods, Sultana* Chand & Sons, Thirty-Fourth Edition, 2004 (Unit 4,5).

Books for Reference

1. Mark L.Crossley, The Desk Reference of Statistical Quality Methods, American Society for Quality, Quality Press, Second Edition 2008.

2. Rao V.Dukkipati, Numerical Methods, New Age International, First Edition, 2010.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	M	L
CO2	M	L	M	M	L
CO3	H	S	S	M	H
CO4	H	S	S	M	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 204	Title	Batch:	2018-2021
Hrs/Week:	4	OBJECT ORIENTED PROGRAMMING WITH C++	Semester	II
			Credits	04

Course Objective

To understand the object oriented concepts and to develop well-structured object oriented programming using C++ language. To train to meet the day – to –day demands of IT industry.

Course Outcomes (CO)

K1	CO1	To recollect the Object Oriented Programming concepts.
K2	CO2	To understand the usage of various significant operators.
K3	CO3	To apply programming concepts such as Functions, Classes and Objects along with overloading concepts.
K4	CO4	To analyze the File concepts and in usage of storing the data in files.

Units	Content	Hrs
Unit I	Procedure Oriented Programming-Object Oriented Programming Paradigm-Basic Concepts of Object -Oriented Programming-Benefits of OOP-Object Oriented Languages-Applications of OOP-Steps in Object Oriented Analysis-Steps in Object Oriented Design.	10
Unit II	Tokens-Keywords-Identifiers and Constants-Data Types-Reference Variables-Operators in C++-Scope Resolution Operator-Member Dereferencing Operator-Memory Management Operators-Manipulators-Type Cast Operators-Expression and their Types-Control Structures.	10
Unit III	Functions: Function Prototype-Call By Reference-Return By Reference-Inline Functions-Default and Constant Arguments-Function Overloading-Friend and Virtual Functions-*Classes and Objects*.	12
Unit IV	Constructors and Destructors-Operator Overloading-Inheritance-Pointers-Virtual Functions and Polymorphism.	10

Unit V	Managing Console Input / Output operations: C++ Streams-C++ Stream Classes-Formatted and Unformatted I/O Operations-Managing Output Manipulations-*Working Files*.	10
	Total Contact Hrs	**52**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study
1. E.Balagurusamy, *Object Oriented Programming with C++*, Tata McGrawHill Publications Ltd, Second Edition, 1999(Unit 1 to 5).

Books for Reference
1. C.Ravichandran, *Programming in C++*, Tata McGraw Hill Publications, Fourteenth Edition, 2001.
2. K.R Venugopal, Rajkumar Buyya, T Ravishankar, *Mastering C++*, Muhammadali Shaduli Publisher,1997

Mapping

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	H	M	M	M
CO2	S	S	L	M	M
CO3	S	S	S	M	H
CO4	H	H	S	H	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 205	Title	Batch:	2018-2021
Hrs/Week:	3	COMPUTER SYSTEM ARCHITECTURE	Semester	II
			Credits	03

Course Objective

To develop knowledge about the architecture of computer and to understand the concepts CPU, ALU design, I/O instruction format and different processors**.** To conceptualize the basics of organizational and architectural issues of digital computer.

Course Outcomes (CO)

K1	CO1	To recollect basic structure of computer and control unit operations.
K2	CO2	To understand the concept of computer arithmetic operations and memory system design.
K3	CO3	To apply the cache mapping techniques and conceptualize instruction level parallelism.
K4	CO4	To analyze the concept of I/O organization and to identify high performance architecture.

Units	Content	Hrs
Unit I	Basic Computer Organization- Instruction Codes-Computer Registers-Computer Instructions-Timing and Control-Instruction Cycle-Memory Reference Instructions-Input-Output Interrupts.	8
Unit II	CPU-General Register Organization-Control Word-Examples of Micro Operations-Stack Organization-Instruction Formats-Addressing Modes-Data Transfer and Manipulation-Program Control-RISC.	8
Unit III	Computer Arithmetic-Addition & Subtraction-Multiplication Algorithm-Division Algorithm-Floating Point Arithmetic Operations-*Register Configurations*-Addition & Subtractions- Decimal Arithmetic - Decimal Arithmetic Operation.	8
Unit IV	I/O Organization- Peripheral devices-I/O Interface- Synchronous and Asynchronous Data Transfer-Modes of Transfer-Priority Interrupt-DMA-IOP.	8
Unit V	Memory Organization-Memory Hierarchy-*Main Memory*-Auxiliary Memory-Associative Memory-Cache Memory –Virtual Memory- Memory Management Hardware.	7
	Total Contact Hrs	**39**

Books for Study
1. Morris Mano, Computer System Architecture, Prentice Hall Of India, Third Edition, 1994(Unit 1 to 5).

Books for references
1. David A. Patterson and John L.Hennessy, Computer Organisation and Design, Harcourt Asia Pvt Ltd, Second Edition, 1999. 2. William Stallings, Computer Organization & Architecture, Designing for Performance, Pearson Education, Sixth Edition.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	S	H	M
CO2	H	S	H	M	H
CO3	S	H	M	S	H
CO4	M	H	S	L	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 206	Title	Batch:	2018-2021
Hrs/Week:	4	PROGRAMMING LAB – II: : C++ PROGRAMMING	Semester	II
			Credits	02

Course Objective

To understand the object oriented concepts and problem solving methods using 'C++' Programming.

Course Outcomes (CO)

K3	CO1	To remember the Programming concepts using branching statements and looping statements.
K4	CO2	To get the idea about OOPS concepts such as inheritance, overloading, etc
K5	CO3	To verify the files created using C++.

1. Write a C++ Program to find Factorial of a given number.
2. Write a C++ Program to find Fibonacci series for user-defined limit.
3. Write a C++ Program to find whether the given number is prime or not.
4. Write a C++ Program to find whether the given number is odd or even.
5. Write a C++ Program to swap the two given numbers.
6. Write a C++ Program to find whether the given number is Armstrong or not.
7. Write a C++ Program to print the Student Details.
8. Write a C++ Program to calculate simple interest using default arguments.
9. Write a C++ Program to find the greatest of two numbers using nested functions.
10. Write a C++ Program to perform arithmetic operations using inline functions.
11. Write a C++ Program to find the greatest of two numbers and three numbers using Friend function.
12. Write a C++ Program to print the Student Details using Single Inheritance.
13. Write a C++ Program to print the Student Details using Multiple Inheritance.
14. Write a C++ Program to print the Student Details using Multilevel Inheritance.
15. Write a C++ Program to print the Student Details using Hybrid Inheritance.
16. Write a C++ Program to calculate the sum of two numbers using Constructors.
17. Write a C++ Program to destroy the objects using Destructors.
18. Write a C++ Program to change the sign value of the inputs by overloaded unary operator.
19. Write a C++ Program to add input values by overloading binary operator.
20. Write a C++ Program to calculate the area using Function Overloading.
21. Write a C++ Program to find the inverse of the given number using formatted I/O operations.
22. Write a C++ Program to perform string operations using unformatted I/O operations.

23. Write a C++ Program to open and close multiple files.
24. Write a C++ Program to arrange the even and odd numbers in separate files using command line arguments.

Assignment, Case Study

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M
CO2	S	S	H	L	M
CO3	S	S	S	L	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 2A2	Title	Batch:	2018-2021
Hrs/Week:	4	MARKETING AND HR MANAGEMENT	Semester	II
			Credits	04

Course Objective

To familiarize in marketing concepts and to design and implement the best combination of marketing actions to carry out a firm's strategy in its target markets. To equip the students with knowledge, skill and competencies to manage people in the organization.

Course Outcomes (CO)

K1	CO1	To recollect the skills in market analysis and design customer driven strategies with regard to product, pricing, and promotion.
K2	CO2	To understand various elements of management such as concept, nature and scope.
K3	CO3	To apply the decision making policies in an organization.
K4	CO4	To analyze the appraisal of the employee's performance and leadership theories which help to improve the organization's excellence.

Units	Content	Hrs
Unit I	Marketing Definition: Marketing-Fundamentals of Marketing-Scope of Marketing Product Definition: Types of Products-Product Life Cycle- Introduction Stage-Growth Stage-Maturity Stage-Decline Stage-Brand.	10
Unit II	Promotion: Promotion Mix-Factors Influencing Promoting Mix-Advertising- Advantages- Advertisement Copy-Media Selection-Advertising Agencies.	9
Unit III	Concept, Nature and Scope of Management-Concept of Management-Definitions of Management-Nature and Features of Management-Management VS Administration-Levels of Management-Skills of a Manager-*Roles of a Manager*-Importance of Management-Scope of Management-Management process-Fundamentals & Principles-Nature of Management process-Classification of Managerial functions-Managerial functions & levels-Description-Principles of Management.	11
Unit IV	Management by Objectives-Meaning-Objectives-Features-Steps-Advantages-Limitations. Decision Making: Meaning-Nature-Role-Types-Bases-Approaches-Styles-Principles-Line & Staff Relations- Theories of Organisation.	11
Unit V	Human Resource-Appraisal & Accounting-Concept of Performance Appraisal-Appraisal of Managers-Significance-Objectives-Obstacles-Essentials-Methods-Human Resource Accounting-Meaning-	11

	Objective-Benefits-Problems &Limitations-Methods-Leadership-Meaning-Nature-Importance-Styles-Theories-Trait-*Behavioural Theory*-Managerial Grid-Team Building-Concept-Process-Essentials.	
	Total Contact Hrs	**52**

Books for Study

1. Phlip Kotler, *Marketing Management*, *Analysis, Planning and Control*, Prentice Hall of India, 1997 (Unit 1,2)
2. C.B.Gupta, *Management Theory and Practice,* Sultan Chand & Sons, 15th Thoroughly Revised Edition Reprint 2010. (Unit 3, 4, 5)

Books for References

1. S.A.Sherlekar, *Marketing Management*, Himalaya Publishing House Pvt., Ltd., Fourteenth Edition, 2008.
2. S.Kathiresan and Dr. V. Radha, *Marketing,* Prasanna & Co Ltd , Revised Edition, 2006.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	H	H	S
CO2	H	H	H	M	H
CO3	H	S	S	H	H
CO4	M	H	H	H	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 307	Title	Batch:	2018-2021
Hrs/Week:	5	RDBMS AND VISUAL PROGRAMMING	Semester	III
			Credits	04

Course Objective

To gain knowledge about the DML, DDL operations and to develop a Database with enhanced models and Techniques and understand about RDBMS, Object oriented Databases and issues.

Course Outcomes (CO)

K1	CO1	To understand the VB Application and IDE.
K2	CO2	To get the idea about Data types, Functions and Procedures.
K3	CO3	To execute more about the Relational database to apply in the database.
K4	CO4	To analyze the SQL Statement and Query to apply in the application program.

