BCA 2022-25 Batch Scheme and Syllabus

SEMESTER I

S.N.	Course Code	Courses	L	T	P	Credit
1	CA3CO01	Problem Solving and Programming	3	1	4	6
2	CA3CO18	Digital Electronics	4	0	0	4
3	CA3CO03	Computer Fundamentals	4	0	0	4
4	CA3CO17	Mathematics-I	3	1	0	4
5	CA3AE01	English Communication	3	0	0	3
		Total	**17**	**2**	**4**	**21**
		Total Contact Hours		**23**		

SEMESTER II

S.N.	Course Code	Courses	L	T	P	Credit
1	CA3CO05	Object Oriented Programming	4	0	4	6
2	CA3CO06	Computer Architecture	3	1	0	4
3	CA3CO07	Data Structure	3	0	4	5
4	CA3CO19	Mathematics-II	3	1	0	4
5	CA3AE02	Environmental Science	3	0	0	3
		Total	**16**	**2**	**8**	**22**
		Total Contact Hours		**26**		

SEMESTER – III

S.N.	Course Code	Courses	L	T	P	Credit
1	CA3CO09	Database Management Systems	3	0	4	5
2	CA3CO10	Computer Networks	3	0	2	4
3	CA3CO20	Mathematics-III	3	1	0	4
4	CA3SE01	Web Designing	3	0	4	5
5	CA3EG07	Financial Accounting and Management	4	0	0	4
		Total	**16**	**1**	**10**	**22**
		Total Contact Hours		**27**		

SEMESTER – IV

S.N.	Course Code	Courses	L	T	P	Credit
1	CA3CO12	Operating System	4	0	0	4
2	CA3CO13	Software Engineering	4	0	0	4
3	CA3CO14	Object Oriented Technology	3	0	4	5
4	CA3SE06	PHP Programming	3	0	4	5
5	CA3EG11	Wireless and Mobile Computing	4	0	0	4
		Total	**18**	**0**	**8**	**22**
		Total Contact Hours	**26**			

SEMESTER – V

S.N.	Course Code	Courses	L	T	P	Credit
1	CA3CO21	Operations Research	4	0	0	4
2	CA3EL03	Advanced PHP	2	0	4	4
3	CA3EL07	Object Oriented Analysis and Design	4	0	0	4
4	CA3EL06	Python Programming	2	0	4	4
5	CA3EL09	Minor Project	0	0	4	2
6	CA3SE07	Software Testing	4	0	0	4
		Total	**16**	**0**	**12**	**22**
		Total Contact Hours		**28**		

SEMESTER – VI

S.N.	Course Code	Courses	L	T	P	Credit
1	CA3CO16	Network Security	4	0	0	4
2	CA3EL13	Linux and Shell Programming	3	0	4	5
3	CA3EL16	Cloud Computing	4	0	2	5
4	CA3EL17	Project Work	0	0	8	4
5	CA3SE10	Mobile Application Development	3	0	2	4
		Total	**14**	**0**	**16**	**22**
		Total Contact Hours		**30**		

List of Electives

List of Skill Enhancement (SE) Electives

S. N.	Course Code	Courses	L	T	P	Credit
1	CA3SE01	Web Designing	3	0	4	5
2	CA3SE02	MySQL (SQL/PL-SQL)	3	0	4	5
3	CA3SE03	Maintenance	3	0	4	5
4	CA3SE04	Introduction to Linux	3	0	4	5
5	CA3SE05	Open Source Software	3	0	4	5
6	CA3SE06	PHP Programming	3	0	4	5
7	CA3SE07	Software Testing	4	0	0	4
8	CA3SE08	R Programming	3	0	2	4
9	CA3SE09	XML Programming	3	0	2	4
10	CA3SE10	Mobile Application Development	3	0	2	4
11	CA3SE11	Ethical Hacking	3	0	2	4

List of Discipline Specific Electives (EL)

S. N.	Course Code	Courses	L	T	P	Credit
1	CA3EL01	Advanced Java	2	0	4	4
2	CA3EL02	Computer Graphics and Multimedia	3	0	2	4
3	CA3EL03	Advanced PHP	2	0	4	4
4	CA3EL04	.Net Programming	2	0	4	4
5	CA3EL05	Information Security	4	0	0	4
6	CA3EL06	Python Programming	2	0	4	4
7	CA3EL07	Object Oriented Analysis and Design	4	0	0	4
8	CA3EL08	Artificial Intelligence	4	0	0	4
9	CA3EL09	Minor Project	0	0	4	2
10	CA3EL10	Agile Software Development	4	0	0	4
11	CA3EL11	Management	4	0	0	4
12	CA3EL12	ASP.NET Programming	3	0	4	5
13	CA3EL13	Linux and Shell Programming	3	0	4	5
14	CA3EL14	Big Data Analytics	4	0	2	5
15	CA3EL15	Internet of Things	4	0	2	5
16	CA3EL16	Cloud Computing	4	0	2	5
17	CA3EL17	Project Work	0	0	8	4
18	CA3EL18	Data Mining	4	0	0	4
19	CA3EL19	Search Engine Optimization	4	0	0	4

List of Generic Electives (EG)

S. N.	Course Code	Courses	L	T	P	Credit
1	CA3EG01	Office Automation	2	0	4	4
2	CA3EG02	Desktop Publishing	2	0	2	3
3	CA3EG03	Shooting	4	0	0	4
4	CA3EG04	Engineering Graphics	3	0	2	4
5	CA3EG05	Principles of Animation	2	0	2	3
6	CA3EG06	Elements of Commerce	3	0	0	3
7	CA3EG07	Management	4	0	0	4
8	CA3EG08	Microprocessors	4	0	0	4
9	CA3EG09	Professional Ethics	3	0	0	3
10	CA3EG10	Cyber laws	3	0	0	3
11	CA3EG11	Computing	4	0	0	4
12	CA3EG12	E-Commerce	4	0	0	4

Nature of Course	Code
Core	CO
Ability Enhancement	AE
Skill Enhancement	SE
Discipline Specific Elective	EL
Generic Elective	EG

Semsterwise Credit for BCA

Nature of Course	Credits to be earned (As per Choice Based Credit System)						
	Semesters						Total
	I	II	III	IV	V	VI	
Core	**18**	**19**	**13**	**13**	**4**	**4**	71
Ability Enhancement	**3**	**3**					6
Skill Enhancement			**5**	**5**	**4**	**4**	18
Discipline Specific Elective					**14**	**14**	28
Generic Elective			**4**	**4**			8
Total							**131**

Medi-Caps University, Indore
Faculty of Science
Department of Computer Science

Course Code	Course Name	Hours Per Week				
		L	T	P	Hrs.	Credits
CA3CO01	Problem Solving and Programming	3	1	4	8	6

Unit-I

Problem Solving Methodology: Problem statement, Analysis, Design a solution, Implement/Coding the solution, Test the solution, Design tools (Algorithm, Flow-chart, Pseudo-code)- Develop algorithms for simple problems.

Programming Languages: Types and generation of programming languages- Compiler – Interpreter-Linker –Loader Execution of Program.

Unit-II

Basics of Language: Character set, Identifier, Keywords, Constants, Data Types, Variables and declaration.

Operators and Expressions: Operator precedence and associativity, Expression Evaluation (Simple Examples), Input and output functions, Simple computational problems involving the above constructs.

Control Statements: Selection, Conditional operator, Iteration (for, while, do-while), Branching (switch, break, continue, goto), Nesting of control statements- Problems using control statements.

Unit-III

Arrays and Strings: 1D and 2D arrays, Strings and basic operations on strings, Strings functions.

Functions: Definition, Calling Declaration, Parameter Passing (by value and by reference), Recursion, Library functions.

Unit-IV

User defined data types:

Structure: Why use structure, declaration of structure, accessing structure elements, how structure elements are stored, array of structure, uses of structure. Union: Union definition & declaration, accessing a union member, union of structures, initialization of union member, uses of union, use of user defined data types.

Unit-V

Pointers: Declaration, Initialization, Pointers and arrays, Pointers and structures, Pointers and functions, Command line arguments, Dynamic memory allocation, Operations on pointers.

Introduction to File Handling: File concept, File pointer, File handling operations.

Text Books

1. R.G. Dromey, How to Solve it by Computer, Pearson Education
2. B.W. Kernighan and D. M. Ritchie, The C Programming Language, Pearson Education.
3. B. Gottfried, Programming with C , 2nd Edition, (Indian Adapted Edition), TMH .

References Books

1. H. Schildt C, The Complete Reference, Tata McGraw Hill.
2. E. Balaguruswamy, Programming in C, Tata McGraw Hill.
3. Y. Kanetkar, Let us C, BPB Publications.
4. Practical C Programming, 3rd Edition, A Nutshell Handbook O'Relly.
5. A. N Kamthaneet. al, Computer Programming and IT, Pearson Education, 2011.

List of Practicals:

1. Write a program (WAP) for Fibonacci series, Generation of Prime, Sum of Series
2. WAP for Call by Value & Call by reference.
3. WAP for recursive function.
4. WAP for Library functions.
5. WAP for Bitwise Operations
6. WAP for Case Conversion, Encoding and Decoding
7. WAP for String Operations
8. WAP for Array of Structures
9. WAP for Make Patterns
10. WAP for Implementation of Structures using Pointers.
11. WAP for union.
12. WAP for Pointers to Functions
13. WAP for Pointers to Pointers
14. WAP for File Handling

Course Code	Course Name	Hours Per Week				
		L	T	P	Hrs.	Credits
CA3CO18	Digital Electronics	4	0	0	4	4

Unit-I

Number System : Binary, Octal, Hexadecimal, Conversions from one base to another base, Binary Arithmetic, Unsigned binary number, signed magnitude number, 2's complement representation, 2's complement arithmetic.
ASCII Code, BCD Code, EBCDIC Code, Excess3 Code and Gray Code.
Arithmetic Circuits: Adder, Subtractor, Binary multiplier and divider.

Unit-II

Logic gates: NOT, AND, OR, Universal gates- NAND, NOR, EX-OR and EX-NOR gates, Diode and Transistor as a switch.
Boolean algebra: Laws of Boolean algebra, Logic Gates, Simplifications of Boolean equations using K-maps.

Unit-III

Combinational Circuits: Multiplexers, Demultiplexers and their use as logic elements, Decoders. Adders/ Subtracters. Encoders, Decoders
Flip Flops: S-R- J-K. T. D, Clocked Flip-flop, Race around condition, Master slave Flip-Flop.

Unit-IV

Shift Registers: Serial-in-serial-out, serial-in-parallel-out, parallel-in-serial-out and parallel-in-parallel-out, Bi-directional shift register.
Counters: Asynchronous and Synchronous Ring counters and Johnson Counter,Tristate logic. A/D and D/A converters: Sample and hold circuit.

Unit-V

Memory: Memory cell, Primary memory—RAM, ROM , PROM, EPROM, EEPROM, Cache memory, Flash Memory, DDR, Secondary Memory and its types, Introduction to physical memory and Virtual memory, Memory accessing methods: serial and random access.

Text Books:

Digital Principles and Applications, Malvino & Leach, McGraw Hill.
Digital Integrated Electronics, Taub & Schilling, MGH
Thomas C Bartee, Digital Computer Fundamentals, MacGrawhill

References:

R.P. Jain , Digital Electronics, McGraw Hill
Morris Mano, Digital Design, PHI
Gothmann, Digital Electronics, PHI
Tocci , Digital System Principle & Application, Pearson Education Asia
Donald D Givone, Digital Principles and Design , TMH

Course Code	Course Name	Hours Per Week				
		L	T	P	Hrs.	Credits
CA3CO03	Computer Fundamentals	4	0	0	4	4

Unit-I

Introduction to Information Technology: Information concepts & Processing: Basic concepts of IT, data Processing, data and information. Elements of computer system: Classification, history and types of computers. Hardware: CPU, Memory unit, I/O devices, auxiliary storage devices, data representation Software: System and Application s/w and utility packages.

Unit-II

Operating System: Introduction, Basic functions of OS, Classification of OS. Client server systems, Computer networks, network protocols, LAN, WAN, Internet facilities through WWW, scripting languages, communication channels, factors affecting communication among devices.

Unit-III

Introduction to viruses, worms, malware, Trojans, Spyware and Anti-Spyware Software, Different types of attacks like Money Laundering, Information Theft, Cyber Pornography, Email spoofing, Denial of Service (DoS), Cyber Stalking, Hacking Spamming, Cyber Defamation, Security measures Firewall, Computer Ethics & Good Practices.

Unit-IV

Data base Management System Introduction, File oriented approach and Database approach, Data Models, Architecture of Database System, Data dictionary, DBA

Unit-V

Cloud computing definition, cloud infrastructure, cloud segments or service delivery models (IaaS, PaaS and SaaS), cloud deployment models/ types of cloud (public, private, community and hybrid clouds), Pros and Cons of cloud computing.

Text Books:

1. E Balagurusamy, Fundamentals of Computers , TMH
2. Silakari and Shukla, Basic Computer Engineering, Wiley India
3. V Rajaraman, Fundamentals of Computers ,PHI

References:

1. Sanders, D.H. , Computers Today, McGraw Hill
2. Prof. Vikram Singh, Impact of Information & Communication Technology on public life, Lakshmi Publications.
3. Galvin P., J.L. Abraham Silberschatz. Operating System Concepts, John Wiley & Sons Company
4. Elmasri &Navathe ,Fundamentals of Database systems.
5. Buyya, Selvi , Mastering Cloud Computing, TMH Pub.

Course Code	Course Name	Hours Per Week				
		L	T	P	Hrs.	Credits
CA3CO17	Mathematics-I	3	1	0	4	4

Unit-I

Set Theory: Sets and their representations, types of sets,operations on sets,Venn diagrams, algebra on sets, De- Morgan's laws (without proof) and cartesian product, practical problems based on sets.

Unit-II

Relation and Function: Definition and types of relations, composition of relation, Function: definition, types of functions, some important functions(identity, constant, absolute, even and odd) classification of function: algebraic function (polynomial-linear, quadratic and rational) and transcendental function (exponential, logarithmic and trigonometric function).

Unit-III

Elementary Differential Calculus:Concept of limit and continuity, derivative, derivatives of sum, differences, product, quotientof functions and chain rule of differentiation, successive differentiation.

Unit-IV

Elementary Integral Calculus: Concept of integration, basic formulae, integration of sum, differences, product of functions, integration by substitution, definite integral(simple problems).