Units	Content	Hrs
Unit I	Introduction to Visual Basic Steps in VB Application Integrated Development Environment (IDE) – Menu Bar – Tools Bar – Project Explorer Window Property Window Form Layout Window Code Window Properties , Methods and Events-Event Driven Programming –Working with Forms- Variables – Scope of Variables- Constants – Data Types – Functions – Procedures – Control Structures – Arrays – User Defined Data Types – Operators- String, Date and Time Function.	13
Unit II	Creating and Using Standard Controls- Text Box, Command Button, Check Box, Combo Box, List Box, Option Box, Timer, Frame, Label, Shape & Line Control, Picture Box, Image Control, Scroll Bar Controls - DB Grids – Dialog Boxes – Control Arrays - Single Document Interface(SDI) – Multiple Document Interface(MDI) – Menus. DAO – RDO-ADO	13

Unit III	Introduction- *Database System Applications*- Database System Versus File Systems- View of Data- Data Models- Entity-Relationship Model: Basic Concepts- Constraints- Keys- Design Issues- ER Diagram Weak Entity Sets- Extended ER Features- Design of an ER Schema to Tables. Relational Model- Structure of Relational Databases- The Relational Algebra- Extended Relational Algebra Operation - Relational Database Design: First Normal Form- Pitfalls in Relational Database Design - Functional Dependencies- Decomposition- Desirable Properties of Decomposition- BCNF- Third Normal Form- Fourth Normal Form- More Normal Forms.	14
Unit IV	ORACLE: Introduction- CODD's Rule- Tools of ORACLE- Introduction to SQL- Benefits of SQL- Data Types- DDL- DML- DCL- TCL- Data Constraints. ORACLE SQL Functions- Single Row Functions- Date, Number, Miscellaneous, Conversion, Character Functions- Group Functions- SQL Operators- Arithmetic, Comparison and Logical Operators- Set Operators- Joins- Sub Queries- Views.	12
Unit V	PL/SQL Introduction- Advantages of PL/SQL- Architecture of PL/SQL- Introduction to PL/SQL Block- Data Types- Control Structure- Concept Of Error Handling- Cursors Procedures Functions- Triggers- Types of Triggers. SQL * Forms- Basic concepts- Components of ORACLE Form- SQL * Forms System Variables- Creating a Form- *Generating and Running a Form*- Reports.	13
	Total Contact Hrs	**65**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. Steven Holzner, *Visual Basic 6 programming black book,* Dreamtech Press, First Edition, 2007 (Unit 1 & 2).
2. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, *Database System Concepts*, Tata McGraw-Hill, Fourth Edition(Unit 3).
3. Ivan Bayross, *ORACLE- 7 The Complete Reference*, BPB Publications, Revised Edition(Unit 4&5)

Books for Reference

1. C.J. Date, A. Kannan, S. Swamynathan, *An Introduction to Databas* , Pearsons Education, Eighth Edition,2004.
2. Ivan Bayross, *SQL, PL/SQL-The Programming Language of ORACLE*, BPB Publications, Third Revised Edition.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	H	S	H
CO2	H	H	S	S	H
CO3	H	S	H	S	H
CO4	H	M	L	H	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 308	Title	Batch:	2018-2021
Hrs/Week:	5	SHELL PROGRAMMING IN OPERATING SYSTEMS	Semester	III
			Credits	04

Course Objective

To study and apply concepts relating to operating systems, such as concurrency and control of asynchronous processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization.

Course Outcomes (CO)

K1	CO1	To remember the Master functions, structures and history of operating systems.
K2	CO2	To understand the implementation of file systems and directories along with the interfacing of IO devices with the operating system.
K3	CO3	To deploy, Linux has become sufficiently mainstream that deploying it isn't a mystery.
K4	CO4	To analyze the need for security measures for a Linux environment.

Units	Content	Hrs
Unit I	Introduction to OS – Early History – Hardware: Interrupts and Polling, Buffering, Storage Protection, Online – Offline Operation-Cycle Stealing- Processing-Storage Hierarchy- Reduced Instruction Set Computing (RISC). Semaphores – Process Synchronization with Semaphores – Counting Semaphores. Storage Management: Real Storage – Storage Organization – Storage Management Storage Hierarchy –Swapping – Virtual Storage – Basic Concepts.	13
Unit II	PAGING: Basic Concepts – Segmentation. Dead Lock: Examples – Dead Lock Preventions – Dead Lock Avoidance – Bankers Algorithms Only – Dead Lock Detection – Dead Lock Recovery. Processor Management: Job and Processor Scheduling – Introduction – Scheduling Levels – Scheduling Objectives – Preemptive Vs Non preemptive Scheduling – Priorities – FIFO Scheduling – Round Robin Scheduling – Quantum Size Shortest Job First Scheduling – Shortest Remaining Time Scheduling – Highest Response Ratio Next Scheduling.	13

Unit III	Auxiliary Storage Management: Disk Performance Optimization – Why Disk – Scheduling is Necessary – Desirable Characteristics of Disk Scheduling Policies – Seek Optimization – Disk Caching – RAM Disks. FILE Database System: Introduction – The File System – File System Functions – Blocking and Buffering – File Organization – Allocating and Freeing Space – File Description – Access Control Matrix – Access Control by User Classes – *Backup Recovery*.	13
Unit IV	Linux: Introduction – File structure of Linux – Directory hierarchy – Environmental variables –file access permissions –utility commands- files – print – login details. VI-editors - three modes. File splitting – pipes and filters – paginating files – head – tail – grep – process termination – timing process.	13
Unit V	Shell Programming: Creation and execution – command line arguments – logical operations – condition statements – System administration – Booting and shutting down – super user status – Disk management – security – user services – mount – unmount- *installing and managing printers*.	13
	Total Contact Hrs	**65**

'The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study
1. H. M. Deitel, *Operating Systems*, Addison Wesley Publication, Second Edition. (Unit 1, 2 & 3). 2. Sumitabha Das, "Unix system Concepts and applications" Tata McGraw Hill, 1995(Unit 4 & 5)

Books for Reference
1. Stewart E. Madnick, John J.Donovan, *Operating Systems*,Tata McGraw Hill, Sixth Edition, 2008.
2. Williams Stallings, *Operating Systems- Internals and Design Principles*, Prentice hall of India, Fifth Edition, 2005.
3. Mark.G.Gobell "Red Hat Linux" – Reference Manual, Pearson Edition, First Edition, 2003.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	M	M	L
CO2	L	M	M	L	L
CO3	M	L	M	H	L
CO4	S	M	S	H	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 309	Title	Batch:	2018-2021
Hrs/Week:	5	DATA STRUCTURES AND ALGORITHMS	Semester	III
			Credits	03

Course Objective

To introduce various techniques for representation of the data in the real world and improve the improve the logical ability. To teach efficient storage mechanisms of data for an easy access.

Course Outcomes (CO)

K1	CO1	To remember the students to know about how to develop their programs.
K2	CO2	Point of more about the algorithm and implementation in the system.
K3	CO3	To implement the Data Structure methods in object oriented languages.
K4	CO4	To analyze the time complexity for Data Structure problems.

Units	Content	Hrs
Unit I	Introduction-How to Create Program – How to Analysis Program-Sparse Matrices - Representation of Arrays - Stacks and Queues - Evaluation of Expressions - Multiple Stacks and Queues.	13
Unit II	Linked Lists-Singly Linked Lists - Linked Stacks-and Queues-Polynomial Addition - Doubly Linked Lists and Dynamic Storage Management - Strings	12
Unit III	Trees-Basic Terminology – Binary Trees - Binary Tree Representations - Binary Tree Traversal - More on Binary Trees - Threaded Binary Trees - *Counting Binary Trees*.	13
Unit IV	Graphs – Terminology and Representation - Traversals Connected Components and Spanning Trees - Shortest Paths - Topological Sorts.	13
Unit V	Internal Sorting: Insertion Sort - Quick Sort - 2 Way Merge Sort - Heap Sort. External Sorting**:** Storage Devices-Sorting with Disks - *Sorting with Tapes*	14
	Total Contact Hrs	**65**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. Elliz Horowitz, Sartaj Sahani, *Fundamentals of Data Structures*, Galgotia Publishers, 1984 (Unit 1 to 5).
2. Seymour Lipschutz, *Data Structures*, Mc - Graw- Hill, Indian Adapted Edition, 2006.

Books for Reference

1. Jean- Paul Trembly, Paul G.Sorenson, *An Introduction to data structures with application*, Mc - Graw- Hill, Second Edition, 1991.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	M	H	S
CO2	H	H	S	H	H
CO3	M	S	L	M	M
CO4	M	S	H	H	L

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 310	Title	Batch:	2018-2021
Hrs/Week:	4	PROGRAMMING LAB – III: RDBMS AND VISUAL PROGRAMMING	Semester	III
			Credits	02

Course Objective

To familiarize with the basic SQL Queries, Functions, Join operations and PL/SQL program in RDBMS with GUI environment.

Course Outcomes (CO)

K3	CO1	To recollect about the oracle queries.
K4	CO2	To understand the simple application program using VB concepts.
K5	CO3	To validate a knowledge to connect VB with oracle database.

1. Write Oracle Queries in Data Definition Language.
2. Write Oracle Queries in Data Manipulation Language.
3. Write Oracle Queries in Transaction Control Language.
4. Write Oracle Queries in Data Control Language.
5. Write Oracle Queries using Data Constraints.
6. Manipulate Single Row Function.
7. Manipulate Function – Group function.
8. Generate Operators in SQL plus.
9. Manipulate SET Operators.
10. Generate View.
11. Generate Index functions.
12. Generate Join functions.
13. Write PL/SQL to find whether the given number is Even or Odd.
14. Write PL/SQL to find whether the given number is Armstrong or Not.
15. Write PL/SQL to Display ten numbers.
16. Write PL/SQL to reverse of given number.
17. Write PL/SQL to find whether the given number is Prime number or not.
18. Write Oracle Query to Update Trigger.
19. Write PL/SQL to Access Restriction Trigger.
20. Write Oracle Queries to Display Department Name.
21. Develop a VB program to process the Arithmetic Operation.
22. Develop a VB program to generate timer control.
23. Develop a VB program to design a scientific calculator.
24. Develop a VB program for Railway Reservation using menus.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	S	M	L
CO2	H	S	H	H	H
CO3	H	S	S	H	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 311	Title	Batch:	2018-2021
Hrs/Week:	4	PROGRAMMING LAB – IV: OS –COMMANDS AND SHELL SCRIPT PROGRAMMING LAB	Semester	III
			Credits	02

Course Objective

To familiarize students with the Linux environment, fundamentals of shell scripting/programming with basic linux administration.

Course Outcomes (CO)

K3	CO1	To remember the various UNIX commands on a standard UNIX/LINUX Operating system.
K4	CO2	To get the idea about be able to do shell programming on UNIX OS.
K5	CO3	To verify the files to understand and handle UNIX system calls.

1. Work with utility commands.
2. Work with directory commands.
3. Work with handling file commands.
4. Work with file access commands.
5. Work with pipes and filters.
6. Work with VI editors.
7. Create a program to find simple interest
8. Create a program to find factorial value
9. Create a program to find Fibonacci series.
10. Create a program to find sum of N numbers.
11. Write a program with case condition.
12. Create a program to find divisibility of numbers.
13. Create a program to find greatest of three numbers.
14. Create a program to find Armstrong number.
15. Create a program to find prime or not.
16. Create a program to find reverse the digit.
17. Create a program to find sum of individual digit.
18. Create a program to find odd or even.
19. Create a program to swap any two numbers.
20. Create a program for sorting of N numbers.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	L
CO2	L	S	M	H	M
CO3	L	M	M	M	L

S-Strong; H-High; M-Medium; L-Low

Department	**UG Department of Computer Applications**	
Course	**BCA**	**Effective from the year: 2018-2021**
Subject Code:	**Title: PROGRAMMING LAB :**	**Semester: III**
18 UBC 312	**OFFICE AUTOMATION**	
Hrs/Week:	**1**	**Credit: 1**
Objectives	To learn how to prepare office documents using Word, Power Point, Excel and Access Database.	

MS-WORD

1. Create a Resume in a neat format.
2. Create the front page of a newspaper.
3. Create their class time table.
4. Mail merge an application letter.

MS-EXCEL

5. Create students's marksheet.
6. Draw chart and apply filter.

MS-ACCESS

7. Create a Table.
8. Create a Query.
9. Create a Form.
10. Generate a Report**.**

MS-POWER

11. Prepare a presentation with various slide transitions.
12. Prepare a presentation with various animations

Programme Code:	BCA	ProgrammeTitle :	Bachelor of Computer Applications	
Course Code:	18UBC3A3	Title	Batch :	2018-2021
		ACCOUNTANCY FOR DECISION MAKING	Semester	III
Hrs/Week:	04		Credits:	04

Course Objective

To enlighten the students on the basics of Accountancy.

Course Outcomes (CO)

K1	CO1	To recollect the knowledge of accounting theory based on conceptual framework of accounting.
K2	CO2	To enable students to understand the concept of accounting.
K3	CO3	To execute the knowledge going in accounting for decision making.
K4	CO4	To analyze and interpret accounting related transactions in accordance with accounting theory.

Units	Content	Hrs
Unit I	Financial Accounting – Meaning - Definition– Concepts – Conventions – Accounting Cycle – Methods of Book Keeping– Journal – Ledger –*Trial Balance*.	10
Unit II	Subsidiary Books – Purchase Book and Sales Book – Purchase Returns and Sales Returns Book – Cash Book - Preparation of Final Accounts with Simple Adjustments.	12
Unit III	Cost Accounting – Elements of Cost – Cost Sheet –Stock Valuation – FIFO - LIFO - Simple Average Method .	10
Unit IV	Management Accounting – Meaning - Definition – *Objectives of Management Accounting* - Budgetary Control – Cash Budget – Flexible Budget.	10
Unit V	Ratio Analysis – Meaning - Significance of Ratio Analysis - Types – Liquidity Ratio – Profitability Ratio – Solvency Ratio.	10
	Total Contact Hrs	**52**

Group discussion, Seminars and Assignment

Books for Study

1. Shukla. M.C And Grewal. T.S And Gupta. S.L.(2010), Advanced Accountancy, New Delhi, S.Chand & Co.

Books for Reference

1. Jain. S.P and Narang. K.L. ,Cost Accounting (2012), New Delhi, Kalyan Publishers.
2. Sharma. K, Sasi.K.Gupta. (2012), Management Accounting, New Delhi, Kalyani Publishers.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	S	M
CO2	H	M	M	M	S
CO3	S	H	H	S	S
CO4	S	H	S	H	S

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 3N1	Title	Batch:	2018-2021
Hrs/Week:	1	NME: PROGRAMMING	Semester	III
		LAB –WEB DESIGNING	Credit	02

Course Objective

To develop the basic concepts of HTML and to equip with the programming skills in implementing and debugging Web based applications.

Course Outcomes (CO)

K3	CO1	To recollect the logic behind advanced Web page applications.
K4	CO2	To understand the HTML and CSS programming.
K5	CO3	To verify the files created in Web applications.

1. Write HTML code to develop a web page for giving details of your name, age, address. It contains the different background and foreground color, with different attributes of Font tags like italic, bold, underline etc. and give suitable heading style
2. Create a Web Page using HREF tag having the attribute ALINK, VLINK etc.
3. Create a Web Page, when user clicks on the link it should go to the bottom of the page.
4. Write a HTML code to create a Web Page of pink color and display moving message in red color.
5. Create a Web Page, showing an ordered list of name of your five friends and unordered list of any five your hobbies.
6. Create a HTML document containing a nested list showing the content page of any book.
7. Write a HTML program to reload the page which contains an image that should reload automatically for every 5 seconds.
8. Create the following table in HTML with Dummy Data.

Name of the train	Place	Destination	Train No	Time Arrival	Departure	Fare

9. Design a form using all input types.
10. Create a simple form for accepting –Name, Register No, and use Submit Button.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	S	S
CO2	H	H	H	H	M
CO3	M	H	H	M	S

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 3N2	Title	Batch:	2018-2021
Hrs/Week:	1	NME: OFFICE AUTOMATION	Semester	III
			Credits	02

Course Objective

To master the basics of Microsoft Excel, PowerPoint, Access and Word and become accustomed with the tasks for which each application is best suited.

Course Outcomes (CO)

K3	CO1	To remember the MS-Office applications in creating new documents, formatting, presentations and short cuts.
K4	CO2	To get the idea about Word, Power Point, Excel and Access in MS-Office.
K5	CO3	To verify the files created in MS-Office applications.

MS-WORD

1. Create a Resume in a neat format.
2. Create the front page of a newspaper.
3. Create their class time table.
4. Mail merge an application letter.

MS-EXCEL

5. Create students marksheet.
6. Draw chart and apply filter.

MS-ACCESS

7. Create a Table.
8. Create a Query.
9. Create a Form.
10. Generate a Report**.**

MS-POWER POINT

11. Prepare a presentation with various slide transitions.
12. Prepare a presentation with various animations

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	H	M	H	M	M
CO3	H	H	S	H	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 413	Title :	Batch:	2018-2021
Hrs/Week:	5	OBJECT ORIENTED PROGRAMMING USING JAVA LANGUAGE	Semester	IV
			Credits	04

Course Objective

To understand the basic concepts and techniques which form the object oriented programming paradigm in JAVA programming.

Course Outcomes (CO)

K1	CO1	To remember the structure and model of the Java Programming Language.
K2	CO2	To understand the usage of Java Programming Language for various programming technologies.
K3	CO3	To implement certain technologies in the Java Programming Language to solve the given problem.
K4	CO4	To evaluate whether the Java Programming Language can meet user requirements.

Units	Content	Hrs
Unit I	Java Evolution – Overview of Java language, Constants, Variables and Data types – Operators and Expressions.	13
Unit II	Decision Making and Branching – Decision Making and Looping – Classes, Objects and Methods – Arrays, Strings and Vectors.	13
Unit III	Interfaces – Multiple Inheritance – Packages: Putting Classes Together- *Introduction to Utility Packages* – Java Collections – Overview of Interfaces – Overview of classes - Multi-Thread Programming.	13
Unit IV	Managing Errors and Exceptions – Applets Programming – Graphics Programming – The Graphics Class – Lines and Rectangles – Circles and Ellipses – Drawing Arcs – Drawing Polygons.	13
Unit V	Managing Input /Output Files in Java – Concepts of Streams – Stream Classes – Byte Stream Classes – Stream Classes – Character Stream Classes – Useful I/O Classes – Characters – Reading / Writing Bytes – Handling Primitive Data Types – Concatenating and Buffering Files – *Random Access Files*.	13
	Total Contact Hrs	**65**

Seminar, Assignment, Case Study

Books for Study
1. E.Balagurusamy, *Programming With Java* , Tata McGraw Hill , Second Edition, 2005(Unit 1 to 5).
Books for Reference
1. ISRD Group, *Introduction to Object Oriented Programming through Java*,Tata Mc-GrawHill Publishing Company Limited, 2007. 2. Patrick Naughton Herbert Schildt Java2, The *Complete Reference*, Tata Mc- Graw Hill, 1999. 3. John R. Hubbard, *Schaum's Outline of Programming with Java*.

Mapping

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	S	H	H	M
CO2	S	H	H	M	H
CO3	S	S	H	S	S
CO4	H	H	S	S	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC414	Title	Batch:	2018-2021
Hrs/Week:	5	INTRODUCTION TO WEB DESIGNING & PROGRAMMING	Semester	IV
			Credits	04

Course Objective

To develop knowledge about the technologies and their applications and to understand the basic of web designing**.** To develop skills in analyzing usability of a website.

Course Outcomes (CO)

K1	CO1	To recollect the importance of the web as medium of communication.
K2	CO2	To understand the logic behind advanced web applications.
K3	CO3	To apply the javascript to validate from input entry.
K4	CO4	To analyze the usability of web site and develop well formed XML document.

Units	Content	Hrs
Unit I	INTERNET: Introduction to Internet – Resources of Internet – Internet Services-Protocol Concepts – Internet Addressing. HTML : Introduction to HTML – Functions of HTML in Web Publishing – basic Structural elements and their usage – Traditional text and formatting – Style Sheets formatting – using tables for organizing and layout – Forms – Frame sets.	13
Unit II	Java Script : Introduction – Language Elements : Identifiers – Expressions – JavaScript Keywords – Operators – Statements _ Functions – Objects of JavaScript : The Window Object – The Document Object – Forms Object – Text boxes and Text areas – Buttons, Radio buttons and Checkboxes – The Select Object – Other Objects – Arrays.	13
Unit III	VB Script: Introduction – Embedding VBScript Code in an HTML Document – Comments – Variables – Operators – *Procedures* – Conditional Statements – Looping Constructs.	13
Unit IV	Active Server Pages (ASP) - Introduction – Advantages of using ASP – First ASP Script – Processing of ASP Scripts with Forms – Variables and Constructs – ASP Cookies – ASP Objects – Connecting to Data with ASP.	13

Unit V	XML - XML Basics - What is XML*?* - XML Tags and Conventions - More on Elements - XML Schema - *XML Attributes* - Introduction to DTD - DTD - *XML* building blocks - Elements - Attributes - Entities.	13
	Total Contact Hrs	**65**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. Harley Hahn, *The Internet Complete Reference,* Tata McGraw-Hill Publishers, Second Edition, 2001. (Unit 1)
2. N.P.Gopalan and J.Akilandeswari, "Web Technology – A Developer's Perspective", PHI Learning Private Limited, Delhi, Seventh Edition, 2013. (Unit 1To 5)

Books for references

1. Thomas A.Powell, *HTML- The Complete Reference,* Tata Mc-Graw Hill Edition.1998.
2. Shelly Powers et al, "Dynamics Web Publishing", Techmedia, 1998.
3. Scot Johnson, *Using Active Server Pages,* Prentice Hall of India Pvt. Ltd, Special Edition, 1997.