Unit-V

Determinant: Determinant of a square matrix (up to 3 x 3 matrices), properties of determinants, minors, co-factors and applications of determinants in finding the area of a triangle, elementary operations on determinant,application of determinant to solve system of equation using Cramer's rule.

Text Books:

1. R.D. Sharma*, Applied Mathematics, Dhanpat Rai Publication , New Delhi.*

2. H. K. Dass, *Higher Engineering Mathematics ,S. Chand & Company Pvt LTD., New Delhi*

References:

1. Mathematics Exemplar Problems for class XI Published by NCERT.

2. George B. Thomas & Ross L. Finney, *Calculus and Analytic Geometry, Pearson.*

3. Ivo Duntsch, Gunther Gediga,*Methodos Primers1*: *Sets, Relations, Functions, Methodos Publishers*

1. George B. Thomas & Ross L. Finney, Calculus and Analytic Geometry, Pearson.
2. Jacob T. Schwartz, Introduction to Matrices and Vectors, Dover Publications.
3. Frank Ayres, Jr, Theory and Problems of Matrices SI (Metric) edition, McGraw Hill.
4. B.S.Grewal , Elementary Engineering Mathematics , Khanna Publishers.
5. HK Dass, Advanced Engineering Mathematics , S Chand & Co
6. Shanti Narayan , Differential Calculas , S Chand & Company .

Course Code	Course Name	Hours Per Week				
		L	T	P	Hrs.	Credits
CA3AE01	English Communication	3	0	0	3	3

Unit-I

Grammar: Applied Grammar and usage, Parts of Speech, Articles, Tenses, Subject-Verb Agreement, Prepositions, Active and Passive Voice, Reported Speech: Direct and Indirect, Sentence Structure, Punctuations, Voices, narration, clauses, modals. (Practical exercises on grammar).

Unit-II

Vocabulary: Using Dictionaries and Thesaurus, Synonyms, Antonyms, Homophones, One Word Substitution, Affixation: Prefixes & Suffixes, Analogies, Sentence Completion, Correctly Spelt Words, Idioms, phrases, Common Errors. Derivation from root words, , Proverbs, Scientific Jargon.

(Practical exercises on vocabulary).

Unit-III

Developing Reading Skills: Reading Comprehension, Process, Active & Passive Reading, Reading Speed Strategies, Benefits of effective reading, Reading comprehension and SQ3R reading technique.

(Practical Reading comprehension).

Unit-IV

Developing Writing Skills : Developing logical paragraphs, art of condensation, précis, essay, Business Correspondence : Business Letters, Parts & Layouts of Business Letters, Writing Resume, E-mails.

(Practical on précis and paragraph writing).

Unit-V

Appreciating Literature: Poetry: The Solitary Reaper - William Wordsworth/Where the mind is without fear - Rabindranath Tagore/ Ozymandias - Percy Bysshe Shelley.

Prose: On Courage – A. G. Gardiner/ On Saying 'Please'/On Friendship – Francis Bacon. Short stories: Khushwant Singh - The Mark of Vishnu/ The last leaf - O Henry/The Man Who Had No Eyes - MacKinlay Kantor.

Text Books

1. Kumar Sanjay, PushpaLata. English for Effective Communication. Oxford UP. New Delhi.
2. Thompson A.J, A. V. Martinet. A Practical English Grammar. Oxford UP. New Delhi.
3. Bacon Francis. The Essays. Penguin Classics.
4. Singh, Khushwant. The Mark of Vishnu: Stories. Penguin Books.
5. Tagore, Rabindranath. Best of Rabindranath Tagore box set. Srishti Publishers, Oxford University Press

References Books

1. Wren P.C, N.D.V. Prasada Rao. High School English Grammar & Composition. S Chand and Co Pvt Ltd
2. Rai U S, Rai SM. Effective Communication. Himalaya Publishing House.
3. Korlahalli J.S. , Rajendra Pal. Essentials of Business Communication All Courses.Sultan Chand & Sons
4. Krishna Mohan, Sharma R C. Business Correspondence and Report Writing. Mc Graw Hill Education, New Delhi. Fourth Edition.
5. Bovee and Thill. Business Communication Today. Pearson Education
6. Garner Bryan A.. HBR Guide to Better Business Writing. Harvard Business Review Press

Course Code	Course Name	Hours per Week			Total	Total
		L	**T**	**P**	**Hrs.**	Credits
CA3CO05	Object Oriented Programming	4	0	4	8	6

Unit-I

Introduction: Basic concepts of OOP: object, class, data abstraction, data encapsulation, inheritance, polymorphism, Static and dynamic binding, message passing, benefits of OOP's, disadvantage of OOP's, application of OOP's, a simple program, anatomy of program, creating a source file, compiling and Linking .

Unit-II

Tokens, Expressions and Control structures : Preprocessor directive, Tokens, keywords, Identifiers and constants , Data types- Basic, User defined and Derived, Variables- Declaration and Dynamic initialization, operators- scope resolution operator, Member Referencing operators, Memory management operators, manipulator, Expression and their types, Special Assignment Expressions, Type conversions, Implicit & Explicit conversions, Control structure: for, do, while, do-while, if, if-else, switch. Jump statement: break, continue, go to, exit.

Unit-III

Functions & Classes: Main function, Function prototyping, Call by value, Call by reference, Return by reference, Inline functions, Arguments - default, constant, Math library functions, string handling function.

Defining classes and objects, constructors and destructors, access modifiers-public, private, protected, Defining member functions inside and outside class definition, Arrays within a class, Memory allocation of objects, Static data members and static member functions, Array of objects, Object as function arguments, Returning objects, Friend functions.

Unit-IV

Inheritance: Introduction, Base class and derived class, reusability of code through inheritance Examples, Types of Inheritance ,Virtual base class, Abstract class , Constructors in derived class.

Polymorphism: Introduction, Compile Time Polymorphism, Function overloading, Operator Overloading ,Overloading unary and binary operator, Overloading using friend function Overloading insertion and extraction operators ,String manipulation using operator overloading, Runtime Polymorphism, this Pointer, pointers to objects, pointer to derived classes, Virtual functions and pure virtual functions.

Unit-V

File Handling: Classes for File Stream operations, File operations - Opening, Closing and updating, Error handling during File operations, Command Line arguments, Exception Handling(Introduction) .

Text Books

1. Herbert Schildt, C++ The Complete Reference, Mcgraw Hill Education , 4th Edition,.

2. E . Balagurusamy, Object oriented programming with C++ , Mc Graw Hill Education, 4th Edition.

References Books

1. S.B.Lippman and J.Lajoie ,C++ Primer, Pearson Education, 3rd Edition.
2. B.Stroutstrup ,The C++ Programming Language, Pearson Education ,3rd Edition.
3. T.Gaddis, J.Walters and G.Muganda ,OOP in C++, Wiley DreamTech Press,3rd Edition.
4. R.Lafore, Object Oriented Programming in C++, Galigotia Publications pvt ltd, 3rd Edition.
5. Dr. G. T. Thampi, Dr. S. S. Mantha, ,Object Oriented Programming in C++ , DreamTech Press, 2nd Edition.

List of Practicals:

1. Write a program to sum of all even and odd number.
2. Write a program to find smallest of three numbers.
3. Write a program to check the given number is palindrome or not.
4. Write a program to calculate the average of three numbers.
5. Write a program to find maximum and minimum of three numbers using functions.
6. Write a program to understand concept of class & objects.
7. Write a program to understand concept of constructors & destructors.
8. Write a program to understand working of different access specifiers.
9. Write a program to understand concept of inline functions.
10. Write a program to understand concept of call by value & call by reference.
11. Write a program to understand working of static functions & data members.
12. Write a program to understand concept of friend function.
13. Write a program to understand concept Inheritance & its type.
14. Write a program to understand concept of abstract class.
15. Write a program to understand concept of virtual base class.
16. Write a program to understand concept of function overloading.
17. Write a program to understand concept of operator overloading(unary & binary operator).
18. Write a program to understand concept of overloading using friend function.
19. Write a program to demonstrate concept of runtime polymorphism.
20. Write a program to demonstrate concept of exception handling.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO06	Computer Architecture	3	1	0	5	4

Unit-I

Introduction to Computer Architecture: what is a Computer, A basic Computer, Structure of a typical desktop computer, computers as dumb machines, the language of instructions, Instruction Set Design.

Unit-II

Computer Arithmetic:

Addition, Subtraction and Multiplication algorithms, divisor algorithms, Floating point arithmetic operations, decimal arithmetic operations.

Unit-III

Register Transfer Language and Micro-operations: concept of bus, data movement among registers, A language to represent conditional data transfer, Data movement from/to memory. Design of simple arithmetic & logic & control unit. Arithmetic and logical operations along with register transfer.

Unit-IV

Assembly Language programming: Pin Diagram of 8086, Architecture of 8086,Addresing Mode of 8086, detailed study of 8086/8088 assembly language, instruction set of 8086, loops and Comparisons, conditions and procedures, arithmetic operations in assembly language. Simple assembly language program of 8086.

Unit-V

Memory System:

Speed imbalance between the arithmetic and memory units, advantages of memory hierarchies, RAM/ROM basic cell, building large memories using chips, Auxiliary memory, Associative memory, Cache Memory.

Text Books

1. Smruti Ranjan Sarangi, “Computer Organisation and Architecture”, Tata McGraw-Hill 2015.
2. M. Morris Mano, “Computer System Architecture”, PHI. 1993
3. Liu Gibson, “Microprocessor Systems: The 8086/8088 family Architecture, Programming & Design”, PHI, 1999

References Books

1. Govindarajalu “Computer Architecture & Organisation”, Tata McGraw-Hill 2014
2. P.V.S Rao, “Computer System Architecture”, PHI, 2009
3. Peter Able, “IBM PC Assembly language programming”, PHI, 1994

Course Code	Course Name	Hours per Week			Total	Total
		L	**T**	**P**	**Hrs.**	Credits
CA3CO07	Data Structure	3	0	4	7	5

Unit- I

Data Structures Basics:

Data Definition, Built in data types, Basic Data Structure, Classification of Data Structure, Data structure Operations, Complexity of Algorithms: Time and space trade-off, notations of time complexity

Unit - II

Arrays:

Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List.

Unit - III

Stacks and Queues:

Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Applications of stack: Conversion of Infix to prefix and postfix Expressions, Applications of recursion. Queues: Array representation and implementation of queues, Operations on Queue.

Unit - IV

Linked List and Trees:

Linked list: Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists. Trees: Basic terminology, Binary Trees, Binary tree representation, Complete Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary trees, AVL Trees, B-trees.

Unit - V

Searching, Hashing, Sorting, Graph:

Sequential search, binary search, comparison and analysis. Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation. Sorting: Insertion Sort, Bubble Sorting, Quick Sort and Heap Sort. Graphs: definition, representation, traversal and applications.

Text Books:

1. E. Horowitz and Sahani, “Fundamentals of data Structures”, Galgotia Publication Pvt. Ltd., New Delhi.
2. R. Kruse, “Data Structures and Program Design in C”, Pearson Education Asia, Delhi-2002

3. A. M. Tenenbaum, “Data Structures using C & C++”, Prentice-Hall of India Pvt. Ltd., New Delhi.

Reference Books:

1. Bruno R Preiss, “Data Structures and Algorithms with Object Oriented Design Pattern in C++”, Jhon Wiley & Sons, Inc.
2. Adam Drozdek, “Data Structures and Algorithms in C++”, Thomson Asia Pvt. Ltd.(Singapore).
3. N. Wirth, “Algorithmsm+ Data Structure= Program,” Prentice Hall of India.
4. Goodrich and Tamassia, “ Data Structure and Algorithms in C++,” John Wiley and Sons.

List of Experiments

1. Write a program for Array implementation of Stack.
2. Write a program for Array Implementation of Queue.
3. Write a program for Insertion and Deletion in Stack.
4. Write a program for Insertion and Deletion in Queue.
5. Write a program for Implementation of PUSH and POP operation on stack.
6. Write a program for Implementation of circular Queue.
7. Write a program for Implementation of Tree Structures, Binary Tree.
8. Write a program for Implementation of Linear Search Algorithm.
9. Write a program for Implementation of Binary search Algorithm.
10. Write a program for Implementation of Insertion Sort Algorithm.
11. Write a program for Implementation of Bubble Sort Algorithm.
12. Write a program for Implementation of Heap Sort Algorithm.
13. Write a program for Implementation of Quick Sort Algorithm.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO19	Mathematics-II	3	1	0	4	4

Unit-I

Matrices: Concept, notation, order, equality, types of matrices, zero and identity matrix, transpose of a matrix, operation on matrices, concept of elementary row and column operations, invertible matrices,rank of a matrix, nullity of matrix, solution of simultaneous equations by elementary transformation method, consistency and inconsistency of equations.

Unit -II

Partial Differentiation: Function of multiple variables, partial derivatives, homogenous function,Euler's theorem for function of two variables, deduction of Euler's theorem, differentiation of implicit function, total differentiation.

Unit-III

Ordinary Differential Equations-I: Order and degree of ordinary differential equation, formation of ordinary differential equation, solution of first degree and first order differential equations by method of separation of variables, solution of homogeneous and linear ordinary differential equation of first order, solution of exact differential equation.

Unit–IV

Ordinary Differential Equations–II : Linear differential equations of second and higher order with constant coefficients, auxiliary equation, complimentary function,particular integral of exponential, sin, cosine function and general rule to find particular integral.

Unit–V

Statistical Measures of Central Tendency: Descriptive statistics – measure of central tendency - arithmetic mean, median, mode and relationship among mean, median and mode,concept of dispersion, variance, standarddeviation, coefficient of variation.

Text Books:

1.M. Ray, H. Sharma and S. Chaudhary, "Mathematical Statistics", Ram Prasad& Sons.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publication, New Delhi

References Books:

1. H. K. Das, "Higher Engineering Mathematics", S. Chand and CompanyLtd., New Delhi, 2014.
2. S. C. Gupta and V. K. Kapoor, "Fundamentals of Mathematical Statistics", S. Chand and Sons, 2017.
3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons 1999.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3AE02	Environmental Science	3	0	0	3	3

Unit I

Environmental Communication and Public Awareness

Multidisciplinary nature of environmental studies: Scope and Significance of environmental education; Public awareness and rural outreach; Concept of sustainability and sustainable development – Principles, imperatives and threats; three E's to optimize sustainable development, Sustainable Agriculture and Organic Farming.