Mapping

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	H	H	M	H
CO2	S	H	M	S	H
CO3	M	H	H	S	H
CO4	H	H	H	M	L

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 415	Title	Batch:	2018-2021
Hrs/Week:	5	Title: SOFTWARE ENGINEERING	Semester	IV
			Credits	03

Course Objective

To prepare graduates who will be successful in the chosen career path. It develops a broad understanding of the discipline of software engineering and encompasses with a detailed knowledge of techniques for the analysis and design of complex software intensive systems and to get success in their chosen profession.

Course Outcomes (CO)

K1	CO1	To recollect the software models, techniques and technologies to bring out the innovative and novelistic solutions for the growth of the society.
K2	CO2	To understand the issues affecting the organization planning and control of software based systems development.
K3	CO3	To apply the end user requirements into system and software requirements.
K4	CO4	To analyze, formulate, identify and solve the problems as well as identify the computing requirements appropriate to their solutions.

Units	Content	Hrs
Unit I	System Concepts and the Information Systems Environment: System Definition-Characteristics of System- Elements of a System- Types of System- The System Development Life Cycle: Recognition of Need - Feasibility Study – Analysis – Design – Implementation - Post implementation and Maintenance- Consideration for Candidate System.	13
Unit II	Software-Software Characteristics-Software Components-Software Applications-The Process-Software Engineering a Layered Technology-The Process, Methods, Tools-A Generic View of Software Engineering- The Software Process- Software Process Models-Linear Sequential Models-Prototyping Model-RAD Model-Evolutionary Software Model-The Incremental Model-Spiral Model-Component Assembly Model-Concurrent Model.	13

Unit III	An Agile view of Process-Agility-Agility Process-The Politics of Agile Development-Human Factors-Agile Process Models-Extreme Programming-Adoptive Software Development –Dynamic System Development Method-Scrum-Crystal-Feature Driven Development-Agile Modeling. Analysis Concepts and Principles-Requirement Analysis-Communication Techniques-Initiating the Process-FAST-QFD-Analysis Principles-Information Domain-Modeling-Partitioning-Essential and Implementation Views-Analysis Modeling-Elements of Analysis Model-Data Modeling-Data Objects, Attributes and Relationship Diagram-Function Modeling-Data Flow Diagram, Extensions- *Behavioral Modeling.*	13
Unit IV	Design Concepts and Principles-The Design Process-Design Principles-Design Concepts-Abstraction, Refinement, Modularity, Software Architecture, Control Hierarchy, Structured Partitioning, Software Procedure, Information Hiding-Effective Modular Design-Functional Independence-Cohesion-Coupling-Design Documentation.	13
Unit V	Design Method-Data Design-Architectural Design-Architectural Design Process-Transform Mapping-Transaction Mapping- Interface Design -Human Computer Interface Design –Interface Design Models-Task Analysis and Models-Design Issues-Implementation Tools-Design Evaluation-Tabular Design Notation-Program Design Notation-*Program Design Languages.*	13
	Total Contact Hrs	**65**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. Elias M.Award, *System Analysis and Design* , Galgotia Publications (P) Ltd, Second Edition, 1996 (Unit 1).
2. Roger Pressman, *Software Engineering*, A Practioner's Approach, Fourth Edition, 1997(Unit 2,3,4 &5).
3. Roger Pressman, *Software Engineering*, A Practioner's Approach, Sixth Edition, 2005(Unit 3).

Books for Reference
1. Sommerville, *Software Engineering*, Pearson education, Sixth Edition.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	S	S	H
CO2	S	H	S	H	M
CO3	M	M	M	M	L
CO4	H	H	H	H	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 416	Title	Batch:	2018-2021
Hrs/Week:	4	PROGRAMMING LAB –VI: JAVA PROGRAMMING	Semester	IV
			Credits	02

Course Objective

To provide students with the ability to write programs in Java and apply concepts described in the Object-Oriented Programming course.

Course Outcomes (CO)

K3	CO1	To recollect object-oriented concepts.
K4	CO2	To understand the usage of Java Programming Language for various programming technologies.
K5	CO3	To decide frontend and backend of an application

1.Write a java program to check the Amstrong number
2. Write a java program to generate Fibonacci series
3. Write a java program to print the Floyds triangle using for loops.
4. Write a program in java using multiple catch statements.
5. Write a program in java for method overloading to draw circle, triangle, rectangle..
6. Write a java program to sort the given numbers in ascending order.
7. Write a java program to find the prime numbers between 1 to 200.
8. Write a program in java for method overriding.
9. Write a program in java to sort the strings in alphabetical order.
10. Write a java program for employee details using single inheritance concept.
11. Write a java program to check the given string is palindrome or not.
12. Write a program to find the roots of a quadratic equation.
13. Write a java program for multithreading concept.
14. Write a program in java to read and write using random access file.
15. Write a java program to draw lines and rectangles using applets
16. Write a java program to draw ellipses and circles using applets
17. Write a program in java for method overriding.
18. Write a program in java to copy bytes from one file to another.
19. Write a program in java to copy characters from one file to another.
20. Write a program in Java using the concept of interface.
21. Write a program in java to multiply two matrices.
22. Write a program to add two numbers using applets

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	H	M	M
CO2	S	H	H	M	M
CO3	S	S	S	H	S

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 417	Title	Batch:	2018-2021
Hrs/Week:	4	PROGRAMMING LAB –VII: WEB DESIGNING	Semester	IV
			Credits	02

Course Objective

To develop an ability to design and implement static and dynamic websites. To gain the knowledge of project based experience needed for entry into web application and development careers.

K3	CO1	To remember the Web page applications and identify its elements and attributes.
K4	CO2	To get the idea about web pages and create HTML and Cascading Style Sheets.
K5	CO3	To validate the files created in Dynamic web pages and JavaScript.

Course Outcomes (CO)

1. Write a program to create Student timetable
2. Write a program to create External style sheet
3. Write a program to create Embedded style sheet
4. Write a program to create Inline style sheet
5. Write a program to create Horizontal frames
6. Write a program to create Vertical frames
7. Write a program to create Horizontal and vertical frames
8. Write a program to create Frameset
9. Write a program to create I Frame
10. Write a program to create Image positioning
11. Write a program to create Z-Index
12. Write a program to create Webpage
13. Write a program to create Submit and reset button
14. Write a program to create Password control
15. Write a program to create Confirmation dialogue box
16. Write a program to create Date and time
17. Write a program to change the text in status bar.
18. Write a program to scroll the text.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	S	S	M
CO2	S	S	H	H	M
CO3	S	H	S	M	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 418	Title	Batch:	2018-2021
Hrs/Week:	1	PROGRAMMING LAB VIII: DTP PROGRAMMING	Semester	IV
			Credits	01

Course Objective

To provide a deep knowledge in various image processing effects.

Course Outcomes (CO)

K3	CO1	To remember the basic technical tools.
K4	CO2	To get the idea for handling tools and applying various effects.
K5	CO3	To access various formats in this platform for editing.

1. Design the Wedding Invitation using the associated tools in Photoshop.
2. Apply special art effects for the image using various options from the Filter Gallery.
3. Design the Banner.
4. Implement the Usage of different modes in a Single Image.
5. Design the College Profile.
6. Work with different images to implement Sharpen tool and Smudge Tool
7. Design the Calendar.
8. Edit the image using Blur tool.
9. Design the Visiting Card.
10 Edit the image using Burn and Sponge tool.
11. Edit the image using Clone tool.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	H	H
CO2	M	M	H	H	H
CO3	H	H	H	M	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 4A4	Title	Batch:	2018-2021
Hrs/Week:	4	MATHEMATICS-II COMPUTER BASED OPTIMIZATION TECHNIQUES	Semester	IV
			Credits	04

Course Objective

Every industrial organisation faces multifacet problems to identify best possible solution to their problems. OR aims to help the executives to obtain optimal solution with the use of OR techniques and to locate best or optimal solution.

Course Outcomes (CO)

K1	CO1	To recollect the modeling tools and computational tools as well as analytic skills to evaluate the problems.
K2	CO2	To understand how to translate real world problem given in words into a mathematical formulation.
K3	CO3	To apply mathematical optimization techniques, existing optimization tool kits to write computer programs and to implement algorithms and solve problems.
K4	CO4	To analyze the problem situation leading to better control, better co-ordination, better systems and finally better decisions.

Units	Content	Hrs
Unit I	Linear Programming Problem: Graphical Solution Method- General Linear Programming Problem (Definition alone) - Canonical and Standard forms of LPP. Simplex Method: Basic Solution and Degenerate Solutions to Linear Equation- Simplex Method- Big M Method (Only Simple Problems).	10
Unit II	Transportation Problem: North West Corner Method- Least Cost Method- Vogel's Approximation Method- Moving towards optimality UV Method. Assignment Problem: Definition- Assignment Algorithm-Hungarian Assignment Method- Unbalanced AP.	10
Unit III	Inventory Control: Introduction- *Types of Inventory*- Inventory Decision- Economical Order Quantity (EOQ) - Deterministic Inventory Problems.	10
Unit IV	Sequencing Problems: Introduction- Problems with n Jobs and 2 Machines- Problems with n Jobs and k Machines- Problems with 2 Jobs and k Machines (Simple Problems).	11

Unit V	Network Scheduling: Introduction- Network and Basic Components- *Rules of Network Construction*- Time calculation in Networks-CPM-PERT-PERT Calculations- Difference between CPM and Pert Network.	11
	Total Contact Hrs	**52**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study
1. Kanti Swarup, P.K.Gupta, Man Mohan *Operations Research*, Sultan Chand & Sons, Seventh Edition, 1996(Unit 1 to 5).
Books for Reference
1. R. Paneer Selvam, *Operation Research*, Prentice Hall of India Pvt Ltd, Second Edition.

Mapping

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	M	H	H
CO2	S	M	M	H	M
CO3	M	M	S	L	M
CO4	S	H	S	S	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 4N3	Title	Batch:	2018-2021
Hrs/Week:	1	NME: PROGRAMMING LAB –OPEN SOURCE SOFTWARE	Semester	IV
			Credits	02

Course Objective

To create a high-end image manipulation application that is free to use and modify by everyone, ever.

Course Outcomes (CO)

K3	CO1	To keep in mind about the open source software and their opportunity in their career.
K4	CO2	To get the idea about the Graphic Design open software.
K5	CO3	To verify their creativity skill using GIMP Free open source software.

1. Create a Business Card.
2. Create a Monthly Calendar.
3. Change the Background Transparent and Save it in Transparent Image.
4. Create a Poster with a Fancy Font.
5. Convert Blur Image into Correct Image.
6. Changing Hair Color into Simply Fix Grey Hair.
7. Convert an Image into Blend Images using Layer Masking.
8. Create a 3D Text.
9. Create an Outline using a Brush Strokes.
10. Create a Photo Manipulation.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	H	H	H	H
CO2	S	H	M	M	H
CO3	M	H	S	M	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 4N4	Title	Batch:	2018-2021
Hrs/Week:	1	PROGRAMMING LAB NME: 2D ANIMATION	Semester	IV
			Credits	02

Course Objective

To provide a depth knowledge in designing text animation and lighting effects.