Unit II

Domestic and Global Environmental Concerns

Domestic environmental concerns: Human population growth: Impacts on environment, Water conservation and Management;; Disaster management; Solid Waste management; Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan;; case studies.

Global environmental concerns: Global Challenges - climate change and global warming, Kyoto Protocol, Greenhouse Gases, Ways to reduce Greenhouse gases emissions, Carbon Footprint, ways to reduce carbon footprint, Carbon Trading; Ozone layer depletion,

Unit III

Natural resources and Biodiversity

Natural Resources: Land resources and land use change; Land degradation, soil erosion, salinization and desertification. Water: Use and over exploitation of surface and ground water, floods, droughts, conflicts over water;. Use of alternate energy sources, case studies.

Unit IV

Ecosystem and Environmental Pollution

Ecosystem: Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession.

Environmental pollution: types, causes, effects and control of; Air, water, soil and noise pollution; nuclear hazards and human health risks, Acid rain and impacts on human communities and agriculture.

Unit V

Sustainable habitat and Green Technology

Sustainable Habitat: Concept of Green Building and its rating systems, Heating Ventilation and Air Conditioning (HVAC) systems.

Green Technology: Hybrid Vehicle Technology, Industrial ecology,Green Technology, Green Business, Green Computing,

Field work (Equal to 5 lecture hours)

•Visit to a local area for documentation of environmental assets- viz. river/forest/grassland/hill/mountain

• Visit to a local polluted site- Urban/Rural/Industrial/Agricultural

• Study of social/ environmental problem in a particular area

• Survey of simple ecosystems-pond, river, hill slopes, etc.

Recommended Books

1. Environmental Science by Dr. Surinder Deswal, *Dhanpat Rai & Co. publication*
2. Environmental Studies by R. Rajgopalan ,*Oxford IBH Publication 2011*
3. Environmental Studies by Dr. Preeti Jain ..... *Manthan publication*
4. Environmental Science (8 th Edition) (2010): Daniel D. Chiras, Jones & Bartlett Ltd
5. Introduction to Environmental Science and Engineering (2nd Ed.) (2004): G. M. Masters, Pearson Education Pvt. Ltd.
6. Fundamentals of Environmental Science: G. S. Dhaliwal, G. S. Sangha and P. K. Raina, Kalyani Publication
7. Environmental Chemistry : A. K. De
8. Environmental Chemistry : B.K. Sharma, and H. Kaur
9. Environmental Science (6 th ed) (1997): Jr. G. T. Miller, Wadsworth Pub. C
10. Environmental Science –S.C. Santra
11. A text book of Environmental Studies.,2006. D.K.Asthana, Meera Asthana (S.Chand&Co.)
12. Handbook of Environmental Laws, Acts, Rules, Guidelines, Compliances and Standards, Vol. I and II, BS Publications, Hyderabad.
13. Introduction to Environmental Legislation, B.L.Chavan, A.R.Shahane and C.S. Rawandale, Asian Inst. Env. Law., Karmala.
14. Environmental Law Case Book Leelakrishnan. P, 2004, , Lexis Nexis, Butterworths
15. Environmental Law in India Singh Gurdip, 2004, , Mcmillan & Co.
16. G.J. Rau and C.D. Wee ten, "Environmental Impact Analysis Hand book, McGraw Hill, 1980.
17. Petts Judith, 1999, Handbook of environmental impact assessment. Vol. 1, Blackwell Science

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO09	Database Management Systems	3	0	4	7	5

Unit - I

Introduction: Introduction of Database Management Systems, advantage of DBMS approach, various views of data, data independence, schema and sub-schema, primary concepts of data models, Database languages, Database administrator and users, overall system architecture.

Unit - II

ER model: basic concepts, design issues, mapping constraint, keys, ER diagram, weak and strong entity sets, specialization and generalization, aggregation, inheritance, design of ER schema, reduction of ER schema to tables.

Unit -III

Domains, Relations and Keys: domains, relations, kind of relations, relational database, various types of keys, candidate, primary, alternate and foreign keys.
Relational Algebra & SQL: The structure, relational algebra operations, idea of relational calculus, basic structure and operations of SQL.

Unit -IV

Normalization: the purpose of normalization, how normalization supports database design, data redundancy and update anomalies, functional dependencies, characteristics of functional dependencies, identifying functional dependencies, identifying the primary key for a relation using functional dependencies, the process of normalization, first normal form (1NF), second normal form (2NF), third normal form (3NF), general definitions of 2NF, 3NF, and BCNF.

Unit – V

Transaction, concurrency and Recovery: basic concepts, ACID properties, transaction states, basic idea of serializability, basic idea of concurrency control, basic idea of deadlock, recovery and atomicity - log based recovery, deferred database modification, immediate database modification, checkpoints.

Text Books:

1. Silberschatz, H. F. Korth, and S. Sudershan, “Database system concepts”, McGraw Hill.
2. Elmasri and Navathe “Fundamentals of Database systems”, Pearson Education.
3. Fred R McFadden, “Modern database system”, Prentice Hall.

Reference Books:

1. T. Connolly and C. Begg, “Database Systems: A Practical Approach to Design, Implementation, and Management”, Addison-Wesley.
2. C.J Date “An introduction to Database Systems”, Pearson Education.

3. B.C. Desai. “An introduction to Database systems” BPB Publication.
4. Raghurama Krishnan “Database Systems” TMH.
5. Jeffery A Hoffer , V.Ramesh, Heikki Topi, “Modern Database Management”, Pearson.

Web Reference:

1. http://nptel.ac.in/courses/106106093/

Reference of Open Learning Course:

1. http://nptel.ac.in/courses/106106093/

List of Experiments:

The following tables form part of a database held in a relational DBMS:
Hotel (hotelNo, hotelName, city)
Room (roomNo, hotelNo, type, price)
Booking (hotelNo, guestNo, dateFrom, dateTo, roomNo)
Guest (guestNo, guestName, guestAddress)
Where **Hotel** contains hotel details and hotelNo is the primary key;
Room contains room detals for each hotel and (roomNo, hotelNo) forms the primary key;
Booking contains details of bookings and (hotelNo, guestNo, dateFrom) forms the primary key;
Guest contains guest details and guestNo is the primary key.

Simple Queries

1. List full details of all hotels.
2. List full details of all hotels in London.
3. List the names and addresses of all guest living in London, alphabetically ordered by name.
4. List all double or family rooms with a price below $40.00 per night, in ascending order of price.
5. List the names for which no dateTo has been specified.
6. List all single rooms with a price below $40.00 per night.
7. List the name and cities of all guests.
8. List the price and type of all rooms at the Grosvenor Hotel.
9. List the guests currently staying at the Grosvenor Hotel.
10. List the details of all rooms at the Grosvenor Hotel, including the names of the guest staying in the room, if the room is occupied.
11. List the guest details (guestNo, guestName, and guestAddress) of all guests staying at the Grosvenor Hotel.

Grouping

1. List the number of rooms in each hotel.
2. List the number of rooms in each hotel in London.
3. What is the average number of bookings for each hotel in August?
4. What is the most commonly booked room type for each hotel in London?
5. What is the lost income from unoccupied rooms at each hotel today?

Q. 2 The following tables form part of a database held in a relational DBMS:

S SUPPLIER

Field name	Data type	Constraints
SNO	Varchar(5)	Primary key
SNAME	varchar(25)	NOT NULL
STATUS	int	NOT NULL
CITY	varchar(20)	NOT NULL

P PART

Field name	Data type	Constraints
PNO	Varchar(6)	Primary key
PNAME	varchar(25)	NOT NULL
COLOR	varchar(10)	NOT NULL
WEIGHT	Numeric(5,1)	NOT NULL
CITY	varchar(20)	NOT NULL

J PROJECT

Field name	Data type	Constraints
JNO	Varchar(6)	Primary key
JNAME	varchar(25)	NOT NULL
CITY	varchar(20)	NOT NULL

SPJ SHIPMENT

Field name	Data type	Constraints
SNO	Varchar(5)	NOT NULL, Foreign key SNO references S
PNO	Varchar(6)	NOT NULL, Foreign key PNO references P
JNO	varchar(6)	NOT NULL, Foreign key JNO references J

QTY	int	NOT NULL

S

Sno	SNAME	STATUS	CITY
S1	SMITH	20	LONDON
S2	JONES	10	PARRIS
S3	BLAKE	30	PARRIS
S4	CLARK	20	LONDON
S5	ADAMS	30	ATHENS

P

Pno	PNAME	COLOR	WEIGHT	CITY
P1	NUT	RED	12	LONDON
P2	BOLT	GREEN	17	PARIS
P3	SCREW	BLUE	17	ROME
P4	SCREW	RED	14	LONDON
P5	CAM	BLUE	12	PARIS
P6	COG	RED	19	LONDON

J

Jno	JNAME	CITY
J1	SORTER	PARIS
J2	DISPLAY	ROME
J3	OCR	ATHENS
J4	CONSOLE	ATHENS
J5	RAID	LONDON
J6	EDS	OSLO
J7	TAPE	LONDON

SPJ

SNO	PNO	JNO	QTY
S1	P1	J1	200
S1	P1	J4	700
S2	P3	J1	400
S2	P3	J2	200
S2	P3	J3	200
S2	P3	J4	500
S2	P3	J5	600
S2	P3	J6	400
S2	P3	J7	800
S2	P5	J2	100
S3	P3	J1	200
S3	P4	J2	500
S4	P6	J3	300
S4	P6	J7	300
S5	P2	J2	200
S5	P2	J4	100
S5	P5	J5	500

S5	P5	J7	100
S5	P6	J2	200
S5	P1	J4	100
S5	P3	J4	200
S5	P4	J4	800
S5	P5	J4	400
S5	P6	J4	500

Figure: The supplier-parts-project database (Sample Values)

Write SQL Queries for the above database:

1 Get Full details of all projects.

2 Get Full details of all projects in London.

3 Get supplier numbers for suppliers who supply projects J1.

4 Get all shipments where the quantity is in the range 300 to 750 inclusive.

5 Get all part-color/part-city pairs. Note : Here and subsequently, the terms “all” means “all currently represented in the database, “ not “all possible”.

6 Get all supplier -number/part- number/project- number triples such that the indicated supplier, part and project are all collocated (i.e. all in the same city).

7 Get all supplier -number/part- number/project- number triples such that the indicated supplier, part and project are not all collocated.

8 Get all supplier -number/part- number/project- number triples such that no two of the indicated supplier, part and project are collocated.

9 Get full details for parts supplied by the supplier in the London.

10 Get part numbers for parts supplied by a supplier in London to a project in London.

11 Get all pairs of city names such that a supplier in the first city supplies a project in the second city.

12 Get part numbers for parts supplied to any project by a supplier in the same city as that project.

13 Get project numbers for projects supplied by at least one supplier not in the same city.

14 Get all pairs of part numbers such that some supplier supplies both the indicated parts.

15 Get the total number of projects supplied by supplier S1.

16 Get the total quantity of part P1 supplied by supplier S1.

17 For each part being supplied to a project, get the part number, the project number, and the corresponding total quantity.

18 Get part numbers of parts supplied to some project in an average quantity of more than 350.

19 Get project names for projects supplied by supplier S1.

20 Get colors of parts supplied by supplier S1.

21 Get part numbers for parts supplied to any project in London.

22 Get project numbers for projects using at least one part available from supplier S1.

23 Get supplier numbers for suppliers supplying at least one part supplied by at least one supplier who supplies at least one red part.

24 Get supplier numbers for suppliers with a status lower than that of supplier S1.

25 Get project numbers for projects whose city is first in the alphabetic list of such cities

26 Get project numbers for projects supplied with part P1 in an average quantity greater than the greatest quantity in which any part is supplied to project J1

27 Get supplier numbers for suppliers supplying some project with part P1 in a quantity greater than the average shipment quantity of part P1 for that project.

28 Get project numbers for project not supplied with any red part by any London supplier.

29 Get project numbers for projects supplied entirely by supplier SI.

30 Get part numbers for parts supplied to all projects in London.

31 Get supplier numbers for suppliers who supply the same part to all projects.

32 Get project numbers for projects supplied with at least all parts available from supplier SI.

33 Get all cities in which at least one supplier. Part. Or project is located.

34 Get part numbers for parts that are supplied either by London supplier or to a London project.

35 Get supplier-number/part-number pairs such that the indicated supplier does not supply the indicated part.

36 Get all pairs of supplier numbers, Sx and Sy say. Such that Sx and Sy supply exactly the same set of parts each. Note: For simplicity, you might want to use the original suppliers-and-part data-base for this exercise, instead of the expanded suppliers-part-projects database.

37 Get a "grouped" version of all shipment showing, for each suppliers-number/part-number pair, the corresponding project numbers and quantities in the form of a binary relation.

Project using Data base technology.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO10	Computer Networks	3	0	2	4	4

Unit - I

Introduction to computer networks and Internet: Understanding of Network and Internet, Network Hardware, Network Software, Reference Models: OSI, TCP/IP their protocols layers and models.

Unit - II

Physical Layer: The theoretical basis for data communication, Guided transmission Media: Magnetic Media, Twisted Pairs, Coaxial Cable, Fiber Optics; Wireless Transmission: The Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission, Light Transmission; The Public Switched Telephone Network.

Unit - III

Data Link Layer: Data link layer design issues; Error correcting codes, Error detecting codes, Elementary data link protocols: A Utopian Simplex Protocol, A Simplex Stop-and-Wait Protocol for an Error-Free Channel, A Simplex Stop-and-Wait Protocol for a Noisy Channel; Sliding window protocols: A One-Bit Sliding Window Protocol, A Protocol Using Go-Back-N, A Protocol Using Selective Repeat, The channel allocation problem; Multiple access protocol, Ethernet, WLANs, Bluetooth.

Unit - IV

Network Layer: Network Layer Design Issues: Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service; Routing Algorithms: Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing in Ad Hoc Networks; Congestion Control Algorithms: Approaches to Congestion Control, Traffic-Aware Routing; IP Address:IPv4, IPv6.

Unit - V

Transport and Application Layer:

Transport services,Transport Protocols, Internet Transport Protocols UDP, TC, Congestion Control algorithms.

Application Layer Design Issues, Domain Name System, Electronic Mail, World Wide Web Multimedia, HTTP, SMTP, Cryptography, and Digital Signature.