Course Outcomes (CO)

K3	CO1	To remember graphics primitives and demonstrate geometrical transformations.
K4	CO2	To get the idea with interactive graphics applications using one or more graphics application programming interfaces.
K5	CO3	To identify effectively and creatively solve a wide range of graphic design problems.

1. Setting Motion for a Butterfly.
2. Create a Rain Effect.
3. Create a masking.
4. Create a Basket Ball.
5. Create a Text Animation.
6. Design a Cartoon Background.
7. Create a Water Effect.
8. Create a flash website.
9. Create a Lightening Effect for Text.
10. Create an Image Gallery using Buttons.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	H	M	H	S	H
CO3	M	S	S	M	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 519	Title	Batch:	2018-2021
Hrs/Week:	4	FRAMEWORK TECHNOLOGIES	Semester	V
			Credits	04

Course Objective

To develop knowledge about the methodologies behind Vb.Net and Asp.Net. To develop Dot Net based applications using ADO.NET and SQL managed provider-OLEDB managed provider.

Course Outcomes (CO)

K1	CO1	To recollect the basic structure of visual basic .net and main features of IDE.
K2	CO2	To understand the .net framework and describe some of the major enhancement to the new version of visual basic.
K3	CO3	To apply message passing mechanism between components and message threads using messaging.
K4	CO4	To analyze the applications using Microsoft windows forms and ADO .Net.

Units	Content	Hrs
Unit I	Introduction to .Net: .net framework- difference between VB6 and VB.Net-Object-Oriented programming and VB.Net-Data types-Variables-Operators-Arrays-Conditional logic.	10
Unit II	Procedures- Dialog boxes- File IO and System objects- Error handling- Namespaces-Classes and Objects- Multithreading-Message Queue.	10
Unit III	VB.Net IDE-Compiling and Debugging-Customizing- Data access: ADO.Net- Visual studio .Net and ADO.Net. Windows Forms: Controls-Specific controls- *Irregular forms*.	12
Unit IV	VB.Net and web: Introduction to ASP.Net page framework-HTML server controls- Web controls- Validation controls- Events-CSS-State management- Tracing- Security.	10
Unit V	Web Services: Introduction- Infrastructure- SOAP-*Building web services*- Deploying and publishing web services- Finding and consuming web services- REST- why use REST over SOAP- SOAP vs REST.	10
	Total Contact Hrs	**52**

Books for Study
1. Bill Evjen, Jason Beres, et.al, Visual Basic .Net programming, Wiley Dreamtech India (p) Ltd. ISBN 81-265-0254-1(Unit 1 to 5).

Books for References
1. Fergal Grimes, ―Microsoft .NET for programmers, Shroff Publishers & distributors (p) Ltd. ISBN 81-7366-540-0. 2. Thuan Thai & Hoang Q.Lam, ―.NET Framework essentials, Shroff Publishers & Distributors (p) Ltd. ISBN 81-7366-654- .

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	S	M
CO2	M	H	M	M	S
CO3	M	H	H	H	S
CO4	H	H	H	M	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 520	Title:	Batch:	2018-2021
Hrs/Week:	4	SOFTWARE TESTING	Semester	V
			Credits	04

Course Objective

To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies and methods. To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects using Win Runner tool.

Course Outcomes (CO)

K1	CO1	To keep in mind the fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
K2	CO2	To understand how to plan a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report and how to write software testing documents.
K3	CO3	To execute software testing automation problems and solutions.
K4	CO4	To analyze the techniques and skills on how to use modern software testing tools to support software testing projects.

Units	Content	Hrs
Unit I	Software Quality Assurance (SQA), Quality Control (QC), Comparison between QA & QC. Introduction to Testing, Black Box Testing: Equivalence Partitioning- Boundary Value Analysis-Error Guessing- White Box Testing: Statement Coverage-Decision Coverage-Path Coverage- Test Case- Levels of Testing: Unit Testing-Integration Testing- Sub System Testing-System Testing- Acceptance Testing.	10
Unit II	Software Testing Life Cycle-Special Types of Testing: Documentation Testing- Smoke Testing- Sanitary Testing- Compatibility Testing- Usability Testing- Configuration Testing- Disaster Testing- Interoperability Testing- Acceptance Testing- Load Testing-Stress Testing- Recovery Testing-Regression Testing- Security Testing, Client/Server Testing- Web Testing-Performance Testing.	10

Unit III	Test Plan- Phases of Test Plan-*Hierarchy of Test Plan*-Hierarchy of Test Document-Test Plan Process-Components of a Test Plan.-Verification and Validation- Audits-Reviews- Software Metrics- Process Metrics- Project Metrics-Product Metrics- Testing Metrics.	10
Unit IV	Introduction to Automation Test Tools- Automation Process- Features of Automation Tools: Record and Playback- Integration- Environment Support- Database Test- Data Function- Object Mapping- Image Testing- Object Name-Map-Object Identity Tool- Test/Error Recover- Web Testing- Extensible Language- Mercury Interactive- Quality Standards	10
Unit V	Introduction to WINRUNNER- *Two Models for Recording Test:* Context Sensitive- Analog Model-Six Main Stages of Testing Process in Win runner- Starting Win runner- Main Win runner-Window- Text Window- User Tool Bar- Executing Commands using Soft Keys- Understanding GUI Map- Viewing GUI Object Properties-Saving the GUI Map.	12
	Total Contact Hrs	**52**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. Course Material prepared by the Department of Computer Science based on the above web references (Unit 1 to 5).

Books for Reference

1. Srinivasan Desikan & Gopalswamy Ramesh, Software Testing, Pearson Edition, 2007.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	H
CO2	S	S	H	S	M
CO3	H	S	S	H	H
CO4	S	S	H	H	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 521	Title	Batch:	2018-2021
Hrs/Week:	5	COMPUTER NETWORKS	Semester	V
			Credits	05

Course Objective

To be familiar with the basics of data communication, various types of computer networks, experience in designing communication protocols.

Course Outcomes (CO)

K1	CO1	To remember, use and implement Computer Networks and the basic components of a Network system.
K2	CO2	To understand the layers of OSI and TCP and get knowledge about congestion control and network security.
K3	CO3	To apply pieces of hardware and software to make networks more efficient, faster, more secure, easier to use, able to transmit several simultaneous messages, and able to interconnect with other networks.
K4	CO4	To analyze packet switching networks, evaluate shortest path routing and traffic management at packet level, flow level and flow aggregate level.

Units	Content	Hrs
Unit I	Introduction: Uses of Computer Network- **Network Hardware:** LAN – WAN – MAN – Wireless – Home Networks. **Network Software:** Protocol Hierarchies – Design Issues for the Layers – Connection-oriented and connectionless services – Service Primitives – The Relationship of services to Protocols. **Reference Models:** OSI Reference Model – TCP/IP reference Model	13
Unit II	**Physical Layer** - Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. **Wireless Transmission:** Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Light Waves. **Communication Satellites:**	13

	Geostationary, Medium-Earth Orbit, Low Earth-orbit Satellites – Satellites versus Fiber. **Data-Link Layer:** Error Detection and correction – Elementary Data-link Protocols – Sliding Window Protocols.	
Unit III	**Medium-Access Control Sub Layer:** Multiple Access Protocols – Ethernet – Wireless LANs - Broadband Wireless – Bluetooth. **Network Layer:** Routing algorithms – Congestion Control Algorithms. **Transport Layer:** *Elements of Transport Protocols* – Internet Transport Protocols: TCP.	13
Unit IV	**Session Layer:** Session and Transport Interaction – Synchronization Points – Session Protocol Data Unit. **Presentation Layer:** Translation – Encryption/Decryption – Authentication – Data Compression.	13
Unit V	**Application Layer:** DNS – E-mail. NETWORK SECURITY: Cryptography –Symmetric Key Algorithms – Public Key Algorithms – *Digital Signatures*.	13
	Total Contact Hrs	**65**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. Andrew S. Tanenbaum, *"Computer Networks",* 4th edition Reprint 2003, PHI. (Unit -1, 2, 3, 5)
2. Behrouz A.Forouzan, "*Data Communication And Networking"*, 2nd Edition Update, Genuine Tata Mcgraw – Hill Edition. (Unit – 4)

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	H	H
CO2	H	H	S	M	H
CO3	H	M	H	M	M
CO4	H	M	S	M	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 522	Title	Batch:	2018-2021
Hrs/Week:	5	ORGANIZATIONAL BEHAVIOUR	Semester	V
			Credits	05

Course Objective

To develop the knowledge in personality, perception, attitudes and motivation and to learn about stress management, communication, leadership, organization structure and organization culture.

Course Outcomes (CO)

K1	CO1	To recollect the Individual Behaviour and its effects.
K2	CO2	To understand the Personality, Perception, Attitudes and Values.
K3	CO3	To apply Learning and Motivation concepts in an Organization.
K4	CO4	To analyze the Organizational Culture and Organizational Structure.

Units	Content	Hrs
Unit I	Introduction: Elements of OB – Nature and Scope of OB - Contributing Disciplines to OB. Organisational Behaviour in Historical Perspective - Foundations of Individual Behaviour: Introduction – The Individual and Individual Differences – Human Behaviour and its Causation.	13
Unit II	Personality – Perception - Attitudes: Concept of Attitudes – Formation of Attitudes – Types of Attitudes – Measurement of Attitude – Change of Attitude. Values: Concept of Value – Types of Values – Formation of Values – Values and Behaviour. Job Satisfaction.	13
Unit III	Learning: Meaning and Definition – Determinants of Learning – Learning Theories – Learning Principles – Reinforcement – Punishment – Learning and Behaviour. Motivation: Concepts – Meaning of Motivation – Nature of Motivation – Motivation Cycle or Process – Need for Motivation – Theories of Motivation – Motivation and morale. *Group Behaviour*.	13

Unit IV	Organisational Conflicts: Definition of Conflict – Sources of Conflict – Types of Conflicts – Aspects of Conflicts – Functional Conflict – Dysfunctional Conflict – Conflict Process – Conflict Management. Job Frustration - Stress Management.	13
Unit V	Communication: Nature and Need for Communication – Communication Process – Communication Channel – Communication Networks – Communication Barriers – Effective Communication. Leadership - Organisational Structure - *Organisational Culture*.	13
	Total Contact Hrs	**65**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. S.S Khanka, *"**Organizational Behaviour**",* S.Chand & Company Ltd, 2002 (Unit 1 to 5).

Books for Reference

1. John W Newstorm and Keith Davis – *"Organizational Behaviour"* – TMH, 2001.
2. Hugh J Arnold and Daniel C Fieldman – *"Organizational Behaviour"* – MC Graw Hill, 1996.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	L	S
CO2	S	S	L	M	M
CO3	S	S	S	M	H
CO4	H	H	S	S	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 523	Title	Batch:	2018-2021
Hrs/Week:	5	PROGRAMMING LAB VI:FRAMEWORK TECHNOLOGIES	Semester	V
			Credits	02

Course Objective

To master the basics of visual basic .Net and to build windows applications using structured and object based programming techniques.