Text Books:

1. Andrew S. Tanenbaum,"Computer Networks", PHI.
2. Jim Kurose, "Computer Networking: A Top-Down Approach", Pearson.
3.Bruce S. Davie and Larry L. Peterson, "Computer Networks: A Systems Approach", PHI.

Reference Books:

1. Behrouz A. Forouzan, "Data Communications and Networking", Mc-Graw Hills.
2. Andrew S. Tanenbaum and David J. Wetherall, "Computer Networks", Pearson.
3. Douglas E. Comer, "Computer Networks and Internets", Pearson.
4. Olivier Bonaventure, "Computer Networking: Principles, Protocols and PracticeTextbook", Cisco Press.
5. Chwan-Hwa Wu and J. David Irwin, "Introduction to Computer Networks and Cyber-security", CRC Press.

List of Experiments

1. To compare IPv4 and IPv6.
2. To determine the hardware address corresponding to the input IP address.
3.To implement the routing algorithm(link state routing).
4. Study of LAN transmission media's , topologies , interconnection devices &LAN standards.
5. Study of TCP/IP & Internet.
6. Study on client-server architecture.
7. Study of encryption of string.
8. Study of Decryption of string.
9. Study of Header of TCP/ UDP.
10. Make a project on Network.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO20	Mathematics -III	3	1	0	4	4

Unit –I

Solution of Algebraic and Transcendental Equations

Errors andApproximations, RegulaFalsi, Newton-Raphson, Iterative, Solution of Simultaneous Linear Equations by Gauss Elimination and Gauss-Siedel Iterative Methods.

Unit –II

Difference Operators and Interpolation

Difference Operators, Factorial Notation, Interpolation: Newton Forward and Backward Formulae,Lagrange's and Newton's Divided Difference Formulae.

Unit-III

Numerical Integration and Solution of Ordinary Differential Equations

Numerical Integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule.

Solution of Ordinary Differential Equation: Taylor's Series Method, Picard's Method,Runge-Kutta Fourth Order Method.

Unit-IV

Probability and Discrete Distributions

Concept of Probability, Random Variable, Probability Mass Function, Expected Value, Discrete Distribution: Binomial Distribution, Mean, Variance and Standard Deviation of Binomial Distribution, Poisson's Distribution, Mean, Variance and Standard Deviation of Poisson's Distribution.

Unit–V

Continuous Distributions

Probability Density Function, Continuous Distribution: Normal Distribution, Mean, Variance and Standard Deviation of Normal Distribution, Exponential Distribution, Mean, Variance and Standard Deviation of Exponential Distribution.

Texts Books :

1. S. S. Sastry, Introductory Methods of Numerical Analysis,PHI.
2. S.P. Gupta, *Statistical Method, Sultan Chand & Sons (2012)*

References Books:

1. George R.,*Mathematical Statistics , Springer.*
2. Ravichandran ,*Pobability and Statistics Wiley India.*
3. M KJain, Iyengar and RK Jain, *Numerical Methods for Scientific and Engg. Computation, New Age International Publication*

Web Source:

1. *nptel.ac.in/courses/111101003/*
2. *nptel.ac.in/courses/116102019/14*

Open Learning Source:

1. https://swayam.gov.in/courses/public

2. http://nptel.ac.in/course.php

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3SE01	Web Designing	3	0	4	7	5

Unit – I: Internet

History and evolution of Internet. Internet & intranet ,Basic concept of www , HTTP, FTP, URL, domain name, IP address, web browser, web server, web page, web site, Portals, email, chatting, Usenet, telnet, newsgroup, Fax, Telephony, telecommuting, Conferencing. Searching, downloading and uploading files on internet, Search Engines, Internet protocols

Unit – II: HTML

Introduction to HTML. Basic structure of an HTML document. Creating an HTML document. HTML elements and tags, formatting with HTML tags. Working with text, lists, tables and multimedia. Working with Forms and controls.

Unit – III: Cascading Style Sheets

Concept of CSS, Creating CSS, CSS properties, CSS styling (Background, Text Format, Controlling Fonts), Working with block elements, working with lists ad tables, CSS id and class, Box Model(Introduction, Border properties, Padding Properties, Margin properties). CSS Color, Creating page Layout and Site Designs.

Unit – IV: Java Script

Introduction to Java script, Basics, Variables, String manipulation, Mathematical Functions, Operations, Arrays, Functions, Objects in Java script- regular expressions, Built- in objects, Data validation, Messages & Confirmation.

Unit – V: E-Commerce

Introduction to E-Business, Electronic Fund Transfer (EFT), Value chain, internet Business strategy, Functional Architecture, implementation Strategies, Building Blocks of E-commerce, System design, creating and managing content. Payment systems, transaction Processing, Building e-commerce system, system architecture, secure links etc. Present and future Trend; Impact of e-commerce.

Text Books:

1. Deitel, Harvey M., Paul J. Deitel, and Tem R. Nieto, “Internet & world wide web”, Prentice Hall.
2. Rajkamal, “internet & Web Technology”, Tata McGraw-Hill.
3. Jeffrey C. Jackson, “Web Technologies: A Computer Science Perspective”, Pearson.

Reference Books:

1. Holzner, Steven, “HTML black book”, Paraglyph, Incorporated.
2. Michel Morrison, “HTML and XML for Beginners”, PHI.
3. Thomas A powell, “The complete reference HTML”, TMH publication.

4. Ivan Bayross, “Web enabled commercial application development using HTML, DHTML, Java Script, Perl CGI”, BPB.
5. Eccher, Clint. Professional web design: techniques and templates. Cengage Learning.

Web Reference:

1. https://www.w3schools.com/html/default.asp
2. https://www.w3schools.com/css/default.asp
3. https://www.w3schools.com/js/default.asp

List of Practicals:

1. Write a Program to illustrate body and pre tags.
2. A Program to illustrate text Font tag.
3. A Program to illustrate comment,h1 ... h6, and div tag
4. A Program to illustrate text formatting tags.
5. A Program to illustrate Order and unordered List tag
6. A Program to illustrate Nested and Definition tag
7. A Program to illustrate Img tag
8. A Program to illustrate Hyper Link tag (Anchor tag)
9. A Program to illustrate Table tag
10. A Program to illustrate Form tag
11. A Program to illustrate span tag
12. A Program to illustrate same page hyper reference.
13. A Program to illustrate Embedded Multimedia
14. Design a home page which will display your information, i.e. Bio data, using Image Link and File Link to upload images and necessary documents.
15. Design a Signup form with validation using HTML
16. Create links on the words e.g. “Wi-Fi” and “LAN” to link them to Wikipedia pages.
17. Insert an image and create a link such that clicking on image takes user to other page.
18. Design a CSS to create menu
19. Design a webpage i.e. Bio data using CSS.
20. Write a program to create table and list using CSS.
21. To create a web page that displays college information using various Style sheets.
22. Write a program to embed javascript in HTML pages
23. Design a registration form and validate its field by using javascript.
24. Write a program to create popup boxes in javascript.
25. **Project: Create a website.**

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3EG07	Financial Accounting and Management	4	0	0	4	4

Unit-I

Introduction:

Financial Accounting-meaning & definition, objectives of Financial Accounting, users of accounting information, advantages and limitations of accounting. Types of accounting. Basic term used in accounting, Basic accounting concepts & Conventions.

Unit -II

Accounting Process:

Classification of Account, Rules of Debit and Credit, journalizing, Sub Division of Journal-Preparation of Subsidiary Books ,Simple cashbooks, Double columns cash book,Triple columns & Petty cash book , Preparation of sales register, purchase register, journal proper , Ledger – Posting from Journal to respective ledger accounts.

Unit-III

Preparation of Final Accounts:

Final Accounts: Meaning, objectives, uses and preparation of Trading Account, Profit & Loss Account and Balance Sheet . Simple problem of final account With Basic adjustment related to, depreciation, closing stock, prepaid & outstanding expenses, Accrued income and bad debts.

Unit 4:

Financial management:

Financial management- definition, objectives, importance, Scope of financial functions, role of finance manager, Understanding of income statement & Financial statements, Preparation of financial statement, Statement of Changes in financial position, definition of funds, basic problem of fund flow statement.

Unit 5:

Computerized Accounting System:

Computerized Accounting: Meaning and Features, Advantages and disadvantages of computerized Accounting, Basic understanding of accounting software ,Creation of an Organization , Creation of Accounts, types of vouchers-voucher entry ,editing and deleting of vouchers, Preparing different Reports using accounting software.

Text Books:

1. Tulsian, P.C. “Financial Accounting”, Tata McGraw Hill, New Delhi

2. Shukla, Grewal, and Gupta, “Advanced Accounts”. S. Chand & Co., New Delhi.
3. Dr.Kapil Jain and Rashmi Somani, “Accounting for managers”, Dreamtech publications.

Reference Books:

1. Maheshwari, and Maheshwari “Financial Accounting”, Vikas Publishing House, New Delhi.
2. Horngren, Charles T. Introduction to Financial Accounting, Pearson Education
3. Lal, Jawahar, Financial Accounting, S. Chand & Company, New Delhi.
4. R.L.Gupta & Radhaswamy,Advanced Accounting, S. Chand & Company, New Delhi.Sultan chand
5. Hanif & Mukherjee-Modern Accountancy, TMH, New Delhi.

Web Sites & Open learning courses:

1. http://www.acca-x.com/global/en/courses/bookkeeping/introduction-fa1.html
2. http://www.acca-x.com/global/en/courses/management-accounting/introduction-ma1.html

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO12	Operating System	4	0	0	4	4

Unit-I

Introduction to Operating System:

Operating system and function, the evolution of operating systems (History of evolution of OS with the generations of computers), Operating System services, operating system Components. Operating System Concepts (Definition and examples of these topics)–Shell, kernel, system calls. Operating Systems Types: Batch, Time Sharing, Multiprogramming, Multitasking, Multiprocessor, Distributed, Real Time and Network.

Unit-II

Process Management:

Process concept, Process Control Block, Process state transitions, schedulers (long term, short term, mid term), Context Switch, Operation on Process, Process Creation, Process Termination.

CPU Scheduling: concept of scheduling, CPU-I/O Burst Cycle, CPU Scheduler, Preemptive and Non-preemptive scheduling, Dispatcher Scheduling criteria, Scheduling Algorithms: FCFS, SJF (Preemptive and non-preemptive), Priority Scheduling (Preemptive and Nonpreemptive), Round Robin Scheduling, Multilevel Queues, Multilevel Feedback queues.

Unit -III

Process Synchronization:

Introduction, Critical section problem, Semaphores: Concept, Implementation. Deadlock & Starvation, Binary Semaphores, Critical Sections, Classical Problems of synchronization: Bounded buffer problem, Readers & writers problem, Dining Philosophers problem. Deadlock: Introduction, Deadlock Characterization, Necessary Condition, Resource allocation graph, Deadlock Prevention, Avoidance, Safe State, Resource allocation graph algorithm, Bankers algorithm, Deadlock Detection, Recovery from deadlock, Process Termination, Resource Preemption.

Unit-IV

Memory Management:

Introduction to memory management, Address Binding, Dynamic Loading, Dynamic Linking, Overlays, Logical vs. physical addresses. Swapping, Contiguous memory allocation, Single Partition Allocation, Multiple Partition Allocation, External and Internal Fragmentation. Paging, Segmentation, Segmentation with paging, Virtual memory, Demand paging. Page replacement algorithms: FIFO, LRU, LRU approximation using reference bit, optimal replacement.

Unit-V

File System:

Introduction of File System, File concepts, Access methods: Sequential access, Direct access. File structure, Allocation methods: Contiguous allocation, Linked Allocation, Indexed Allocation. Free Space Management: Bit Vector, Linked List, Grouping, Counting. Disk Scheduling: Introduction of Disk Scheduling, Disk scheduling algorithms namely First come first

serve, shortest seek time first, SCAN, C-SCAN, LOOK and C-LOOK algorithms, Error handling, track-at-a-time caching, RAM Disks.

Text Books:

1. Silberschatz and Galvin, “Operating System Concepts”, John Wiley & Sons, Inc..
2. Tenenbaum, A.S., “Modern Operating System”, PHI Publication.
3. Godbole, A.S., “Operating Systems”, Tata McGraw-Hill Publishing Company, New Delhi.

Reference Books:

1. H.M.Deitel, “An Introduction to Operating Systems”, Pearson Education.
2. D. M. Dhamdhere, "System Programming and Operating System" Tata McGraw Hill.
3. William Stallings “Operating Systems” , Prentice Hall of India Pvt. Ltd.
4. Milankovic M., “Operating System: Concept & Design”, McGraw Hill.
5. P.K.Sinha, “Distributed Operating Systems concepts and design” Prentice Hall of India Pvt. Ltd.

Web Reference:

1. http://nptel.ac.in/courses/106106144/

Reference of Open Learning/Certification Course:

1. http://nptel.ac.in/courses/106108101/

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO13	Software Engineering	4	0	0	4	4

Unit-I

Introduction: Defination of Software Engineering, Software Crisis, Exploratory Software Development, Human Cognition Mechanism, principles of Abstraction and Decomposition, Types of Software Projects, Emergence of Software Engineering Techniques, Evolution of other Software Engineering Techniques. Life Cycle Models: Software Life Cycle, Waterfall, Iterative Waterfall Model, V model, Prototyping, Incremental Model, Evolutionary, RAD Model, Unified Process, Spiral model.

Unit-II

Agile models: Agile Manifesto, Principal Techniques of Agile, Extreme Programming Model, Values, Practices, Scrum, Scrum Framework. Requirements analysis and specification: Activities in Requirements Analysis and Specification: Gathering, Analysis, Specification. SRS Document, Component of SRS Document, overview of IEEE Standard for SRS, Representation of complex processing logic:Decision trees, Decision tables.

Unit-III

Basics of software design: Defination of Software Design, Module, Stages in Design, Modularity, Cohesion and Coupling, Hierarchical Design, Control Relationships, Visibility and Layering, Abstraction. Design Approaches: overview of Function-Oriented and Object-Oriented Design. Structured Analysis and Design: Functional Decomposition, Structured Analysis: Data Flow Diagram, Data Dictionary. Structured Design: Structure Chart, Transform Analysis, Transaction Analysis.

Unit-IV

Object-oriented concepts: Diagrams and views in UML, Use Case Modelling, Factoring Use Cases, Use Case Description, Class Diagram: Relation, Association, Generalization, Dependency, Aggregation, Composition. Sequence Diagram, State Machine Diagrams. Object-oriented analysis and design: Domain Modelling: Boundary objects, Entity objects, Controller objects, Class-Responsibility-Collaborator (CRC) Cards.