Course Outcomes (CO)

K3	CO1	To remember the .NET environment to create Web Service-based applications and components.
K4	CO2	To get the idea about object-oriented programming techniques including classes, objects, methods, instance variables, composition, and inheritance, and polymorphism
K5	CO3	To verify the files created in Microsoft windows forms and ADO.Net

Console Applications

- Create a Program to implement the concepts of Object oriented programming techniques.
- Create a program to implement multiple inheritances using interface.
- Create a program to validate the data members in the class using property.
- Create a program to catch the exceptions.
- Create a program to implement multithreading.
- Write a program to implement stack operations using array.
- Write a program to implement Queue using array.
- Write a program to perform file operations.

Windows Applications

- Create a directory list using tree view control.
- Create a calculator using basic controls.
- Create a notepad editor using Context menu strip and menu controls.
- Create an application to illustrate the use of dialog boxes.
- Create an application for students Proctorial report.
- Create an application for library management system.
- Create an application for Pay roll processing system.
- Create a program to generate electricity Bill.

Web Applications

- Create a web page to generate a photo gallery.
- Create an application for encryption and decryption.
- Create an Alumni registration form.
- Create a website for online Quiz.
- Create your own portal which describes yourself and your skills.
- Create a portal for online purchasing system.
- Create a portal and validate the web page using validation controls.
- Create a web page and validate that page using client side scripting.
- Create a crystal report for Alumni registration portal.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M
CO2	S	S	H	L	M
CO3	S	S	S	L	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 524	Title :	Batch:	2018-2021
Hrs/Week:	5	PROGRAMMING LAB –X : SOFTWARE TESTING	Semester	V
			Credits	02

Course Objective

To learn strengths and weaknesses of variety of software testing techniques by implementing practically. To learn how to write test cases in programming languages and to practice different testing methodologies.

Course Outcomes (CO)

K3	CO1	To remember the fundamental concepts in software testing
K4	CO2	To understand the current state-of-the-art in software testing.
K5	CO3	To validate software testing automation

1. To perform some basic operation using calculator in context sensitive mode.
2. To perform some basic operation in paint using Win Runner Analog Mode.
3. To create a GUI checkpoint for single Property using Win Runner.
4. To create a GUI checkpoint for object property using Win Runner.
5. To create a GUI checkpoint for multiple object using Win Runner.
6. To work with the BITMAP checkpoint for object/window property using Win Runner.
7. To check the database checkpoint for default check using Win Runner.
8. To check the database checkpoint for custom check using Win Runner.
9. To create a GUI-SPY using Win Runner.
10. To perform an operation in data driver wizard using Win Runner.
11. To develop a test script to test addition of two numbers in VB using GUI checkpoint.
12. To develop a test script for testing calculator using GUI checkpoint.
13. To develop a test script for testing Flight Reservation using GUI checkpoint.
14. To develop a test script to test the Timer control application and adding GUI checkpoint.
15. To develop a test script for List box application developed in VB.
16. To develop a test script for student details using GUI in database checkpoint.
17. To develop a test script for testing Railway Reservation using synchronization point.

18. To develop a test script for testing bank details application developed in VB using insert function.
19. To develop a test script for testing Hotel Management application using insert function and data driver Wizard.
20. To work with insert function for object window in Win Runner.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	H	H	M
CO2	S	H	S	S	M
CO3	S	H	S	H	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 5S1	Title	Batch:	2018-2021
Hrs/Week:	1	SOFTWARE ANALYSIS AND DESIGN	Semester	V
			Credits	02

Course Objective

To impart knowledge about the process of analysis, design and object orientation through providing a framework of the activities involved in designing software**.**

Course Outcomes (CO)

K1	CO1	To remember the data to analyze and specify the requirements of a system.
K2	CO2	To get the idea about the design system components and environments.
K3	CO3	To implement the general and detailed models that assist programmers in implementing a system.
K4	CO4	To figure out a database for storing data and a user interface for data input and output, as well as controls to protect the system and its data.

Units	Content	Hrs
Unit I	**Data and Information:** Information - Kinds of information-firm-user staff-work flow-origin of information-Information gathering tools- Review-onsite-Observation-Interviews and Questionnaires. **System Analysis and Analyst:** System development life cycle- Recognition - Feasibility Study – Analysis - Design-Implementation-maintenance - Role of systems analyst –qualification-multifaceted role of the analyst- analyst interface-behavioral issues-conflict resolution.	3
Unit II	**Feasibility Analysis:** System performance definition: statement of constraints-identification of specific system objectives-description of outputs-feasibility study-considerations-steps in feasibility analysis-feasibility report-oral presentation.	2

Unit III	**Input Output and Forms Design:** Input design-Input data-input media and devices-output design-forms design-classification of forms-requirements of forms design-types of forms-layout considerations-*forms control*.	2
Unit IV	**Object Oriented Systems Modeling:** Object oriented concepts -classes and objects-attributes-operations-methods and services-messages-design for object oriented systems-conventional vs. OO approaches – design issues-object design process –design patterns - object oriented testing-unit-integration-validation testing in the OO context.	3
Unit V	**Security System:** Security definition- Threat to system security:-personal computer and system integrity-risk analysis -Control Measures-identification – access controls-encryption-audit controls-system integrity-recovery requirements-failures-Disaster planning-plan-*ethics in system development*.	3
	Total Contact Hrs	**13**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. Elias M.Award, *System Analysis and Design* , Galgotia Publications (P) Ltd, Sec**o**nd Edition, 1996 (Unit 1 to 5).
2. Sommerville, *Software Engineering*, Pearson education, Sixth Edition.

Books for Reference

1. Roger Pressman, *Software Engineering*, A Practioner's Approach, Fourth Edition, 1997.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	H	H	M
CO2	S	M	L	S	M
CO3	M	S	H	M	H
CO4	H	H	H	S	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 5S2	Title	Batch:	2018-2021
Hrs/Week:	1	E-COMMERCE	Semester	V
			Credits	02

Course Objective

To understand the interest and opportunity of e-commerce to plan and how to manage e-commerce solutions to apply processes of e-commerce and to analyze and understand the human, technological and business environment associated with e-commerce, how to use technologies to build e-commerce websites.

Course Outcomes (CO)

K1	CO1	To keep in mind of the foundations and importance of E-commerce.
K2	CO2	To understand the electronic payment system for e-commerce and its security issues.
K3	CO3	To apply the concept of electronic data interchange and its legal, social and technical aspects.
K4	CO4	To analyze the security issues over the web, the available solutions and future aspects of e-commerce security.

Units	Content	Hrs
Unit I	Introduction to E-Commerce-Nature of E-Commerce-Features-Need for E-Commerce-Objectives-Types of E-commerce-Advantages and disadvantages-Framework of E-Commerce.	3
Unit II	E-Commerce and Business-Business Models of E-Commerce-B2B-B2C-B2C-C2B-C2C-B2E-G2B.Business applications of E-Commerce-Mobile Commerce-Applications.	3
Unit III	Electronic Data Interchange-Definitions-Evolution of EDI-Objectives-Advantages-Bottlenecks of EDI-Components of EDI-*Electronic Payment Systems.*	2
Unit IV	E-Online Banking-Electronic Delivery Channels-ATM-Telebanking-Electronic Money Transfer (EMT)-E-Cheque-E-Banking-Components-Advantages and Limitations of Online Banking.	3

Unit V	Security Issues in E-Commerce-Risks involved- E-Commerce security tools-Biometric-Client Server Network Security-Data and Message Security-Legal and Ethical Issues-Cyber Law-Aims-*Salient Provisions*.	2
	Total Contact Hrs	**13**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study
1. E-Commerce, E-Business-Dr.C.S Rayuda, Himalaya Publishing house, Reprint Editions 2008(Unit 1 to 5).
Books for Reference
1. E-Commerce,Kamalesh, K.Bajaj and Debjani Nag, TATA MC Graw Hill Publications, New Delhi. 2. Marketing and E-Commerce, Roger Leroy Miller, West Thomson Learning Australia

Mapping

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	H	M	M
CO2	S	M	H	M	H
CO3	M	M	M	L	M
CO4	S	M	M	M	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 5S3	Title	Batch:	2018-2021
Hrs/Week:	1	APTITUDE	Semester	V
			Credits	02

Course Objective

To equip the students to critically evaluate various real life situations and will be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

Course Outcomes (CO)

K1	CO1	To keep in mind the personal career assessment to identify the strong and weak points.
K2	CO2	To understand which type of career will be best suited according to their potential.
K3	CO3	To apply the individual's potential ability to grow with their career.
K4	CO4	To analyze their skills, values likes, dislikes and their innate abilities.

Units	Content	Hrs
Unit I	**Number System:** Prime numbers- Divisibility of numbers – Factors and multiples – HCF & LCM – **Average:** Average of different groups – Addition and removal of items and change in average –**Profit and Loss:** Relation among Cost price, selling price, gain/loss and its percentage.	3
Unit II	**Simple and Compound Interest:** Fundamentals of Interest & its understanding –Difference between Compound Interest and Simple Interest – **Ratio and Proportion:** Ratio application problems – proportion application problems – **Time and Work:** Individual efficiency – Group efficiency – Pipes and cistern.	3
Unit III	**Time, Speed and Distance:** Average speed – Early - late problem – Relative speed – effective speed - **Mensuration & Geometry:** Area – Volume - Heights & Distance – ***Data Interpretation:*** Table - Bar chart - Pie chart - *Line graph.*	3

Unit IV	**Logical Reasoning:** Coding & Decoding – Seating Arrangement – Blood relation – Cubes – Venn diagram – Number series – odd man out – Data sufficiency.	2
Unit V	**Verbal Ability:** Reading Comprehension – Error spotting – Sentence correction – Para Jumbles – Cloze test – Vocabulary – *fill in the blanks.*	2
	Total Contact Hrs	**13**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study
1. Dr.R.S.Aggarwal, *Quantitative Aptitude*, S.Chand Publication, 20 th Edition, (Unit 1 to 3). 2. Dr.R.S.Aggarwal, *A Modern Approach to Verbal and Non- Verbal*, Reasoning,S.Chand Publication, Old Edition, (Unit 4 to 5)
Books for Reference
1. Abhijit Guha, 'Quantitative Aptitude for All Competitive Examinations', Sixth revised edition

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	H	H	M
CO2	S	S	S	H	M
CO3	S	S	M	M	H
CO4	H	S	M	S	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 625	Title	Batch:	2018-2021
Hrs/Week:	5	ADVANCED JAVA PROGRAMMING	Semester	VI
			Credits	04

Course Objective

Develop error-free, well-documented Java programs; test Java servlets while developing Java programs which incorporate advanced graphic functions. Learn how to write, test, and debug advanced-level Object-Oriented programs using Java.