Unit-V

Software Testing: Errors, Faults, Failures, Verification and Validation, Testing Levels: Unit testing, Integration testing, System testing, Regression testing. Pesticide Effect. Basic Concepts in Testing: Test Cases, Test data, Test Suites, Negative Test Cases, Design of Test Cases, Test Plan. Unit Testing: Black-Box Testing: Equivalence class partitioning, Boundary value testing, White-box Testing:coverage based testing, fault based testing.

Text Books:

1. *Software Engineering: A Practitioners Approach*, R. S. Pressman, McGraw Hill
2. *Fundamentals of Software Engineering*, Rajib Mall, PHI

Reference Books:

1. *Software Engineering Concepts, Richard E. Fairly, Tata McGraw Hill Inc. New York*
2. *Software Engineering: Concepts & Practices, Ugrasen Suman, Cengage Learning*
3. *An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa Publishing House publications*
4. *Software Engineering Fundamental, Ali Behforooz and Frederick J Hudson, Oxford University Press*
5. *Software Engineering, Ian Sommerville, Pearson Education, New Delhi*

Web Source:

1. https://www.tutorialspoint.com/software_engineering/
2. https://www.agilealliance.org/agile101/
3. http://www.softwaretestinghelp.com/

Open Learning Source:

1. https://www.coursera.org/courses?languages=en&query=software+engineering
2. http://nptel.ac.in/courses/106101061/32
3. https://swayam.gov.in/nd1_noc19_cs69/preview

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3CO14	Object Oriented Technology	3	0	4	7	5

Unit-I
Basics of JAVA:

Basics of JAVA, tools in JDK, javadoc, java, jdb. JAVA Language- Keywords, Constants, Variables, and Data Types. Operators and Expressions, Decision making, Branching and Looping, Labelled Loops Statement, Jump statements: Break, Continue, and Return.

Unit-II
Array and Classes:

Arrays and Strings Creating Arrays, one and two Dimension Arrays. Classes, Objects and Methods Defining a class, adding variables and Methods, creating objects, constructors, Wrapper Classes. Inheritance, Basics types, using super, multi level hierarchy, abstract and final classes, packages and interfaces.

Unit-III
Exception handling and Multithreading:

Exception Handling, Fundamentals exception types, uncaught exceptions, throws, throw, try - catch, final, built in exceptions, creating your own exceptions. Multithreading Fundamentals, Java Thread model : priorities, synchronization, messaging, thread class, Runnable interface, Interthread communication, suspending, resuming and stopping threads.

Unit-IV
AWT programming:

Containers and components, AWT classes, window fundamentals: Component, Container, Panel, Window, Frame, AWT Controls, Layout Managers and Menus: adding and removing control, Labels, Button, Check Box, Radio Button, Choice , menu, Text area, Scroll list, Scroll bar; Frame; Layout managers- flow layout, Grid layout, Border layout, Card layout.

Unit-V
Event handling and Swing:

Event Handling-Different mechanism, the Delegation Event Model, Event Classes, Event Listener interfaces and Adapter. Java Swing -Icons and Labels, Text fields, Buttons, Combo Boxes, Tabbed and Scroll Panes, Trees, Tables.

Text Books:

1. Naughton & Schildt, “The Complete Reference Java 2”, Tata McGraw Hill.
2. Deitel, “Java- How to Program:”, Pearson Education, Asia.

Reference Books:

1. Horstmann & Cornell, “Core Java 2” (Vol I & II) , Sun Microsystems.
2. lvan Bayross, “Java 2.0”, BPB publications.
3. Ivor Horton’s, “Beginning Java 2, JDK”, Wiley India.
4. Russell, “Java Programming for the absolute beginners By Russell”, PHI Learning.
5. Sierra, Kathy, and Bert Bates, “Head First Java: A Brain-Friendly Guide", O'Reilly Media, Inc..
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Web Reference:
http://nptel.ac.in/courses/106106147/
https://www.edx.org/course/subject/computer-science/java

Reference of Open Learning Course:
http://nptel.ac.in/courses/106106147/
https://www.edx.org/course/subject/computer-science/java

List of Practicals:

1. WAP to display “Welcome in JAVA PROGRAMMING” on the screen.
2. WAP to take different types of input from the user using Scanner class.
3. WAP to take command line argument & print them.
4. WAP for finding greater no. between 2 nos. using ternary operator.
5. WAP to find the greater no. between 3 nos. using nested if & relational operators.
6. WAP to find greater no. between 3 nos. using logical operators.
7. WAP to demonstrate type conversion.
8. WAP to check the no. is Armstrong or not.
9. WAP to check the no. is Perfect or not.
10. WAP to print pattern as:

```
            1
        2   3   2
    3   4   5   4   3
4   5   6   7   6   5   4
```

11. WAP to search an element in an array.
12. WAP to sort elements of array.
13. WAP to demonstrate class and object.
14. WAP to find maximum of 2 nos. using function overloading.
15. WAP for Stack simulation using class & constructors.
16. WAP to perform different methods on String.
17. WAP & steps to create your own package.
18. WAP to create your own exception.
19. Create a Thread with the help of Thread class.
20. Create a Thread with the help of Runnable interface.

21. WAP which uses all methods of Thread class.
22. WAP to create 3 threads & set their priority to min, max & normal & write their outputs.
23. WAP to implement “Producer-Consumer Problem”.
24. WAP for Thread which have synchronized method.
25. WAP to use synchronized block.
26. WAP to demonstrate Thread using suspend, resume & stop methods.
27. WAP in an AWT to perform addition which should include Textboxes, Label & Button.
28. WAP to use MouseListener & its methods.
29. WAP to perform MouseDragged operation in an AWT. As we drag the mouse, it should show the current coordinates of mouse.
30. WAP to use Adapter class in keyboard.
31. WAP to use CardLayout.
32. WAP in AWT which shows “Click Me from ClickMe1” or “Click Me from ClickMe2”.
33. WAP in AWT to change background colour on button click of selected buttons.
34. WAP in AWT to show “You clicked me x times” on button click of a button.
35. WAP in AWT to show and hide the buttons alternatively.
36. WAP in AWT which must have checkboxes and labels showing their status.
37. WAP in Swing to create MenuBar & perform different operations accordingly to Menu. (Shape & Colour should be the Menu Items)
38. WAP in Swing to use JTabbedPane. (Movies’ Poster should appear on clicking the Movie name)
39. WAP in Swing to create JTree in JScrollPane.
40. WAP to create a game of TIC-TAC-TOE in swing.

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3SE06	PHP Programming	3	0	4	7	5

Unit-I:

Introduction to PHP

Introducing PHP, important tools and software requirement, Basic development Concepts – Creating first PHP Scripts, Variable and constants, Type of data in PHP, expressions, scopes of a variable (local, global). PHP Operators, Operator precedence and associativity.

Unit-II:

Control Statements and Arrays

Controlling Program Flow: If-Else conditional statement, Switch case, Loops (while, for, do-while loop),
goto, break, continue and exit statement.
Working with Arrays: Storing Data in Arrays, Processing Arrays with Loops and Iterations, Using Arrays with Forms, Working with Array Functions, Working with Dates and Times.

Unit-III:

Functions and String

Function, need of function, declaration and calling a function, function with arguments, default argument function, function argument with call by value and call by reference, scope of function. Creating and accessing string, searching and replacing string, formatting, joining and splitting string, string related library function.

Unit-IV:

Form handling and classes

Capturing form data, GET and POST form methods, dealing with multivalue fields, redirecting a form after submission.
Creating Classes – Using Advanced OOP Concepts.

Unit-V:

Database Connectivity

Working MySQL with PHP-database connectivity, usage of MYSQL commands in PHP, processing result sets of queries, handling errors-debugging and diagnostic functions- validating user input through Database layer and Application layer, formatting query output with Character, Numeric, Date and time , sample database applications.

Text Book:

1. Holzner, Steven, "PHP: the complete reference", Tata McGraw-Hill Education.
2. Vikram Vanvanshi, "PHP and MYSQL", Tata McGraw-Hill.
3. Murach, Joel, and Ray Harris. Murach's PHP and MySQL. Mike Murach & Associates, Inc.

Reference Books:

1. Ullman, Larry, “Php and mysql for dynamic web sites: visual quickpro guide” , Peachpit Press.
2. Lerdorf, Rasmus, Kevin Tatroe, and Peter MacIntyre, “Programming PHP”, O'Reilly Media, Inc.
3. Glass, Michael K., et al. “Beginning PHP, Apache, MySQL Web Development”, John Wiley & Sons.
4. Welling, Luke, and Laura Thomson, “PHP and MySQL Web development”, Sams Publishing.
5. Beighley, Lynn, and Michael Morrison. “Head First PHP & MySQL”, O'Reilly Media, Inc.

Web References:

1. https://www.w3schools.com/php/default.asp

List of Practicals:

1. Write a PHP script to get the PHP version and configuration information.
2. Create a simple HTML form and accept the user name and display the name through PHP echo statement.
3. Write a program to display strings and variables with the echo command.
4. Write a program to display strings and variables with the print command.
5. Write a program to demostrate data types.
6. Write a program to get the length of a string.
7. Write a program to count the number of words in a string.
8. Write a program to reverse a string.
9. Write a program to search for a specific text within a string.
10. Write a program to replace text within a string.
11. Write a program to perform arithmetic operations.
12. Write a program to find greater number among three number using logical operator.
13. Write a program to find greater number among three numbre using nested if.
14. Write a program to print the day name according to the number using switch.
15. Write a program to print the series from 1 to 100 using for loop.
16. Write a program to create array and initialize the array.
17. Write a program to display the string using function.
18. Write a program to sort the array.
19. Write a program to find the length of array.
20. Write a program to to search an element in an array.
21. Write a program to create a html form and apply validation on it.
22. Write a program use readfile() to read a file and write it to the output buffer.
23. Write a program for session handling.
24. Write a program to connect your interface with MySQL
25. **Develop a project to manage a particular system.**

Course Code	Course Name	Hours per Week			Total	Total
		L	T	P	Hrs.	Credits
CA3EG11	Wireless and Mobile Computing	4	0	0	4	4

Unit-I

Antenna, variation pattern, antenna types, types of fading. multiple access technique-SDMA, TDMA, FDMA, CDMA. MAC/CA, Cellular network organization, operations of cellular system, mobile radio propagation effects, handoff, power control, sectorization, traffic engineering, Infinite sources, lost calls cleared, grade of service, poison arrival process

Unit-II

GSM- Services, system architecture, radio interface, logical channels, protocols, localization and calling, handover, security, GPRS-architecture, Interfaces, Channels, mobility management.

Unit-III

IEEE 802.11: LAN-architecture, 802.11 a, b and g, protocol architecture, physical layer, MAC layer , MAC management, HIPERLAN-protocol architecture, physical layer, MAC sub layer. Bluetooth-user scenarios.

Unit-IV

Mobile IP, DHCP, Ad hoc networks: Characteristics, performance issue, routing in mobile host. Wireless sensor network, Mobile transport layer: Indirect TCP, Snooping TCP, Mobile TCP, Selective retransmission, transaction oriented TCP. Introduction to WAP.

Unit-V

Intruders, Intrusion detection, password management, viruses and related threads, worms, trojan horse defense, difference biometrics and authentication system, firewall design principle.

Text Books:

1. J. Schiller, “Mobile Communication”, Addision , Wiley.
2. William Stalling, “Wireless Communication and Network”, Pearson Education.
3. Mischa Schwartz, “Mobile Wireless Communications”, Cambridge.

Reference Books:

1. UpenDalal,” Wireless Communication”, Oxford Higher Education.
2. Dr. KamiloFeher, “Wireless Digital communication”, PHI.
3. William C.Y Lee, “Mobile Communication Design Fundamental” , John Wiley.
4. Bhabani P. Sinha, KoushikSinha, and Sasthi C. Ghosh,“Wireless Networks and Mobile Computing” , CRC Press.
5. Ivan Stojmenovic, “Handbook of Wireless Networks and Mobile Computing”, Wiley.

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
CA3CO16	Network Security	4	0	0	4	4

Course Objectives:

1. To introduce the concept of Network Security.
2. To introduce them about cryptography and its technique.
3. To learn them about Symmetric Key Algorithm and AES.
4. To introduce them about Asymmmetric Algorithm, Digital Signature and RSA.
5. To gain the knowledge about Network Security and different Internet Security Protocol.

Prerequisites: Concept of Networking.
Co-requisites: Nil
Curriculum:

UNIT I: Computer Security

Introduction to the concepts of security, basic concepts, modern nature of attacks, security approaches, security models, Security-management practices, Principles of security, access control, ethical and legal issues, types of attacks.

UNIT II: Cryptography Techniques

Introduction, plain text and cipher text, substitution technique ,Caesar cipher, modified version of Caesar cipher, Homophonic substitution cipher, Polygram substitution cipher, Polyalphabetic substitution cipher, Playfair cipher, Hill cipher, transposition techniques, Rail-Fence technique. Simple Columnar transposition technique (basic technique), Simple columnar transposition technique with multiple rounds, Vernam Cipher (one-time pad). Steganography.

UNIT III: Symmetric Key Algorithms and AES

Algorithms types and modes, overview, of symmetric key cryptography, data encryption standard (DES), Advanced Encryption Standard (AES).

UNIT IV: Asymmetric Key Algorithms, Digital Signatures and RSA

Brief history of asymmetric key cryptography, overview of asymmetric Key cryptography RSA algorithm, Symmetric and Asymmetric key cryptography together, digital Signatures.

UNIT V: Network Security and Internet Security Protocol

Network Security, Firewalls and Virtual Private Networks: Introduction to TCP/IP, Firewalls, IP Security, Virtual Private Networks (VPN), Internet Security Protocols: Basic concepts, Secure Socket Layer (SSL), Transport Layer Security (TLS), Secure Hyper Text Transfer Protocol (SHTTP).

List of Practicals:

NA

Project:

NA.

Course Outcomes:

A. Students will able to manage different types of Computer attacks.

B. Students is capable to perform Cryptographic Techniques.
C. Students will able to perform Symmetric Key Algorithm and AES.
D. Students will able to perform Asymmetric Key Algorithm and Digital signature.
E. Students can perform different Nsetwork security actitivities.

Text Books:

1. *Network Security Essentials (Applications and Standards*,William Stallings*, Pearson Education.*
2. *Hack Proofing your network*, Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W. Manzuik and Ryan Permeh, *Wiley Dreamtech.*
3. *Cryptography and Network Security,* Atul Kahate, *Tata McGraw Hill.*

Reference Books:

1. *Network Security and Cryptography ,*Bernard Menezes, *CENGAGE Learning.*
2. *Network Security - Private Communication in a Public World* , Charlie Kaufman, Radia Perlman and Mike Speciner, *Pearson/PHI.*
3. *Cryptography and network Security,* Stallings*, PHI/Pearson.*
4. *Principles of Information Security,* Whitman, *Cengage Learning.*

Web Source:

1. https://www.vskills.in/certification/tutorial/basic-network-support/network-security/.
2. http://www.omnisecu.com/security/.
3. https://arxiv.org/abs/1412.6017.

Online Learning Sources:

1. https://www.udemy.com/courses/it-and-software/network-and-security/.
2. https://online.stanford.edu/courses/xacs255-network-security.

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
CA3CO21	Operations Research	4	0	0	4	4

Unit –I Introduction to Operations Research

Definition of Operations Research, Models of Operations Research, Scientific Methodology of Operations Research, Scope of Operations Research, Importance of Operations Research in Decision Making, Limitations of Operations Research.

Unit-II Linear Programming Problem

Introduction, Mathematical Formulation, Graphical method and Simplex method for solving Linear Programming Problem for two variables, Advantages and Limitations of Linear Programming Problem.

Unit –III Transportation Problem

Introduction, Initial Basic Feasible Solution (North West Corner Rule, Least Cost Method, Vogel's Approximation Method), Test for optimality by MODI Method (solution procedure without degeneracy)

Unit-IV Assignment Problem and Job Sequencing Problem

Assignment Problem: Introduction, Mathematical Model, Hungarian Method.
Job Sequencing Problem: Introduction, Johnson's rule for n jobs through two machines, Johnson's rule for n jobs through three machines.

Unit –V Game Theory

GameTheory: Introduction, Characteristics of Game Theory, Two Person Zero Sum Games, PureDominance Theory,Mixedstrategy(2×2, mx2),Graphical,Arithmetic andAlgebraicMethod.

Text Books:

1. P.K Gupta, D.S. Heera, *Problem in Operations Research, S.Chand and Co, 2007.*
2. J.K. Sharma, *Operations Research: Theory and Applications, Macmillan India Ltd.*

Reference Books:

1. H. A .Taha, *Introduction to Operations Research, Prentice Hall India, Seventh Edition, Third Indian Reprint 2004.*
2. V.K. Kapoor, *Operations Research Techniques for Management, Sultan chand andSons,Delhi.*
3. J.K. Sharma ,*Operations Research: Problems and solutions, Macmillan India Ltd.*
4. N.D.Vohra, *Quantitative Techniques in Management, Tata Mcgraw Hill, 2010.*

Web Source:

1. *nptel.ac.in/courses/112106134/1*
2. *nptel.ac.in/courses/112106131/1*
3. *nptel.ac.in/courses/111105039/15*

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
CA3EL01	Advanced Java	3	0	4	7	5

Course Objectives:

1. To understand and gain the fundamental knowledge of web programming.
2. To make the students aware of concepts of web programming.
3. To make the students cognizant of developing of programming skills.
4. To enhance student's ability of dealing with object oriented concepts.
5. To inspire students for innovative approach of technical skills in software development.

Pre-requisite : Basic knowledge of computer programming

Co-requisite : Not Applicable

Curriculum:

Unit-I Introduction to java Web-Development Program

An introduction to web Application, An introduction to java web programming, An introduction to java Web development, How to install and use Tomcat: how to get started with Tomcat, How to manually deploy and run a web application, How to work with Tomcat's Web Application Manager, Configuration issues. How to use the Netbeans IDE for advanced java applications.

Unit-II Introduction to Servlet

Introduction to Servlet, Servlet Architecture, Servlet Tasks, Servlet Packages, Servlet life cycle : init, service, doGet, doPost, destroy methods, servlet deployment. Servlet form data: get method, Post method. Reading form data using servlet, server HTTP request and response.

Unit-III Introduction to JSP

JSP: Introduction, uses, advantages, architecture, Processing. Flow of JSP, Elements of JSP: The Scriptlet, Declarations, Expression, Comments, Directives, Actions. JSP Implicit Objects. Control-Flow Statements: Decision-Making Statements, Loop Statements. JSP Operators, JSP Literals, JSP - Form Processing. Cookies

Unit-IV

Handling, Session Tracking, File Uploading, Handling Date, Page Redirecting, Auto Refresh, Standard Tag Library (JSTL), Java Beans: Introduction, Properties, Accessing JavaBeans, Accessing JavaBeans Properties, Accessing the Tag Body.

Unit-V Database connectivity with JSP

JDBC: Introduction, Drivers. Steps to connect to the database, Connectivity with MySQL using JDBC, DriverManager class, Connection interface, Statement interface, ResultSet interface, PreparedStatement Interface, ResultSetMetaData interface, DatabaseMetaData interface, CallableStatement.

List of Practicals:

1. Write the procedure to setup java environment.
2. Write the procedure to setup tomcat server.
3. Write the procedure of deploy and run a simple web application.
4. Write a program of servlet to generate a simple text.
5. Write a program to perform basic arithmetic operation using jsp.
6. Write a program to create a registration form using JSP.
7. Write a program to get data from one jsp page and print on other jsp page.
8. Write a program to generate plain text using java beans.
9. Write a program for session tracking.
10. Write a program for cookies handling.
11. Write a program to auto refresh a jsp page.
12. Write a program to connect your jsp page with database.
13. Write a program to insert records in database using JDBC.
14. Write a program to fetch records in database using JDBC.
15. Write a program to create login page and check your authentication from database.
16. Create a project in java using JSP and Servlet.

Course Outcome:

1. Students will understand the significance of web programming.
2. Students will gain awareness regarding urgency about the programming skills.
3. Student will attain knowledge regarding technical skills for web development.
4. The students will gain fundamental knowledge of the object oriented technology and web programming, which will help in any programming language.
5. Student will also be introduced by front-end and back-end software.

Text Books:

1. The Complete Reference Java 2, Naughton & Schildt, *Tata McGraw Hill*
2. JSP, Servlets, and MySQL, David Harms*, Wiley*

Reference Books:

1. Head First Servlets and JSP, Kathy Sierra, O'Reilly
2. Servlet and JSP: A Tutorial, Budi. Kurniawan, Brainy Software
3. Murach's Java servlets and JSP, Andrea Steelman, Murach

4. Tomcat: The Definitive Guide, Jason Brittain, Ian F. Darwin, O'Reilly Media, Inc
5. Java for the Web with Servlets, JSP, and EJB, Budi Kurniawan, Sams Publishing

Web Sources:

1. https://www.javatpoint.com/
2. https://www.edx.org/course/subject/computer-science/java

Open Learning Source:

1. http://nptel.ac.in/courses/106106147/
2. https://www.edx.org/course/subject/computer-science/java

Course Code	Course Name	Hours per Week			Total	Total
		L	**T**	**P**	**Hrs.**	Credits
CA3EL03	Advanced PHP	2	0	4	6	4

Course Objectives:

1. To provide knowledge about exception handling, uses of filters in PHP.
2. To provide knowledge about the file handling and PHP regular expression.
3. To provide knowledge about the cookies, session management and sending mail with PHP.
4. To provide knowledge about implement Ajax and Jquery with PHP.
5. To enable the students to integrate MySQL with PHP, Ajax and jQuery.

Prerequisites: Basics of PHP Programming

Co-requisites: Nil

Curriculum:

Unit-I Exception Handling and PHP Filters

Using Exception Handling: handling PHP exception with try, throw and catch blocks, use of finally, how to create custom exception Class, exception handling with multiple catch block, throwing exception multiple times, using default exception. PHP Filters: Introduction to filters uses of filters.

Unit-II Working with File and Directories

Handling files and directories in PHP, opening and closing a file, coping, renaming and deleting a file, fetching information from files, uploading and downloading files, understanding file & directory. String matching with Regular Expression: What is regular expression, pattern matching in PHP, replacing text splitting a string with a regular expression.

Unit-III Cookie, Session Management and PHP Email function

Cookies: Introduction to cookies, cookie syntax, how to create a cookie, storing data in cookies, how to retrieve a cookie value, how to delete a cookie.
Session: Introduction to session, creating sessions, storing a session variable, destroying a session.
Email**:** Email background, internet mail protocol, structure of an email message, sending email with PHP.

Unit-IV Introduction to AJAX and JQuery

Introduction to Ajax, features of Ajax, Ajax request, Ajax Response, Ajax events, how Ajax works with PHP. JQuery: Introduction to jQuery, features of jQuery, uses of jQuery library function, basics of jQuery, jQuery selectors, attributes, traversing, events handling.

Unit-V Integrating PHP, Ajax and JQuery with MySQL database.

Integrating PHP forms with database using session, integrating PHP, Ajax, jQuery with mysql, retrieve data from database using Ajax, using Jquery, Ajax and PHP to fetch data from a mysql database.

List of Practical's :

1. Write a program to handle exception in PHP.
2. Write a PHP program for creating custom exception handler.
3. Write a PHP program for Re-throwing exceptions.
4. Write a program to implement filters in PHP.
5. Write a PHP program to open and close a file.
6. Write a PHP program to perform various operations on file such as coping, renaming, deleting and fetching information from file.
7. Write a program to upload and download a file in PHP.
8. Write a program to implement regular expression in PHP.
9. Write a program to split string into array by regular expression.
10. Write a program to create cookies and store data in cookies.
11. Write a program to retrieve cookies value and delete cookies.
12. Write a program to create session and store session value.
13. Write a program to destroy session.
14. Create PHP login form with session.
15. Write a program to sending email with PHP.
16. Write a program to use Ajax in PHP form submitting.
17. How to insert and retrieve data from database using Ajax.
18. Write a program to use Ajax in PHP with Jquery.
19. Write a program to retrieve data from database in PHP using Ajax.
20. Create PHP form connects with database using session.
21. Write a program to fetch data from database using Jquery, Ajax and PHP.

Project:

Minor Project using Advanced PHP.

Course Outcomes:

A. Students will be able to handle exceptions and understand filters in PHP.
B. Students will be able to perform file handling and also aware about uses of regular expressions in PHP.
C. Students will be able to manage cookies and sessions in PHP and also able to sending email with PHP.
D. Students will be able to perform Ajax and Jquery with PHP.
E. Students will be able to implement Ajax, Jquery and PHP with MySQL database.

Text Book:

1. PHP 5.2 The Complete Reference, Steven Holzner, Tata McGraw-Hill Education.
2. PHP6 and MySQL Bible, Steve Suehring, Tim Converse and Joyce Park, wiley.
3. Advanced PHP Programming, George Schlossnagle

Reference Books:

1. PHP Advanced and Object-Oriented Programming: Visual Quickpro Guide, Peachpit.
2. Programming PHP, Rasmus Lerdorf, Kevin Tatroe and Peter MacIntyre, O'Reilly Media, Inc.
3. Beginning PHP, Apache, MySQL Wen Development, Glass A Michael, John Wiley & Sons.
4. PHP and MySQL Web Devlopment, Welling Luke and Laura Thomson, Sams Publishing.
5. AJAX Black Book, Kogent Solution.
6. PHP Web Services, Wrox Publication.

Web Source:

1. https://www.w3schools.com/php/default.asp
2. http://php.net/manual/

Open Learning Source:

1. https://www.siliconindia.com/online_courses/
2. https://www.coursera.org/learn/web-applications-php

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
CA3EL05	Information Security	4	0	0	4	4

Course Objective:

i. Developing an ability to understand security requirements of a given network or internet-work.
ii. Conceptualizing a simple but effective solution to reasonably secure a given network or internet-work.
iii. Configure a simple network for ensuring required level of security.
iv. Analyze a given network security system's.
v. Understanding o the importance and application of each of confidentiality, integrity, authentication and availability.

Prerequisites : Basic knowledge of Security.

Co-requisites : Nil

Curriculum:

Unit-1 Computer Security and Cryptography

Introduction, Need for security, Principles of Security, Types of Attacks

Cryptography : Plain text and Cipher Text, Substitution techniques, Caesar Cipher, Mono-alphabetic Cipher, Polygram, Polyalphabetic Substitution, , Hill Cipher, Transposition techniques

Unit 2 Symmetric Ciphers

Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Simplified DES, Data encryption standard (DES), The strength of DES, Differential

and Linear Cryptanalysis, Block Cipher Design Principles and Modes of Operation, Evaluation Criteria for Advanced Encryption Standard, The AES Cipher.

Unit-3 Principles of Public-Key Cryptasystems

Principles of Public-Key Cryptasystems, The RSA algorithm, Key Management, Diffie - Hellman Key Exchange, Elliptic Curve Arithmetic, Authentication functions, Hash Functions.

Unit-4 Digital signatures

Digital signatures, Authentication Protocols, Digital Signature Standard, Diffie-Hellman Key Predistribution, Kerberos, Diffie-Hellman Key Exchange

Unit-5 Web Security Consideration

Web Security Consideration, Security socket layer (SSL) and Transport layer security, Secure Electronic Transaction, Firewalls Design Principles, Trusted Systems.

Text Books:

1. Network Security Essentials, William Stallings, Pearson Education
2. Cryptography and Network Security, Atul Kahate, Tata McGrawHill
3. Cryptography: Theory and Practice, Douglas Stinson, CRC Press, CRC Press LLC

Reference Books:

1. Cryptography and Network Security, William Stallings, Pearson Education
2. Network Security and Cryptography, Bernard Menezes, CENGAGE Learning
3. Principles of Information Security, Whitman, Cengage learning
4. Cryptography and Network Security, Frouzan, Tata McGrawHill

Course Outcomes

1. Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.
2. Ability to identify information system requirements for both of them such as client and server.
3. Ability to understand the current legal issues towards information security.

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
CA3EL06	Python Programming	2	0	4	6	4

Course Objectives:

1. A general understanding of Python programming.
2. Students will learn how to make programs and work in Python.
3. Students will understand the gain on basic skills of Python programming skills.
4. Students will understand the popular Python functions, modules with examples.