Course Outcomes (CO)

K1	CO1	To keep in mind to implement programs in the Java programming language that makes strong use of classes and objects.
K2	CO2	To understand the concept of Connecting database using JDBC and accessing database.
K3	CO3	To implement the concepts of servlets, JSP & EJB for building enterprise applications.
K4	CO4	To analyze platform independent applications using a variety of component based frameworks.

Units	Content	Hrs
Unit I	A Tour of Swing**:** JApplet-Icons and Labels-Text Fields-Buttons-The JButton Class-Check Boxes-Radio Button-Combo Boxes-TabbedPane-Scroll Panes-Tree-JMenus.	13
Unit II	Servlet Overview and Architecture**:** Movement to Server Side Java-What is Java Servlet-Practical Applications for Java Servlet-Java Servlet Alternatives-Reasons to use Java Servlets-Java Servlet Architecture. Servlet Basics**:** Life cycle of a Servlet- A Basic Servlet-Basic Servlet Source-Building and Installing the Basic Servlet- The HTML Required to Invoke the Servlet-Dissecting the Basic Servlet.	13
Unit III	Servlet chaining**:** What is Servlet Chains-Invoking a Servlet Chain-Servlet Alias-HTTP Request- A Practical Example using Servlet Chaining	13

	Servlets and JDBC**:** What is JDBC-Two and Three Tier Database Access Models- JDBC Driver Types-*JDBC Basics*- A Basic JDBC Servlet.	
Unit IV	JSP**:** What are JSP-User Defined Java Beans-Implicit Java Beans-Conditions-Directives-Declarations-Implicit Variables-Scriptlets-Expressions.	13
Unit V	EJB**:** EJB Architecture-Overview of EJB-*Software Architecture*-View if EJB-Conversation-Building and Deploying EJB's-Roles in EJB.	13
	Total Contact Hrs	**65**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study

1. Herbert Schildt, *The Complete Reference*, Tata McGraw-Hill, Fifth Edition, 2002 (Unit 1).
2. James Goodwill, *Developing Java Servlet*, Techmedia, First Edition, 1999 (Unit 2, 3 &4).
3. Tom Valesky, "*Enterprise Java Beans*", Pearson Education, 2002 (Unit 5).

Books for Reference

1. James Keogh, Jim Keogh, *J2EE: The Complete Reference*, McGraw- Hill/Osborne, Seventh Edition, 2002.
2. Bruce W.Perry, *Java Servlet and JSP Cookbook*, O'Reilly, First Edition, 2004.

Mapping

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	M	H	H
CO2	H	M	M	H	H
CO3	H	H	M	M	H
CO4	S	H	M	H	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 626	Title	Batch:	2018-2021
Hrs/Week:	4	DATA MINING AND WAREHOUSING	Semester	VI
			Credits	03

Course Objective

To introduce students the basic applications, concepts and techniques of data mining and to develop skills for applying data mining techniques and algorithms to solve practical problems in variety of disciplines.

Course Outcomes (CO)

K1	CO1	To remember the contribution of data mining to the decision-support level of organizations
K2	CO2	To understand and carefully differentiate between situations for applying different data-mining techniques
K3	CO3	To implement different models used for OLAP and data preprocessing
K4	CO4	To estimate data-mining and data warehousing solutions for different applications

Units	Content	Hrs
Unit I	Introduction to Data Mining: Definition- Kinds of Data- Kinds of Patterns - Technologies used – Major Issues in Data mining – Data mining Applications & Trends – Data objects & Attribute types – Data visualization.	10
Unit II	Data Preprocessing: Data cleaning: Missing values, Noisy data, Data cleaning as a process-Data Integration: Entity Identification problem, Redundancy and correlation analysis, Tuple Duplication, Data value conflict detection & resolution – Overview of Data reduction strategies – Data transformation strategies overview.	10
Unit III	Knowledge Discovery Process: Data Selection-Cleaning-Enrichment-Coding-Data Mining-*Preliminary Analysis of Data Set Using Relational Query Tools*-Visualization Techniques-Likelihood and Distance-OLAP Tools-K-Nearest Neighbour-Decision Trees-Association Rules-Neural Networks-Genetic Algorithms-Reporting.	10

Unit IV	Setting Up KDD Environment: Introduction-Different forms of Knowledge-Getting Started-Data Selection-Cleaning-Enrichment-Coding-Reporting-10 Golden Rules.	10
Unit V	Data warehousing: Basic concepts – Modeling – Design and usage – Data warehouse Implementation – Data generalized by Attribute – *Oriented Induction*.	12
	Total Contact Hrs	**52**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study
1. Data mining concept and Techniques, Jiawei Han, Micheline Kamber, Jian pei, Morgen Kaufmann publishers, 3rd edition (Unit 1,2 and 5). 2. Peter Andriaans Dolf Zantinge, *Data Mining*,Addison Wesley Publications, Second Edition, 2000(Unit 3, 4).
Books for Reference
1. Ian H. Witten & Edile Frank, *Data Mining- Practical Machine Learning Tools & Techniques*, Second Edition, 2005. 2. Daniel T. Larose, *Data Mining Methods and Models*, John Weiley & Sons, Student Edition, 2006.

Mapping

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	H	M	H	S
CO2	S	H	S	S	H
CO3	S	H	M	S	M
CO4	S	M	S	S	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 627	Title	Batch:	2018-2021
Hrs/Week:	4	INFORMATION SECURITY	Semester	VI
			Credits	3

Course Objective

To select appropriate techniques to tackle and solve problems in the discipline of information security management. To know why security and its management are important for any modern organization.

Course Outcomes (CO)

K1	CO1	To recollect the familiarity with prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath.
K2	CO2	To understand the information assurance as practiced in computer operating systems, distributed systems, networks and representative applications
K3	CO3	To implement the basic understanding of cryptography, how it has evolved, and some key encryption techniques used today
K4	CO4	To analyze the security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

Units	Content	Hrs
Unit I	**Introduction to Computer Security:** Basic Concepts –Security Trends – OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms - Threat models - Common Security Goals - Memory protection - Access control – Authorization - Authentication- Enforcement of security - Security Evaluation.	**11**
Unit II	**Cryptography:** Cryptographic Protocols - Including Encryption – Message Authentication Goals – DES - Hash Functions - Public-key Cryptography - Secure channels - Cryptographic Protocols and their Integration into Distributed Systems and other applications.	**10**

Unit III	**Network Security:** Intruders – Intrusion Detection – Password Management – *Malicious Software* – Viruses and Related Threats – Countermeasures – Distributed Denial of Service Attacks – Firewalls – Design Principles – Trusted Systems.	**10**
Unit IV	**Software Security:** Secure software engineering – Hackers, Crackers, and Attackers – Security Failures – Technical Trends affecting Software Security - Defensive programming and its Techniques- Buffer overruns and other implementation flaws.	**10**
Unit V	**Language-based security:** Analysis of code for Security errors - Safe languages and Sandboxing Techniques. **Case Studies:** Privacy - Mobile code - Digital rights management and copy protection - Trusted devices - Denial of Service and Availability - Network based Attacks - Security and the Law - *Electronic Voting*.	**11**
	Total Contact Hrs	**52**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study
1. William Stallings, "Cryptography and Network Security", 4th Edition, Prentice Hall, 2008 (Unit 1, 2 & 3).
2. Debby Russell and Sr. G.T.Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O'Reilly Media, 2006 (Unit 4).
3. Behrouz A. Forouzan, "Cryptography and Network Security", Special Indian Edition, Tata Mc-Graw Hill Publications, 2007 (Unit 3, 4 &5)

Books for Reference
1. Charles P pfleeger and Shai Lawrence pfleeger, "Security in Computing", Fourth Edition, Prentice Hall, 2007. 2. Ross J.Anderson and Ross Anderson, "Security Engineering: A Guide to Building Dependable Distributed Systems", Wiley, 2001. 3. Thomas R. Peltier, Justin Peltier and John Blackley, "Information Security Fundamentals", 2nd Edition, Prentice Hall, 1996.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	H	M	H	S	H
CO3	M	S	S	M	M
CO4	M	H	H	L	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 628	Title	Batch:	2018-2021
Hrs/Week:	5	CURRENT TRENDS AND TECHNOLOGIES	Semester	VI
			Credits	05

Course Objective

To study and apply IT applications with a wide range of concepts and technical skills in the areas to succeed in the future.

Course Outcomes (CO)

K1	CO1	To implement Data and Knowledge Management and use of Devices in IoT Technology.
K2	CO2	To analyze the terminology used by SAP ABAP, knowledge of big data and its technologies in Big Data Analytics.
K3	CO3	To keep in mind of Cyber Security Policy and Security Evolution.
K4	CO4	To get the idea to apply a Objectives and Guidance of Cyber security.

Units	Content	Hrs
Unit I	IOT ARCHITECTURE: History of IOT- *Machine to machine*- Web of things- IOT protocols APPLICATIONS: Remote monitoring and sensing- Remote controlling - Performance analysis - The layering concepts - IOT communication pattern- IOT protocol Architecture- The 6LoWPAN- Security aspect in IOT.	13
Unit II	SAP: SAP System Overview: SAP System Architecture-Environment for Programs-First look at the ABAP Workbench. DATA DICTIONARY: Introduction-Creating a table-Technical settings-Entering records into a table-Viewing the data in a table.	13
Unit III	BIG DATA NOW: Introduction - *Evolving tools and techniques*-Data Analysis-Big data and advertising-Tightly integrated engines streamline big data analysis -Data scientists tackle the analytic lifecycle-Pattern Detection and Twitter's Streaming API.	13
Unit IV	CYBER SECURITY: Introduction - What is Cyber Security? -	12

	What is Cyber Security Policy – Domain of Cyber Security Policy- Laws & Regulations – Enterprise Policy – Technology Operations – Technology Configurations – Cyber Security Evolution – Productivity - Internet – E Commerce – Counter Measures Challenges.	
Unit V	CYBER SECURITY OBJECTIVES AND GUIDANCE: Cyber Security Metrics – Security Management Goals – counting Vulnerabilities – Security Frameworks - E-Commerce System- Industrial Control system - Personal Mobile Device – Security policy Objectives Guidance for Decision Markers – Tone at the Top – Policy as a project – Cyber Security Management –Arriving at Goals – Cyber Security Documentation – The catalog Approach – Catalog Format – Cyber Security Policy.	14
	Total Contact Hrs	**65**

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Books for Study
1. Rajiv Ramnath, Roger Crawfis, and paolo sivilotti, Android SDK3 for Dummies, Wiley2011 (Unit 1). 2. BEGINNER'S GUIDE TO SAP ABAP- Peter Moxon, Sapprouk Limited 2012 (Unit 2). 3. Big Data Now 2013 Edition- O'Reilly Media, Inc. (Unit 3). 4. Jennifer L. Bayuk, J. Healey, P.Rohmeyer , Marcus Sachs , Jeffery Schmit , Joseph Weiss "Cyber Security Policy Guidebook" John Wiley & Sons 2012. (Unit 4 & 5)
Books for Reference
1. Brain fling, Mobile Design and Development O'Reily media, 2009 2. Maximiliano Firtman, Programming the Mobile Web, O'Reily Media 2010

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	H	M	M
CO2	H	M	H	M	M
CO3	H	M	H	M	H
CO4	S	H	M	M	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 629	Title	Batch:	2018-2021
Hrs/Week:	5	PROGRAMMING LAB – XI: ADVANCED JAVA PROGRAMMING LAB	Semester	VI
			Credits	02

Course Objective

To provide encapsulation for an application's business logic, with a strong foundation in Advanced Java Programming techniques.