Prerequisites: Basic knowledge of programming skills.
Co-requisites: Nil
Curriculum:

Unit-I Introduction to Python

Introduction to Python, History, Features, Installation, command interpreter, working on Jupyter Notebook, Application of Python, Python 2/3 differences, Basic Syntax, Basic program structure-quotation and indentation, Variable, fundamental data types, Operators.

Unit III: Data Types

Lists: Introduction, Accessing list , Operations, Working with lists, Function and Methods.

Tuple: Introduction, Accessing tuples, Operations, Working Functions and Methods

Dictionaries: Introduction, Accessing values in dictionaries, working with dictionaries, Properties, Functions

String: Accessing Strings, Basic Operations, String slices, Function and Methods

Unit-III Python Program Flow Control

Conditional blocks using if, else and elif, for loops in python, for loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else, Programming using Python conditional and loops block

Unit-IV Python Functions and Modules

Functions: definition and use, Arguments, Block structure, scope, Recursion, argument passing, organizing python codes using functions

Modules: Organizing python projects into modules, Importing own module as well as external module, Importing module, Math module, Random module, time.

Unit V: Input-Output and Exception handling

Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files.

Exception Handling: Exception, Exception Handling, Except clause, Try except finally clause, raise, User Defined Exceptions

List of Practicals

1. Write the steps to install and run python in windows or ubuntu operating system
2. Write a program to print Hello world!
3. Write a program to define variables in python and print the type of variables.
4. Write a program to print an Inverted Star Pattern.
5. Write a program to Count Number of Lowercase Characters in a String.
6. Write a program to add a Key-Value Pair to the Dictionary.
7. Write a program to Concatenate Two Dictionaries into One.
8. Write a program to Check if a Given Key Exists in a Dictionary or Not.
9. Create a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old.
10. Take a list, say for example this one: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] and write a program that prints out all the elements of the list that are less than 5.
11. Create a program that asks the user for a number and then prints out a list of all the divisors of that number.
12. Take two lists, say for example these two: a = [1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89] b = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13] and write a program that returns a list that contains only the elements that are common between the lists (without duplicates). Make sure your program works on two lists of different sizes.
13. Write a program to Check if a String is a Palindrome or Not.
14. Write one line of Python that takes this list a and makes a new list that has only the even elements of this list in it.
15. Make a two-player Rock-Paper-Scissors game. (Hint: Ask for player plays (using input), compare them, print out a message of congratulations to the winner, and ask if the players want to start a new game)
16. Generate a random number between 1 and 9 (including 1 and 9). Ask the user to guess the number, then tell them whether they guessed too low, too high, or exactly right.
17. Ask the user for a number. Depending on whether the number is even or odd, print out an appropriate message to the user.
18. Write a program for Addition of Two Numbers.
19. Write a program to check whether a number is prime or not.
20. Write a program to find the Factorial of a Number.
21. Write a program to read a Number n and Print the Natural Numbers.
22. Write a program that takes a list of numbers (for example, a = [5, 10, 15, 20, 25]) and makes a new list of only the first and last elements of the given list.
23. Write a program that asks the user how many Fibonnaci numbers to generate and then generates them
24. Write a program (function!) that takes a list and returns a new list that contains all the elements of the first list minus all the duplicates.
25. Write a program (using functions!) that asks the user for a long string containing multiple words. Print back to the user the same string, except with the words in backwards order.
26. Write a password generator in Python. Be creative with how you generate passwords - strong passwords have a mix of lowercase letters, uppercase letters, numbers, and symbols. The passwords should be random, generating a new password every time the user asks for a new password.

Project:
Optional.

Course Outcomes:

A. Students will be able to program in python .
B. Students will be able to learn Python.
C. Students will be able to use popular Python Language.

Text Books:

3. *Programming & Problem solving with Python*, Ashok Namdev Kamthan, McGraw-Hill Education
4. *Introduction to Computing and Problem solving using Python*, E-Balagurusamy, McGraw-Hill Education
5. *A Byte of Python*, Swaroop C. H.

Reference Books:

8. *Python Multimedia*, Ninad Sathaye, Packt Publishing.
9. *The Python Language Reference Manual,* Guido van Rossum, and Fred L. Drake, Network Theory Ltd..
10. *Python Pocket Reference,* Mark Lutz, O'Reilly Media.
11. *Python 2.1 Bible,* Dave Brueck and Stephen Tanner, John Wiley Publications.
12. *Python Programming Blueprints,* Daniel Furtado, Marcus Pennington, Packt Publishing Ltd..

Web Source:

http://www.swaroopch.com/notes/python

Open Learning Source:

http://nptel.ac.in/courses/106106145/

https://www.edx.org/learn/python

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
CA3EL07	**Object Oriented Analysis and Design**	4	0	0	4	4

Course Objectives:

1. A general understanding of unified process model and UML diagrams.
2. Understanding of requirement analysis for problem domain using UML concepts.
3. Understanding of runtime environment for problem domain using UML concepts
4. Understanding of software design and Modular Design using coupling and cohesion
5. Understanding of developing a reusable software design.

Prerequisites :
1.Knowledge & understanding of Object Oriented concepts.
2.Knowledge & understanding of software engg. concepts.
Co-requisites : Nil
Curriculum:
Unit-I Introduction to OOAD
Complexity in Traditional Systems, What is OOAD, What is UML, What are the Unified process (UP) phases, Inception -Use case Modeling, Relating Use cases – include, extend and generalization.
Unit-II Static Modelling
Elaboration, Domain Models, Finding conceptual classes and description classes, Associations, Attributes, Domain model refinement, Finding conceptual class hierarchies, Aggregation and Composition
Unit-III Dynamic Modelling
System sequence diagrams - Relationship between sequence diagrams and use cases ,
Logical architecture and UML package diagram, Logical architecture refinement - UML class diagrams, UML interaction diagrams, UML activity diagrams and modeling, UML state diagrams and modeling - Operation contracts- Mapping design to code -UML deployment and component diagrams

Unit-IV Design Patterns
GRASP: Designing objects with responsibilities, Creator, Information expert ,Low Coupling,Controller, High Cohesion, Designing for visibility, Applying GoF design patterns –adapter, singleton, factory and observer patterns.
Unit-V Case Studies
Satellite Based Navigation, Traffic Management, Weather Monitoring Station , Library Management System, Point-of-sale, ATM machine

List of Practicals:
Not Appicable.
Project:
Optional.

Course Outcomes:

A. Students will be able to apply unified process model.
B. Students will be able to create use case documents that capture requirements for a software system..
C. Students will be able to build a model for the user interface (UI) of a software application
D. Students will be able to use design methodology and effective modular design.
E. Students will be able to measure the level of user satisfaction and software quality assurance.

Text Books:

6. *Object-Oriented Analysis and Design with Applications*, Grady Booch, Robert A. Maksimchuk, Michael W. Engle, *Addison-Wesley Professional.*
7. *Applying UML and Patterns*, Craig Larmen, *Prentice Hall.*

Reference Books:

13. *Object-Oriented Modeling and Design with UML*, Micheal Blaha, James Rambaugh, *Prentice Hall of India Private Limited*
14. *Object Oriented Systems Development*, Ali Bahrami, *McGraw Hill Education.*
15. *Head First Object-Oriented Analysis and Design*, Brett McLaughlin, *O'Reilly Publication.*
16. *Design patterns: Elements of Reusable object-oriented software*, Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, *Addison-Wesley Professional.*

Web Source:

4. https://www.tutorialspoint.com/object_oriented_analysis_design/
5. https://www.gofpatterns.com/design-patterns/module2/
6. https://www.smartdraw.com/class-diagram/

Open Learning Source:

1. http://nptel.ac.in/courses/106105153/

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Syllabus

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
CA3EL13	Linux & Shell Programming	3	0	4	7	5

Course Objectives:

1. To introduce Linux and Unix operating system with Kernel and Shell.
2. To introduce Linux basic and simple filter commands.
3. To learn about general system administration process and advance filter commands of Linux.
4. To introduce them about shell programming in Linux.
5. To gain the knowledge about setting of Networking and system communication in Linux Operating system.

Prerequisites: Concept of Operating system and Networking .
Co-requisites: Nil
Curriculum:

Unit- I Introduction of LINUX

Definition of Operating System, Evolution of operating system,Types of Operating System, History of Unix, Introduction of Unix and Linux, Features of Linux, Basic Architecture of Unix/Linux, Shell and its type, Features of Kernel and Shell, Linux Installation.

Unit - II Linux Commands for files and directories

Linux Internal commands: cal, cd, ls, cp, mv, rm, mkdir, rmdir, pwd, file, more, less, creating and viewing files using cat, file comparisons – cmp & comm, View files, disk related commands, checking disk free spaces. System startup and shut-down process, init and run levels. connecting processes with pipes, tee, Redirecting input output, manual help, Background processing, managing multiple processes, changing process priority with nice, scheduling of processes at command, cron, batch commands, kill, ps, who, sleep, Printing commands, find, file related commands-ws, sat,dd.

Simple filter commands – pr, head, tail, cut, paste, sort, uniq, tr.

Unit - III General User Administration and advance filter command

Introduction to system administrator, Understanding the root account, Becoming a Superuser (su), Essential system administrative Tools and Techniques, Managing user accounts - Adding a new user, Modifying and Removing User accounts, Changing Password, System monitoring and logging.

Advance filter commands – grep, egrep, and sed, awk.

Unit IV Shell Programming

Vi editor, shell command line processing, shell script features, executing a shell script, system and user-defined variables, expr command, shell screen interface, read and echo statement, command substitution, escape sequence characters, shell script arguments, positional parameters, test command, file test, string test, numeric test.

Conditional Control Structures-if statement, case statement, Looping Control Structure-while, until, for, Jumping Control Structures – break, continue, exit.

Unit - V Networking and system communication

Network management in Linux, The rules governing IP address classes , Network Address, configuring Interface with ifconfig, ping, traceroute, TELNET, FTP, Domain Name System, Distributed File System.

System Communicationin Linux, write, read, wall commands, sending and handling mails, System Administration in Linux, Roles of a System Administrator, File System Maintenance, System Startup and Shutdown, User Management, Backup and Restore.

List of Practicals:

1. Practical of LINUX basic commands:
   (cal, date, echo, printf, bc, script, mailx, passwd, who, uname, tty, stty, pwd, cd, mkdir, rmdir, ls, cat, cp, rm, mv, more, file, wc, od, cmp,comm, diff, chmod, vi)
2. Practical on Simple and advance filter command .
3. Write a Script to print "hello world".
4. Write a shell script to exchange the contents of two variables.
5. Write a script to study local variables.
6. Write a script to study if...else.
7. Write a script to study for, while and until.
8. Write a script that finds the prime factors of a given number.
9. Write a shell script to print integer numbers from 1 to 20.
10. Write a script to check if the two strings are same or not.

Project:
Minor Project using Linux and shell programming.

Course Outcomes:

F. Students will able to perform Linux installation process.
G. Students is capable to execute different Linux basic and simple filter commands .
H. Students will able to perform general system administration task and execute Advance filter commands of Linux.
I. Students will able to perform different complex problems using shell programming.
J. Students can perform different networking actitivities and system communicatin task in Linux.

Text Books:

4. *Beginning Linux Programming, Neil Methew,Richard Stones, Willey India.*
5. *User Mode Linux*, JEFF DIKE, *Prentice Hill.*

Reference Books:

5. *Introduction to Linux A Hands on Guide for beginners ,* Machtelt Garrels, *LDP*.
6. *LINUX NETWORK ADMINISTRATOR'S GUIDE*, OLAF KIRCH & TERRY DWASON, *O'reilly*
7. *Linux Command Line and Shell Scripting BIBLE* ,RICHARD BLUM *& CHRISTINE BRESNAHAN , Willey India.*

Web Source:

4. https://www.cs.clemson.edu/course/cpsc424/material/TCP%20UDP%20Services/etc-services.pdf.
5. http://www.nwds-ak.com/Web-Resources/Linux-Commands.
6. https://community.denodo.com/docs/html/browse/6.0/vdp/developer/access_through_odbc/configuration_of_the_odbc_driver_in_linux_and_other_unix/set_up_a_dsn_on_linux_and_other_unix

Online Learning Sources:

3. http://www.mattcurry.com/linux/unix/
4. https://www.networkworld.com/article/3185826/linux/how-to-learn-unix-linux.html
5. http://nptel.ac.in/courses/117106113/

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
CA3EL14	Big Data Analytics	4	0	2	6	5

Course Objectives:

1. To understand Data Analytics Life Cycle and Business Challenges
2. To understand Analytical Techniques and Statically Models
3. To understand Statically Modelling Language

Prerequisites : Data Mining, Knowledge of probability theory, statistics, and programming

Co-requisites : Basic Mathematical Skills and programming skills.

Curriculum:

UNIT I : INTRODUCTION TO BIG DATA

Introduction to Big Data Platform, Challenges of Conventional Systems, Nature of Data, Definition of Big Data, Big data characteristics & considerations**,** Analytic Processes and Tools. Business Intelligence, Decision Support Systems, Data Warehousing.

UNIT II : BIG DATA ANALYTICS

Big data analytics, Drivers of Big data analytics, Big Data Stack, Typical analytical architecture, Virtualization & Big Data, Virtualization Approaches, Business Intelligence Vs Data science, Applications of Big data analytics.

UNIT III : DATA ANALYTIC LIFECYCLE

Need of Data analytic lifecycle, Key roles for successful analytic projects, various phases of Data analytic lifecycle: Discovery, Data Preparation, Model Planning, Model Building, Communicating Results, Operationalization.

UNIT IV : HADOOP

History of Hadoop, Installation of Hadoop, the Hadoop Distributed File System, Components of Hadoop, Analysing the Data with Hadoop, Design of HDFS, Java interfaces to HDFS Basics. Developing a Map Reduce Application, How Map Reduce Works.

UNIT V : FRAMEWORKS

Frameworks: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams.

List of Practicals:

1. Installation of single cluster Hadoop.
2. Building Hadoop MapReduce Application for counting frequency of words/phrase in simple text file.
3. Implement the following file management tasks in Hadoop:

a. Adding files and directories
b. Retrieving files
c. Deleting files

4. Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented. Data available at: https://github.com/tomwhite/hadoopbook/tree/master/input/ncdc/all.
   a. Find average, max and min temperature for each year in NCDC data set?
   b. Filter the readings of a set based on value of the measurement, Output the line of input files associated with a temperature value greater than 30.0 and store it in a separate file.
5. Install and Run Pig.
6. write Pig Latin scripts to sort, group, join, project, and filter your data.
7. Install and Run Hive.
8. Use Hive to create, alter, and drop databases, tables, views, functions, and indexes.
9. Install, Deploy & configure Apache Spark Cluster.
10. Run apache spark applications using Scala.
11. Data analytics using Apache Spark on Amazon food dataset, find all the pairs of items frequently reviewed together.
    - Write a single Spark application that:
      - Transposes the original Amazon food dataset, obtaining a PairRDD of the type: <user_id> → <list of the product_ids reviewed by user_id>
      - Counts the frequencies of all the pairs of products reviewed together
      - Writes on the output folder all the pairs of products that appear more than once and their frequencies. The pairs of products must be sorted by frequency.

Project:
Optional.
Course Outcomes:

A. Preparing for data summarization, query, and analysis.
B. Applying data modelling techniques to large data sets
C. Creating applications for Big Data analytics
D. Building a complete business data analytic solution

Text Books:

1. David Dietrich, Barry Hiller, Data *Science & Big Data Analytics*, Wiley publications.
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, *The Elements of Statistical Learning*, Springer, Second Edition.

Reference Books:

1. Carlo Vercellis, *Business Intelligence – Data Mining and Optimization for Decision Making*, Wiley Publications.
2. Seema Acharya & Subhashini Chellappan, *Big Data & Analytics*, Wiley Publications
3. DT Editorial Services, *Big Data (Black Book),* Dreamtech Press.
4. Jiawei Han and Micheline Kamber, *Data Mining: Concepts and Techniques Second Edition*, Morgan KaufMan Publisher.
5. Shiva Achari, *Hadoop Essentials*, Packt Publishing Ltd.

Web Source:

1. https://www.tutorialspoint.com/big_data_analytics/index.htm
2. https://data-flair.training/blogs/big-data-analysis-tutorial/

Open Learning Source:

2. https://www.tutorialspoint.com/big_data_analytics/index.htm
3. http://nptel.ac.in/courses/110106064/

Course Code	Course Name	Hours per Week			Total	Total
		L	**T**	**P**	**Hrs.**	Credits
CA3EL16	Cloud Computing	4	0	2	6	5

Course Objectives:

1. To provide knowledge about fundamentals and architecture of cloud computing.
2. To provide knowledge about cloud services.
3. To provide knowledge about cloud implementation.
4. To provide knowledge about the concept of virtualization.
5. To provide knowledge about security, standards and application of cloud computing.

Prerequisites: Basic Knowledge of Networking and DBMS

Co-requisites: Nil

Curriculum:

Unit-I Cloud Introduction

Cloud Computing Fundamentals: Evolution of cloud computing, Types of cloud, Cloud services: Benefits and challenges of cloud computing, Cloud Computing Architecture, Business models around cloud.

Unit-II Cloud Services

Types of Cloud services: Software as a Service, Platform as a Service, Infrastructure as a Service, Database as a Service, Monitoring as a Service, Communication as services. Service providers.

Unit-III Cloud Implementation

Cloud Implementation: Cloud Platforms: Amazon EC2 and S3, Cloud stack, Intercloud, Google App Engine, Collaborating via Web-Based Communication Tools, Evaluating Web Mail Services, Collaborating via Social Networks.

Unit-IV Virtualization for Cloud

Need for Virtualization, Pros and cons of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms, System VM, Process VM.

Unit-V Security, Standards, and Applications

Security in Clouds, Cloud security challenges, Software as a Service Security, Common Standards, The Open Cloud Consortium, Security Monitoring, Security Architecture Design Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control, Autonomic Security.

List of Practical's:

1. Create virtual machines that access different programs on same platform.
2. Create virtual machines that access different programs on different platforms.
3. Exploring Google cloud for the following
   a) Storage
   b) Sharing of data
   c) Manage your calendar, to-do lists
   d) Document editing tool
4. Exploring Microsoft cloud
5. Exploring Amazon cloud

Course Outcomes:

A. Students will be able to understand concept of cloud computing.
B. Students will be able to understand cloud services.
C. Students will be able to implement cloud on various platforms.
D. Students will be able to apply suitable virtualization concept.
E. Students will be able to apply security address the core issues of cloud computing such as security and privacy.

Text Book:

1. *Cloud Computing Bible,* Barrie Sosinsky*, Wiley*
2. *Enterprise Cloud Computing,* Gautham Shroff*, Cambridge.*
3. *Ubiquitous Computing: Smart Devices, Environments and Interactions,* Stefan Poslad*, By John Wiley & Sons, 2011.*
4. *Cloud Computing: A practical approach for learning and implementation,* A.Shrinivasan, J.Suresh*, Pearson.*
5. *Collaboration with Cloud Computing,* Ric Messier*, Syngress.*

Reference Books:

1. *Cloud Computing Principles and Paradigms,* Rajkumar Buyya, J.Broberg, A. Goscinski*,*

Wiley.
2. *Cloud Security: Comprehensive guide to Secure Cloud Computing,* Ronald Krutz*, Wiley*
3. *Cloud Computing,* Bloor R., Kanfman M., Halper F. Judith Hurwitz*, Wiley India Edition, 2010*
4. *Cloud Computing Implementation Management and Strategy,* John Rittinghouse & James Ransome, *CRC Press, 2010*
5. *A Practical Approach Cloud Computing,* Antohy T Velte*, McGraw Hill,2009*
6. *Web-Based Applications That Change the Way You Work and Collaborate Online,* Michael Miller

Web Source:

1. *webpages.iust.ac.ir/hsalimi/.../89.../Cloud%20Common%20standards.pptop ennebula.org,*
2. *www.cloudbus.org/cloudsim/, http://www.eucalyptus.com/*
3. *hadoop.apache.org*
4. *http://hadoop.apache.org/docs/stable/hdfs_design.html*
5. *http://static.googleusercontent.com/external_content/untrusted_dlcp/researc google.com/en//archive/mapreduce-osdi04.pdf*

Open Learning Source:

1. http://cloudcomputing.ieee.org/education-careers/online-courses

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
CA3SE07	**Software Testing**	4	0	0	4	4

Course Objectives:

1. To gain knowledge about Fundamentals of Testing
2. To gain knowledge of the white box testing
3. To gain knowledge of Configuration and Compatibility and User Interface Testing
4. To gain knowledge of Documentation, Security and Web Site Testing
5. To learn about automatic software testing and testing tools

Prerequisites : Nil
Co-requisites : Nil
Curriculum:

Unit-I Introduction to Software Testing

Motivation, Basic Terminologies, Testing based on Models and Criteria, testing Automation by JUnit. Testing Fundamentals: Types, Black Box, White Box, Static & Dynamic Testing. Static Black Box Testing. Dynamic Black Box Testing: Test to Pass & Test to Fail, Equivalence Partitioning, Data Testing, State Testing, Other Black Box Testing Techniques.

Unit-II White Box Testing

Static White Box Testing: Formal Reviews, Peer Reviews, Coding Standards and Guidelines. Review Check List.
Dynamic White Box Testing: Comparison with Debugging, Testing Pieces: Unit & Integration Testing. Data Coverage and Code Coverage.

Unit-III Applying Your Testing Skills

Configuration Testing: Deciding Hardware Configurations.
Compatibility Testing: Backward and Forward Compatibility. Testing Multiple versions, Data Sharing Compatibility
User Interface Testing: Effective UI, Testing for Disabled.

Unit-IV Documentation, Security and Web Site Testing

Types of Documentation, Importance of Documentation Testing. Security Testing: Threat Modelling, Buffer Overrun, Safe String Functions, Computer Forensics Web Site Testing: Web Page Fundamentals, Black Box Testing: Text, Hyperlinks, graphics, Forms. Gray Box Testing & White Box Testing, Configuration and Compatibility Testing.

Unit-V Test Automation

Testing Tools: Benefits of Automation and Tools. Test Tools, Software Test Automation. Random Testing: Monkeys & Gorillas. Bug Bashes & Beta Testing: Test Sharing, Beta Testing, Outsourcing. Planning Testing: Goals, Test phases, Strategy, Resource Requirements, Schedule, Test Cases, Bug Reporting, Metrics. Test Cases: Test Case

Planning, Design, Cases, Procedures, Organization and Tracking. Bug Life Cycle and Tracking System.

List of Practicals:
Not Appicable.
Project:
Optional.
Course Outcomes:

A. Students will be able to understand what a software bug is, how serious they can be, and why they occur.
B. Students will be able to test software to meet quality objectives and requirements.
C. Students will be able to apply testing skills to common testing tasks.
D. Students will be able to perform the planning and documentation of test efforts.
E. Students will be able to use testing tools to test software in order to improve test efficiency with automation.

Text Books:

8. *Software Testing*, Ron Patton, *Sams Publishing, Pearson Education*
9. *Software Testing Principle and Practices*, Srinivasan Desikan and Gopalaswamy Ramesh, *Pearson Education*

Reference Books:

17. *Software Testing Techniques*, Boris Beizer, *Van Nostrand Reinhold New York*
18. *Practical Software Testing*, Ilene Burnstein, *Springer International Edition*
19. *Foundations of Software Testing*, Aditya P. Mathur, *Pearson Education*
20. *Software Testing – Effective Methods, Tools and Techniques*, Renu Rajani, Pradeep Oak, *Tata McGraw Hill*
21. *Selenium Testing Tools Cookbook*, Unmesh Gundecha, *Published by Packt*

Web Source:

7. https://www.cs.drexel.edu/~spiros/teaching/SE320/index.html
8. https://www.softwaretestingmaterial.com/

Open Learning Source:

1. https://onlinecourses.nptel.ac.in/noc16_cs16/preview
2. https://www.coursera.org/courses?languages=en&query=software+testing

Course Code	Course Name	Hours per Week			Total	
		L	T	P	Hrs.	Credits
CA3SE10	**Mobile Application Development**	4	0	2	6	5

Course Objectives:

1. To provide knowledge on basics of Android Architecture along with history, OS, Enviroment.
2. To enable the students to work with Android Activity and GUI objects.
3. To enable the students to build mobile applications using advance UI programming.
4. To introduce the concept of Toast, Menu, Dialog and Adapters.
5. To explain the way of working with database using Android .

Prerequisites : Concept of Java Programming and Operating Systems.

Co-requisites : Nil
Curriculum:

Unit – I Introduction to Android OS Concepts

Introduction to Android Operating Systems, History of Android, Android Ecosystem, Features of Android, Android Architecture, Environment setup, Creating First Android Application, Execution process of Android Application.

Unit – II Android Activities and UI Design

Activity, Activity Lifecycle Expressions and Flow control, Simple UI -Layouts and Layout properties, Fundamental Android UI Design, XML Introduction to GUI objects viz.- Button, TextView, EditText, RadioButton, CheckBox, ListView, Spinner, ToggleButton, Manifest.xml.

Unit - III Advance UI programming

Event Driven Programming in Android (Text Edit, Button clicked etc.), Creating a Splash Screen in Android, Creating and Applying simple Style and Theme, Tabs and Sliders in android.

Unit - IV Menu, Dialog, Toast, Adapters

Introduction to Menu, Dialog, create an Alert Dialog, Toast in Android, Adapter, ArrayAdapter, CursorAdapter, SimpleCursorAdapter, Sending e-mail, sms and phone calls.

Unit – V Working with Database

Understanding of SQLite Database, Create a Database Using a SQL Helper, Put Information into a Database, Read Information from a Database, Delete Information from a Database, Update a Database.

List of Practicals:

1. Create "Welcome" application to show "Welcome App" in the middle of the screen in the White color with Red background.

2. Create an application to copy text from one EditText into another using button click. And concate string from two EditText to third EditText on button click

3. Develop a native calculator application.

4. Create and validate a login application using username without any digit if the username have a digit, login button must remain disabled.

5. Create a Login application and open a browser with any one search engine.

6. Write a program for linear Layout

7. Write a program for Relative Layout

8. Write a program having two activity.Enter Text in first Activity and it should be displayed in second Activity.

9. Write a program on user defined Dialog

10. Write a program on Alert Dialog

11. Create an application to change screen color as per the user choice from a Menu.

12. Write a program to show an image as splash screen ,during load of activity.

13. Write a program to desigen two RadioButton Male and Female ,whatever you will select it will be displayed on Toast.

14. Write a program to illustrate the use of CheckBox,Tabs DragDrop and ListView .

15. Write a mobile application that creates alarm clock

16. Create an application that will display toast (Message) at some regular interval of time.

17. Create an application that will have spinner with list of animation names. On selecting animation name, that animation should affect on the images displayed below.

18. Create sample application with login module.(Check username and password), validate it for login screen or alert the user with a Toast.

19. Create an UI listing the courses. If user selects a course, display the number of semesters and subjects in each course.

20. Create an Quiz and display the marks at the end of quiz.

21. Create an application to call a phone number entered by the user the Edit Text.

22. Create an application that will create database to store student record

23. Create an application to insert, update and delete a record from the database.

24. Create an login application and check the validity of username and password from the database

25. Implement an application that creates an alert upon receiving a message.

26. Use content providers and permissions by implementing read phonebook contacts with content providers and display in the list.

Project:
Optional.
Course Outcomes:
Students will be

A. Able to understand the concept of Mobile Application development Android OS,Android Architecture and its features .
B. Able to design Android UI Layout,to use Activity and work with GUI Objects
C. Able to Develop event driven programs and to use other advance features.
D. Able to Develop applications using menus,toast,adapters and dialog boxes.
E. Able to Develop application using SQlite.

Text Books:

1. *Android application development for java programmers*. James C. Sheusi. *Publisher: Cengage Learning*.
2. *Android Studio Development Essential,* Neil Smyth. *Publisher: ebookfrenzy.*

Reference Books:

1. *Android Programming (Big Nerd Ranch Guide)*, Phillips, Stewart, Hardy

2. and Marsicano *Publisher:Pearson Technology Group.*

3. *The Definitive Guide to SQL Lite* Michael Owens *publisher: Apress Pvt Ltd.*

4. *Android* by Prasanna Kumar Dixit *publisher: Vikas Publishing.*

5. *Android Programming – Pushing the limits* Hellman *Publisher: Wiley Pvt Ltd.*

6. *Beginning Android* By Mark L Murphy *Publisher: Apess pvt Ltd.*

Web Reference:

1. http://nptel.ac.in/courses/106106147
2. http://nielit.gov.in/delhi/

Reference of Open Learning Course:

1. https://developer.android.com/guide/index.html
2. http://docs.oracle.com/javase/tutorial/index.htm