Course Outcomes (CO)

K3	CO1	To remember the interactive user interfaces using the Java Swing class and appropriate layout managers.
K4	CO2	To get the idea in exposing advanced topics including multithreading, internet networking, and JDBC database connectivity.
K5	CO3	To identify advance concepts of java programming with database connectivity.

1. Write a program to implement the concept of JTextField.
2. Write a program to implement the concept of JLabel.
3. Write a program to implement the concept of JCheckBox.
4. Write a program to implement the concept of JRadioButton.
5. Write a program to implement the concept of JcomboBox.
6. Write a program to implement the concept of JMenu, JMenuBar.JMenuItem.
7. Write a program to implement the concept of JTabbedPane.
8. Write a program to implement the concept of JTree.
9. Write a program to make use of Generic Servlet.
10. Write a program to find the request method that is fetched using Servlet.
11. Write a program to develop simple servlet using Generic servlet.
12. Write a program to display the employee details using servlets.
13. Write a program to illustrate servlet chaining.
14. Write a program to develop simple servlet using HTTP tags.
15. Write a program to develop simple servlet to count the number of times an applet being accessed.
16. Write a program to implement the concept of JDBC-ODBC Connectivity.
17. Write a program to count the number of times an JSP is accessed.
18. Write a program to generate Fibonacci series using JSP.
19. Write a program to create java beans to make use of juggler beans.
20. Write a program to create java beans to make use of molecular beans.
21. Write a program to create java beans to make use of sorter beans.
22. Write a program to implement the concept of simple property.
23. Write an EJB Stateless Program to create bonus of an employee.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	M	M	M
CO2	H	H	M	M	M
CO3	H	M	M	M	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 630	Title	Batch:	2018-2021
Hrs/Week:	5	PROGRAMMING LAB XII: GRAPHICS AND MULTIMEDIA	Semester	VI
			Credits	02

Course Objective

To measure the students understanding of Computer Graphics techniques concepts and algorithm. To demonstrate how still image and multimedia animation to can be digitalized on the computer.

Course Outcomes (CO)

K1	CO1	To keep in mind practical fundamentals of line drawing and circle drawing.
K2	CO2	To get the idea about multimedia presentations.
K3	CO3	To access the various motion effects created in flash.

PHOTOSHOP

1. Designing a Visiting card using needed tools in Photoshop
2. Designing an Invitation card using needed tools in Photoshop
3. Creating a Magic light effect using needed tools, filters, and effects.
4. Converting a damaged skin of a girl to a beautiful skin using needed tools and effects in Photoshop
5. Converting a black and white image to new coloured image
6. Creating a Wallpaper using all the tools, filters, styles, and effects

FLASH

7. Setting motion for a butterfly
8. Digital clock
9. Rain effect
10. Create a solar eclipse using masking and motion effect
11. Creating a Race of Tortoise and Rabbit

GRPAHICS UNING C

12. Project an image in 3d using C
13. Adjust the RGB values of an image with key control
14. Demonstrate Bresenhan's line drawing algorithm.
15. Create a game using key control.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	S	M	H	S
CO2	H	M	H	S	H
CO3	M	S	S	M	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 6S4	Title	Batch:	2018-2021
Hrs/Week:	1	SOFTWARE INDUSTRY DOMAINS	Semester	VI
			Credits	02

Course Objective

To develop software development processes, including the knowledge, skills and professional competencies necessary to begin practice as a software engineer.

Course Outcomes (CO)

K1	CO1	To recollect the usage of computers in Healthcare systems.
K2	CO2	To understand the process of banking & Insurance with computers.
K3	CO3	To apply IT in Telecommunication and Textiles at various levels.
K4	CO4	To analyze a solution to the utility problem using computer softwares.

Units	Content	Hrs
Unit I	**Health Care Information Systems** : History and evolution of health care information systems – Current and emerging use of clinical information systems – system acquisition – System implementation and support – Security of health care information systems - Organizing information technology services – IT alignment and strategic planning – IT governance and management - Assessing and achieving value in health care information systems - Case study.	3
Unit II	**Banking and Insurance:** Account Management - Hardware Technology - Customer Accounts – Branch Banking Support – Information Systems Audit – Internet Banking - Electronic Transactions - Web-based Banking. The Uses of Computers in Insurance – Record Keeping - Providing Quotes - Assessing Risk – Underwriting - Life Insurance Applications: Life Administration Module - Policy Servicing of existing policies – New Business - Renewal notice/Billing – Loans - Statistics and MIS Claims - Archiving of historical data and imaging Systems.	3
Unit III	**Telecommunication Systems and Technologies:** Fundamental of Telecommunications - Digital Signal Processing - Wireless / Wire line Networks - PCS - GSM - working of dial up connection – ISP - ISDN - *Web enabled systems, virtual reality, and multimedia applications over Internet*. Protocol Engineering: Principles, stages, specification formalisms	3

	of telecom protocol design, protocol software development process, and computer aided protocol engineering.	
Unit IV	**Textile Industry:** Computers in Textiles – Texture Mapping – Computer Integrated Manufacturing – Order processing, Machinery Planning, Manufacturing – Quality Integration – MIS Reporting – Online monitoring in spinning and weaving – Maintenance and Quality control.	2
Unit V	**Energy Utilities:** Multi processor system – Real Time tasks- Energy Minimization – Energy aware scheduling- Dynamic Reconfiguration- Adaptive power management-*Energy Harvesting Embedded system*. Energy Aware Applications: On chip network – Video codec Design – Surveillance camera- Low power mobile storage.	2
	Total Contact Hrs	**13**

Books for Study
1. Course Material prepared by the Department of Computer Science based on the below web references (Unit 1 to 5).

Websites for Reference	
www.inventors.about.com	www.economywatch.com
www.modernhealthcare.com	www.indiantextilejournal.com
www.atmbanking.net	www.apparelsearch.com
www.banknetindia.com	www. telecoms.org

Mapping

PSO / CO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	H	H	H	M	H
CO2	M	M	S	S	H
CO3	H	H	M	S	H
CO4	H	H	H	S	M

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 6S5	Title	Batch:	2018-2021
Hrs/Week:	1	MULTIMEDIA AND ANIMATION	Semester	VI
			Credits	02

Course Objective

To learn the basic elements in basic of drawing, color and implement in the multimedia software and to apply the techniques to design real time pictures.

Course Outcomes (CO)

K1	CO1	To recollect the effects of multimedia in your daily life
K2	CO2	To get the idea about the animation into digital content and multimedia products.
K3	CO3	To execute the animation using computerised animation tools.
K4	CO4	To evaluate projects and presentations utilizing a variety of digital media multimedia technologies.

Units	Content	Hrs
Unit I	Introduction : MM presentation and production – Characteristics of MM presentation – h/w and s/w requirements- Uses of MM – Steps for creating MM presentation. Text - Types of text – Insertion of text – Text Compression – File formats.	3
Unit II	Image: Image types – Seeing color – Color models – Basic steps for image processing – Scanner– Digital Camera – Specification of Digital Images – Device independent Color Models – Image processing s/w – File formats.	3
Unit III	Audio: Nature of Sound-Fundamental characteristics of sound – Musical Note and Pitch –Elements of Audio systems. What is MIDI – MIDI manufacturers Association (MMA)-MDI Specification-MIDI MESSAGES-*MIDI Connections.*	3
Unit IV	Video: Introduction- Analog Video Camera – Transmission of video signals – Video signal formats..	2
Unit V	Introduction – Uses of animation – Key frames and	2

	Tweening – Types of animation – Creating movement – Principles of animation – *Techniques of animation* — Animation Software.	
	Total Contact Hrs	**13**

Seminar, Assignment, Case Study

- The topics given in **Italics** are noted as Self-Study topics.

Books for Study

1.Principles of Multimedia – Ranjan Parekh – Tata McGraw-Hill publishing Company Limited, New Delhi,2007 (Unit 1 to 5).

Books for Reference

1. Multimedia systems design – Prabhat K. Andleigh – Prentice Hall PTR publishing the University of Michigan, 1996.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	H	H	S
CO2	H	H	M	S	H
CO3	M	S	S	S	L
CO4	S	H	H	H	H

S-Strong; H-High; M-Medium; L-Low

Programme Code:	BCA	Programme Title:	Bachelor of Computer Applications	
Course Code:	18 UBC 6S6	Title	Batch:	2018-2021
Hrs/Week:	1	SOFT SKILLS	Semester	VI
			Credits	02

Course Objective

To develop the student broad career plans, evaluate the employment market, identify the organizations to get good placement, match the job requirements and skill sets.

Course Outcomes (CO)

K1	CO1	To keep in mind about the personality developments.
K2	CO2	To get the idea to connect and work with others to achieve a set task.
K3	CO3	To execute the clear briefing and listening skills, not being afraid to ask for help and support when necessary.
K4	CO4	To interpret the time and resource management, conflict resolution, teaching and mentoring others.

- The topics given in **Italics** are noted as Self-Study topics.

Seminar, Assignment, Case Study

Units	Content	Hrs
Unit I	Introduction – Soft and Hard skills – Communication Skills – Improving Body Language – Interpersonal Skills – Enhancing listening skills – Sharpening writing Skills – Presentation skills.	3
Unit II	Conflict management skills – resolving conflicts – Change management - Stress management – Excelling as a leader – Building Successful Teams – Motivating ourselves.	3
Unit III	Challenges in Indian Educational System- Soft skills at workplace- Soft skills for managers – Challenges in Management Education – *Blending Art and Craft for effective management education*.	3
Unit IV	Employability Skills – Enhancing Employability Skills – Improving Soft skills – Training and Grooming – Teaching Vs Training.	2
Unit V	Soft skills training – Resume Writing – Interview Tips – Common Interview Questions – Group Discussions – *Enhancing employability in management*.	2
	Total Contact Hrs	**13**

Books for Study
1. Barun K.Mitra, *Personality Development and soft skills*, Oxford University Press, 2011. (Unit 1 to 5).
Books for Reference
1. Nitin Bhatnagar, Effective Communication and Soft Skills, Nitin Bhatnagar, Pearson Education India, 2011.

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	S
CO2	H	L	H	H	S
CO3	M	L	S	H	M
CO4	M	H	H	M	H

S-Strong; H-High; M-Medium; L-Low